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Integration Of Indian Knowledge Systems In Science Education Under NEP-2020

Dr. T. Ramesh Babu, K. Ganga Ravi Kiran, U. Pavan Kumar,
Palakuri Madhumathi

Associate Professor Of English, Department Of H&S, K.S.R.M. College Of Engineering, YSR Kadapa Dist. A.P.[1]
Assistant Professor Of English, Department Of H&S, K.S.R.M. College Of Engineering, YSR Kadapa Dist. A.P.[2]
Assistant Professor Of English, Department Of H&S, K.S.R.M. College Of Engineering, YSR Kadapa Dist. A.P.[3]
Junior Lecturer In English, Sri Y.S. Raja Reddy Government Junior College, Simhadripuram, YSR Kadapa Dist. A. P.[4]

Abstract
This chapter offers a conceptual analysis of how Indian Knowledge Systems (IKS) can be critically integrated into science education under India's National Education Policy 2020 (NEP-2020). Drawing on historical scholarship and current policy documents, it examines how traditional Indian contributions in mathematics (Sulbasutras, Pingala, Aryabhata), astronomy, metallurgy, Ayurveda, architecture, agriculture, and ecological practices can enrich mathematics, physics, chemistry, biology, and environmental science curricula without compromising scientific temper or empirical rigour. The chapter proposes an "observe–document–test–explain" pedagogical model, alongside strategies such as comparative history of science, local resource mapping, and laboratory reinterpretation of traditional practices, and outlines corresponding implications for teacher preparation and assessment reform. It further identifies key risks — pseudoscience, exaggerated historical claims, resource scarcity, and the neglect of tribal, folk, and regional (non-Sanskritic) knowledge — that must be managed for integration to remain evidence-based and pluralistic. The chapter argues that, implemented with academic rigour and critical pedagogy, IKS integration can make science education more contextually relevant, interdisciplinary, and socially grounded, producing students who are scientifically literate, culturally aware, and environmentally responsible.

Keywords: *Indian Knowledge Systems; NEP-2020; science education; interdisciplinary pedagogy; scientific temper; teacher education.*

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I. Introduction

NEP 2020 is significant in that it has highlighted the need for a holistic, multidisciplinary, skill-based, research-oriented, and India-centric approach to education. A crucial aspect of it is the focus on Indian Knowledge Systems (IKS) as a valuable part of the education. Indian Knowledge Systems encompasses India's age-old discipline of mathematics, astronomy, medicine, metallurgy, agriculture, architecture, ecology, linguistics, logic and philosophy, art and craft, community-based knowledge etc. Incorporating IKS in science education, through NEP-2020, is thus not only a cultural endeavour. It is a learning opportunity to increase the contextual, historically based, interdisciplinary, local relevance and ethical responsibility of science.

In India, science education has traditionally been a body of content with abstract facts, formula, definition and experiments from the textbook. Modern science is universal in approach and its validity, but learners learn better science when related to familiar examples, to the development of science, to local issues and to actual applications. NEP-2020 advocates for experiential learning and critical thinking, inquiry, creativity and lesser dependence on rote learnings (Ministry of Human Resource Development, 2020). Careful integration of Indian Knowledge Systems in science education can enhance these goals.

It is not to substitute tradition for modern science, that is why IKS has been introduced into science education. It is also not to be taken on faith all that is traditionally said. Instead, it is to juxtapose Indian scientific heritage, local knowledge, and traditional practices with modern scientific practices. For instance, students could learn ancient Indian maths and also learn modern proof and computation; they could learn traditional water harvesting techniques and analyse them from a hydrology point of view; they could learn about Ayurveda and evaluate it from a biological, chemical, and public health perspective; they could learn about traditional architecture and evaluate it from a physics, materials science, and climatic perspective; and they could learn about agricultural practices and evaluate them from an ecology and soil science perspective.

This chapter discusses the incorporation of Indian Knowledge Systems in science education in the context of NEP-2020. It covers the policy context, definition of IKS, the rationale for integration, potential areas of science curriculum, pedagogical approaches, assessment approaches, teacher preparation, research opportunities, challenges, and future directions. It suggests that with academic rigour, scientific temper, inclusivity and evidence-based pedagogy, IKS can be used to enhance science education.

II. NEP-2020 And The Vision Of Rooted Science Education

NEP-2020 is a vision to shift education in India from rote memorization to conceptual learning, from discipline-based learning to flexible learning, from the focus on individual disciplines to the focus on a whole child and from the focus on the child to the focus on the child's future. It focuses on the importance of building scientific temper, ethical reasoning, constitutional values, creativity and an understanding of India's rich heritage in education (Ministry of Human Resource Development, 2020). This establishes the right policy setting to include Indian Knowledge Systems in science education.

The focus of the policy on multidisciplinary is particularly pertinent. It is very common to teach science as a discipline isolated from history, philosophy, language, society and ethics. But there's no such thing as real science knowledge in isolation. Knowledge of science is made in cultural, technological, ecological and historical contexts. Teachers can relate modern science with the traditions of Indian scientific knowledge, so that students will understand the process of the development of knowledge based on observation, experiment, reasoning, debate and social need.

NEP-2020 also emphasizes on experiential learning, integration of art, integration of sports, vocational education, and local context. Such principles are suitable in the context of science education that is based on IKS, as many practices of the traditional knowledge are experiential and practice-based. The farmer knows soil and rainfall through the ages of observation. Artisans have knowledge of materials, heat, pressure, measurement and design by craft. Traditional architects know the climate, the ventilation, the geometry and the local materials with built environments. Healers and communities know about botanicals and ecology which can be critically examined in biology and chemistry. Hence, IKS can help in making science education more hands-on and relate it to community life.

The policy direction is further reinforced by the guidelines and suggestions provided by the University Grants Commission of incorporating Indian Knowledge in the higher education curricula, which instructs students to interact with Indian Knowledge through credit courses, disciplinary linkages, authentic sources, and research (University Grants Commission, 2023). In terms of science education, IKS cannot continue to be an optional or decorative theme. It needs to be integrated appropriately with physics, chemistry, biology, mathematics, the environment, engineering, health sciences, and technology education.

III. Knowledge Of Indian Knowledge Systems In Relation To Science

Indian Knowledge Systems are the collective intellectual, practical, artistic and scientific traditions of India. In the field of science education IKS encompasses formal textual knowledge, as well as oral, folk, tribal, craft based and community knowledge. It encompasses classic works in mathematics and astronomy, medicine and architecture, linguistics and logic, ecology and metallurgy, but also local practices, like the conservation of water, seed saving, traditional ways to process food, knowledge about herbs, weather forecasting, craft techniques, etc.

The scientific value of IKS is in its ways of observing, classification, measuring, experimenting, inferring and applying. For example, ancient Indian mathematics has had an influence on number systems, place value, zero, algebraic thinking, combinatorics and trigonometric ideas (Joseph, 2011; Plofker, 2009). Indian astronomy included systematic observations of the motion of planets, calendars, eclipses, and time measurement (Sarma, 2008). Although the claims of Ayurveda need to be evaluated in modern scientific terms before they could be used clinically, it did develop complex classifications of body, disease, diet, plants and treatment systems (Wujastyk, 2003). Traditional metallurgy led to the development of advanced iron and steel technologies such as famous corrosion-resistant Delhi iron pillar and wootz steel traditions (Srinivasan & Ranganathan, 2004).

Nevertheless, it has to be differentiated between historical knowledge, cultural knowledge, empirical knowledge, and scientifically validated knowledge in order to integrate IKS to science education. If it was a historic tradition, but hasn't been fully substantiated with modern science, a practice could still be historically important. There may be another practice that is scientifically valuable, but needs an up-to-date explanation. Certain claims can be symbolic, philosophical or ritualistic, not scientific. Science education should be about appreciation of heritage and it should demand evidence, repeatability, logical thinking, peer review.

This is a balance that safeguards science and tradition. It does not accept that the knowledge of the Indians is unscientific merely because it is traditional. It does so while at the same time preventing the uncritical glorification of the past. Therefore, integration of IKS should be a scientific temper and not affect it adversely. Pupils should be taught to ask: Where does this knowledge come from? What observations did it draw upon?

What was the issue it addressed? Can it be tested? What are its bounds? What does modern science say about it or what questions does it pose?

IV. There Are Four Reasons Why It Is Necessary To Integrate IKS In Science Education:

The incorporation of IKS in the science teaching and learning process is supported by some good arguments. Firstly, it helps to culture science. Science for many students is an alien, abstract, out-of-life experience. Students might have a stronger sense of ownership over science when tied to local technologies, traditional practices, and historical contributions from India, as well. This is particularly relevant in the post-colonial setting where there is a tendency for scientific knowledge to be seen in terms of western history only (Aikenhead, 1996).

Second, IKS integration counters balance historical imbalance. Science has been traditionally presented in terms of Greek, European and recent western achievements, with less emphasis on the contribution of India, China, the Islamic world, Africa and Indigenous societies. Incorporating Indian contributions in mathematics, astronomy, medicine, metallurgy, agriculture and ecology, students will get a more accurate and plural history of science. This is not to diminish the significance of modern-day science; it is simply to expand pupils' awareness of the formation of knowledge throughout civilisations.

Third, IKS can be used for interdisciplinary learning. In TK, boundaries between disciplines are often blurred. Geometrical, materials science, acoustics, astronomy, aesthetics and ritual space are all part of the process of temple architecture, for instance. Traditional agriculture is associated with biology, chemistry, meteorology, ecology, economics and community knowledge. Ayurveda is a science which includes Botany, Physiology, Chemistry, Psychology, Life style and public health. Examples like these enable students to recognize science as a cohesive body of knowledge, not a set of "compartments".

Fourth, IKS can be used to assist sustainability education. Examples of environmental science that are meaningful include traditional water harvesting, sacred groves, agroecology, biodiversity conservation, and local climate adaptation. Today's ecological issues are not just technologies but also local knowledge and the involvement of communities and moral moderation (Berkes, 2018). IKS can be used to help students link science with their environmental responsibility.

Fifth, IKS promotes inquiries and critical thinking. If taught well it does not require students to remember ancient claims. It requires them to make investigations, comparisons, tests and interpretations. Students, for instance, could experiment with traditional building materials to check for their cooling properties, experiment with different ways of filtering water or examine medicinal plants for phytochemicals, investigate the process of fermentation in Indian food or simulate ancient astronomical calculations. This kind of learning fosters curiosity and the spirit of science.

V. Mathematics Education: 5. Integration

Mathematics is one of the most effective areas for an integration of IKS. The mathematics of India has a great tradition with place value system, concept of zero, arithmetic methods, algebraic ideas, geometry, combinatorics, trigonometry and astronomical computation. Researchers like Plofker (2009) and Joseph (2011) have demonstrated the practical and theoretical nature of the Indian mathematics.

Indian mathematical examples can be used to make abstract concepts more interesting in the school education. They can learn about the evolution of numbers, the place value system in decimal numbers, prosodic patterns in Sanskrit, Combinatorics in Pingala's work, Geometric concepts in the construction of altars in Sulba Sutra Mathematics and Astronomical calculations in the works of Aryabhata and other mathematicians. These examples can be connected to current mathematics and not just as isolated history.

For instance, the Sulbasutras have some rules for making altars, which include approximate and change rules involving squares and rectangles. These examples can be used to discuss measurement, area, geometry, approximation and proof with the students. Pingala's theory of poetic metres can be used to acquaint with binary patterns, and combinatorial thought. The use of Aryabhata's astronomical calculations can be discussed for trigonometry, approximation and mathematical modelling. With due caution to the time being, Bhaskara's work can be connected with algebraic reasoning and calculus-like ideas.

Meanwhile, educators should steer clear of hyperbole. The idea is not that everything that we call mathematics today was already present in the ancient Indian scene. The goal is to demonstrate that Indian mathematicians did make significant contributions and that mathematical thinking evolved in the various cultural and practical requirements. It's a method that instills accuracy and pride.

VI. Integration In Physics And Astronomy Education

There are numerous ways of introducing the concepts of physics and astronomy into knowledge traditions from India. In the old and medieval Indian astronomy, the study of celestial phenomena was part of the observation, calendar making, prediction of eclipse, modelling of the planets, measurement of time, and trigonometric computation. The work of Aryabhata, Varahamihira, Brahmagupta and Bhaskara can be used to discuss the history of astronomy and mathematical modelling (Plofker, 2009; Sarma, 2008).

IKS examples can be used in Physics classrooms to teach measurement, motion, light, sound, heat, materials and energy. Examples of thermal comfort, ventilation, acoustics, load distribution and use of local materials are all available in traditional architecture. The gravity, pressure, fluid flow, evaporation and groundwater recharge are the factors in the Stepwells and in water systems. The vibration, resonance, frequency, pitch and harmonics can be explained by playing musical instruments like Veena, Tabla, Mridangam, Flute and Sitar. Classroom activities involving traditional metalwork or pottery can be used to teach concepts of heat transfer and phase change, strength and properties of materials.

Astronomy education can be particularly engaging when students relate their observations of the sky to calendars and seasons, agriculture and navigation. Rather than explicitly teach astronomy as a set of diagrams, teachers can invite students to observe the phases of the moon, constellations, shadows, sunrise, sunset and variations in seasons. These observations can be linked to the modern astronomy and to traditional calendars. This type of education fosters the respect of historical knowledge and scientific observation.

But it is essential to make a clear distinction between astrology and astronomy in the education of astronomy. The study of historical astrology is acceptable as part of cultural history, but education in science should be based on astronomical observations, with mathematical modelling and physical explanation. This distinction is important to ensure that scientific temper is not compromised, and to appreciate the history of the development of astronomy.

VII. Integration In Chemistry, Metallurgy, And Materials Science

There is another benefit of integration of IKS in the field of chemistry education. Some of the traditional Indian processes include metal working, dyeing, tanning, fermentation, manufacture of cosmetics, perfumery, medicine, pottery, glass-making, preservation of food and processing of textiles. The topics include the following chemical principles: oxidation, reduction, extraction, distillation, crystallisation, fermentation, pH, corrosion, alloys, pigments and thermal reactions.

The research of Indian metallurgy is of special significance. Advanced knowledge of materials is shown in the making of wootz steel, zinc distillation, bronze casting, iron technology, and iron structures that resist corrosion. India's metallurgical heritage has been discussed by Srinivasan and Ranganathan (2004) which include the traditions of High-carbon steel and the Delhi iron pillar. These can be used to illustrate that the history of chemistry (and materials science) has a long association with craft, trade, warfare, architecture and everyday life.

Natural dyes, Mordants, Solubility, Chemical Bonding and Environmental Chemistry can be taught through traditional dyeing and textile practices. The study of indigo dyeing, plant colours, organic dyes, turmeric, madder and lac can be explored using the aspects of sustainable materials and organic compounds. Microbes, enzymes, acids, gases and biochemical change can be explained with the help of fermented products like curd, idli, dosa, pickles, kanji, and local beverages. These examples help to make chemistry familiar and practical.

Laboratory-based IKS approach can involve using natural indicators like turmeric or hibiscus, comparing corrosion rates of metals, analysing the purification process of water, study the process of fermentation, extracting plant pigments or analysing the properties of clay and lime materials. These activities enable students to scientifically assess traditional practices. This is much better than just writing about a bunch of accomplishments from the past.

VIII. Integration In The Context Of Biology, Health And Life Sciences

IKS can be integrated into biology education in four ways: through traditional ecological knowledge, the traditional healing system of Ayurveda, food systems, biodiversity, agriculture, animal care, and the knowledge of medicinal plants. The communities of India have been using practical experience to classify plants, animals, soils, crops, seasons, and diseases. This information can be used to assist in studying taxonomy, ecosystem, adaptation, nutrition, microbiology, and human physiology.

The integration of Ayurveda is an important yet sensitive area. It also has a rich history of health, diet, lifestyle, herbs, disease classification and preventive care, both textually and actually (Wujastyk, 2003). In science education, Ayurveda should not be given the same status as biomedicine of the modern era. Rather, students may learn it historically and scientifically: Which plants are utilized? What chemicals are found in them? What do you believe to be true based on the evidence? Which do need further investigation? What are the potential side effects of non-tested treatments? What factors are involved in the impact of lifestyle, diet, sleep and environment on health?

Biodiversity is a great opportunity for learning about food systems. Idli, Dosa, Dhokla, Curd and Pickles can teach microbiology! There is a close relationship between millets and pulses, and nutrition, climate resilience and agriculture. Spices may be investigated in terms of Plant Defence Compounds, Antimicrobial Activity, Flavour Chemistry and Digestion. The traditional approach to seed conservation can be associated with genetics, biodiversity, adaptation and food security.

Local biodiversity studies can also establish links between IKS and the contemporary science. Students can create records of medicinal plants, sacred groves, local crops, pollinators, birds, insects, and water bodies. They can be able to conduct interviews with farmers, elders, gardeners, and forest communities, to compare local knowledge with scientific literature. This builds an appreciation of and the capacity to observe, document and analyse community knowledge.

IX. Outline Of Environmental Science And Sustainability Education

The subject of environmental science is a prime field where integration of IKS can be achieved. India has a long tradition of ecological practices like sacred groves, community forests, rain water harvesting, mixed farming, agroforestry practices, pastoral system, seasonal calendars and veneration of animals, trees and mountains. The traditions can assist students in understanding sustainability on the scientific and cultural level.

For instance, sacred groves can be researched as biodiversity reserves safeguarded by religious convictions and communal regulations. Sacred groves were recorded as important traditional conservation in India by Gadgil and Vartak (1975). This distinguishes the study of such groves, which can be done through ecology, botany, anthropology and conservation biology. Various traditional water harvesting technologies like stepwells, tanks, johads, baolis, ahar-pyne systems, bamboo drip irrigation and kunds can be explored with the aspect of hydrology, Geography, engineering and climate adaptation (Agarwal & Narain, 1997).

IKS environmental education can also tackle the contemporary issues like climate change, water scarcity, waste management, pollution and biodiversity loss. Students will get to learn about comparing traditional practices with current sustainability solutions. For instance, for rainwater harvesting, there can be a link with groundwater recharge; with traditional architecture, there can be a link with passive cooling; with millets, there can be a link with drought resilience; with local seed banks, there can be a link with genetic diversity; with community conservation, there can be a link with participatory governance.

This type of integration allows sustainability to have an emotional component. Students do not regard environmental protection as a slogan on the international level. Their eyes are open to local ponds, farms, forests, crafts, food, festivals, and community practices. This provides an opportunity to develop ecological responsibility and scientific awareness hand in hand.

X. Pedagogical Strategies For IKS Based Science Education

Pedagogy is essential to the success of the integration of IKS. IKS cannot be taught by rote memorisation, it will not achieve. The teaching of it must be by inquiry, experimentation, comparison, fieldwork, project study and critical discussion. This is supported by the experiential learning that is the key focus of the National Education Policy, 2020 (NEP-2020), which was released by the Ministry of Human Resource Development, 2020 (HRD).

A good approach to follow is the “observe, document, test, explain” approach. Students first watch a traditional practice they are interested in, for example: Rainwater harvesting, fermentation, herbal usage, natural dyeing, or clay cooling. They document the practice by taking photographs, taking measurements and notes, and interview the practice. They then use science procedures to investigate key features. Lastly, they interpret the findings in today's scientific terms and consider the cultural background.

Comparative history of science is another one of these strategies. In addition to Greek, Chinese, Islamic, European and modern global scientific contributions, teachers may introduce the contributions of the Indians to science. This assists pupils to consider science as a common human enterprise. It also eliminates cultural isolation and fosters a global scientific literacy.

Local resource mapping is a third approach. Students have the opportunity to chart the local water bodies, medicinal plants, soil type, crops, biodiversity, craft practices and knowledge of climate. This develops place-based science education. It also fosters respect of the local environment and communities.

Lab reinterpretation is a fourth strategy. Practical activities can be made to be laboratory activities. Scientific experiments can be performed on natural indicators, plant extracts, fermentation, metal corrosion, passive cooling, acoustic instruments, seed germination, soil testing and water purification. The focus should be on transitioning from claim to investigation.

XI. Assessment And Learning Outcomes

Assessment of science education learning based on the IKS approach should be assessed on scientific understanding and critical engagement. Students should not only be tested on knowledge of the names of ancient scientists or ancient texts. These should be evaluated on the basis of their inquiry skills, their use of evidence, their conceptual understanding, their documentation, their comparison and their reflection.

Examples of possible assessment methods are: project reports, laboratory notebooks, oral presentations, fieldwork diaries, portfolios, posters, models, experiments, and research essays. A student project on traditional water harvesting might be evaluated according to scientific explanations of water flow and recharge, scientific quality of the field documentation, the use of maps or measurements, a comparison with modern water harvesting systems, and reflection on the sustainability of the traditional water harvesting system. For a fermented food project, the understanding of microbes, variables affecting fermentation, safety, nutrition, and cultural context may be assessed.

Learning outcomes should cover the following: Identify examples of Indian scientific heritage, the scientific principles underlying selected traditional practices, differentiate between evidence-based and unverified claims, appreciate the history of science in India, conduct simple investigations, connect science to society and environment, and develop respect for diversity of knowledge. This is in line with the objectives of NEP-2020, which is to foster critical thinking, all-round development and cultural values that are Indian-based.

XII. Teacher Preparation And Institutional Support:

It is the teacher that plays a vital role in meaningful integration of IKS. If not well prepared, IKS can be superficial, ideological and/or untrue. The science teachers should be trained in history of Indian science, documentation of local knowledge, inquiry-based teaching methodology, multi-disciplinary approach to teaching and evaluation of traditional claims in scientific terms. They also require tailored resources, lab manuals, and field work guides, as well as access to experts.

Teacher education programmes should have a component covering the topics of IKS and science education. The aim for these modules should be to introduce to students' authentic sources, historical scholarship, local knowledge methods and classroom strategies. Teachers should know how to take difficult topics, not make it over exaggerated and should have scientific temper. Enriching teaching can be done with historians of science, Sanskrit scholars, local artisans, farmers, healers, engineers, and scientists.

Institutions also need support. Special corners for IKS in schools/colleges, archives of local knowledge, science heritage clubs, community field work programme and interdisciplinary seminars should be established. Courses on heritage of Indian science and technology, traditional ecological knowledge, science and civilisation, and sustainability based on IKS can be offered as elective courses at higher education institutions. Research centres can record, trial and reinterpret traditional practice in partnership with communities.

The projects of the UGC and IKS Division can be used for the development of the curriculum, orientation of faculty, internships, research projects, and digital repository. However, implementation to be academically challenging and inclusive. Science teaching is not the place for unverifiable claims or cultural superiority. It should evolve into a forum for appreciating India's knowledge traditions in an evidence-based manner.

XIII. Challenges In Integration

There are some challenges in the integration of IKS in science education. The first danger is that of pseudoscience. When it comes to traditional claims, students can get mixed up on what is scientific and what isn't if these traditional claims are made as if they are fact without evidence. This was to destroy scientific temper. All claims therefore need to be addressed using evidence, experiment, historical context, and critical reasoning.

Exaggeration is the second challenge. There are various popular stories that all science was already in existence in ancient India. It is needless and harmful to make such claims. India's scientific legacy is quite vast and not an exaggeration. The more accurate the history, the more people will trust it, and the more false claims, the more people will distrust it.

The third challenge is related to the lack of teacher training. Some teachers might want to implement IKS, but may not have materials or expertise in their discipline. If not trained, they will either avoid the subject or teach it very superficially. Professional development is thus a must.

The fourth challenge is diversity. Indian Knowledge Systems are not limited to being Sanskritic or textual. They entail tribal, folk, regional, craft, women's, agricultural and community knowledge. A narrow approach will exclude many holders of knowledge. The inclusive IKS integration should reflect India's plurality.

Assessment is the fifth challenge. Examinations that focus on memorisation will not enable teachers and students to give way to inquiry-based learning. Project, experiments, fieldwork, and critical analysis should be encouraged and for that some reforms in assessment is required.

The sixth challenge is between tradition and modernity. There may be people who worry that if IKS is integrated, the scientific quality will decrease, and others who would want to believe all the traditions. There is a balance between the two extremes: respect the tradition and test claims; respect heritage and adhere to scientific method.

XIV. Future Directions

The integration of IKS in science education is dependent on research, curriculum design, teacher preparation and institutional collaboration in the future. First, there needs to be more scientific work done on Indian scientific traditions with reliable historical and scientific techniques. Students and teachers require easily accessible and accurate materials.

Second, curriculum planners should align the topics of IKS with certain science concepts. For instance, natural dyes can be associated with organic chemistry, stepwells with water science, musical instruments with sound, traditional architecture with heat and ventilation, millets with ecology and nutrition, as well as astronomy texts with mathematical modelling, and metallurgy with materials science.

Thirdly, universities need to develop interdisciplinary courses with combination of science, history, philosophy, Sanskrit, regional languages, anthropology, and environmental studies. These courses can be used to train future teachers and researchers.

Fourthly, local communities should be engaged as knowledge partners. Farmers, artisans, healers, forest communities and traditional builders must not be treated as subjects of study. Their knowledge should be recorded responsibly, with their consent, respect and sharing benefits.

Fifth, IKS integration should be connected with innovation. Traditional knowledge can be the source for contemporary solutions in sustainability, health, agriculture, design and materials. Traditional buildings, for instance, can be a template for energy efficient building, traditional water systems can be a model for climate adaptation, and traditional food production can be a model for nutrition and resilience.

XV. Conclusion

The incorporation of Indian Knowledge System in science education under NEP-2020 is a great opportunity to transform science education into meaningful, inclusive, interdisciplinary and Indian experience-based science education. The integration of the scientific legacy of India with contemporary concepts in science can be a valuable addition to science education through IKS, which can be linked to local practices, ecology, craft, agriculture, medicine, mathematics, astronomy, and materials knowledge. It can enable students to experience Science as a dynamic process of enquiry, related to culture, community, environment, and human needs, rather than a foreign and abstract subject.

But this integration needs to be carried out with care. Traditional claims without evidence should not be accepted, and IKS should be used in place of modern science. The aim is to exchange the ideas of heritage and scientific method. Pupils should be taught to value the contribution of the Indians and to think critically, experiment and to have scientific temper. A sensible approach can prevent both negative cultural subjugation and over-idealized, uncritical glorification.

This transformation is supported by NEP-2020, which lays out the policy framework for such holistic, experiential, multidisciplinary and culturally rich education. With careful execution, inclusivity and teacher training, instructional practices that encompass the IKS can yield students who are scientifically literate, historically informed, environmentally conscious, and culturally competent. Such education can enable students to recite the knowledge systems of India and make use of them in a creative and critical manner to address contemporary scientific and social issues.

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