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Integrating IKS into Modern Higher Education and Research: An Analysis

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Abstract
Indian Knowledge Systems (IKS) are now being brought into mainstream higher education and research, and this marks a real change of direction toward teaching that is rooted in local culture, crosses disciplinary lines and treats learning as a whole. Taking the vision of NEP 2020 as its starting point, the paper looks at what it would take, in pedagogy, institutional structure and ways of knowing, to bring traditional Indian learning in astronomy, mathematics, medicine, agriculture and ethics into present-day curricula. It draws on policy initiatives, curriculum models and interdisciplinary research approaches to show how IKS can sharpen critical thinking, speak to global sustainability problems and widen the range of ways in which knowledge is produced. The paper also takes up the obstacles to implementation: the difficulty of translating old material into classroom teaching, the readiness of faculty, the absence of common standards, and the risk that traditional claims get read in a pseudo-scientific way. It concludes that IKS should be seen as a partner to modern science and not a replacement for it, and that a balanced approach can support innovation and research of high quality.

Keywords: Indian Knowledge Systems (IKS), Higher Education, NEP 2020, Interdisciplinary Research, Epistemology, Sustainable Innovation, Curriculum Design.

Introduction

For most of the twentieth century, and well into the twenty-first, education in India followed ideas and methods that came largely from the West. In recent years that has started to shift, as more people recognise the value of their own roots and indigenous heritage. Bringing Indian Knowledge Systems (IKS) into higher education and research is therefore more than a celebration of the past. It is also an attempt to find scientific and sustainable answers to some of the hard problems of the present.

IKS is a long-standing body of knowledge, thought and philosophy that has grown on the Indian subcontinent over thousands of years. It reaches across science, mathematics, astronomy, medicine (Ayurveda), architecture, grammar and literature, and also into social policy, politics and spiritual philosophy.

The tradition goes back to the Vedic period, but it was never confined to written texts. It survived through generations of shruti (learning by hearing and remembering) and through living memory traditions. At its centre is the aim of keeping the individual, society and nature in balance.

Interest in studying IKS afresh, and in placing it in today's context, has been growing in this century. Its holistic and forward-looking outlook offers useful ways of thinking about global challenges such as climate change, stress and inequality. NEP 2020 gives special weight to this knowledge (Government of India, 2020). Its hope is that young people will learn about their cultural roots and the scientific basis of ancient Indian knowledge alongside modern science and the arts.

Objectives: The study aims (i) to understand why the Indian Knowledge System matters, and (ii) to examine the part it can play in modern higher education and research.

Methodology: The paper is a review of existing literature on the importance and role of the Indian Knowledge System, and it follows a descriptive method. The data are secondary and come from books, journal articles, research papers and other published sources.

Concept of the Indian Knowledge System

The Indian Knowledge System is a very large store of knowledge, experience, art, science, philosophy and

technology that developed on the subcontinent across many centuries. Among the subjects it covers are Ayurveda, mathematics (for example the Shulba Sutras and the use of zero), astronomy, architecture (Vastushastra), water management, environmental science, metallurgy and linguistics.

Put another way, IKS records thousands of years of Indian civilisation, culture, scientific thinking and philosophical tradition. It has contributed in important ways to science, education, art, technology, literature and everyday life.

Features of the Indian Knowledge System

1. **A Holistic Approach:** IKS treats knowledge as a whole and not as separate pieces. Nature, human beings as well as the universe are seen as connected. Science, philosophy, art, social and political life and spirituality are not studied in isolation; they are taken collectively as the basis for a way of living.
2. **A Sustainable, Nature-friendly way of Life:** Balance with the natural world is a defining feature. In the older Indian tradition rivers, trees, mountains and animals were held sacred and were looked after. Ayurveda, traditional farming and water management are good examples.
3. **Oral Tradition and Shruti:** For a very long time knowledge passed from one generation to the next by word of mouth, in the shruti and smriti traditions. Careful methods of memorising the Vedas, Upanishads and Shastras, with exact pronunciation and rhythm, were developed, and these kept the knowledge intact for thousands of years.
4. **A Multidisciplinary Outlook:** The old Indian system did not put high walls between subjects. Learning vastushastra, for instance, called for some understanding of mathematics, physics, geography and astronomy, and Ayurvedic medicine drew on botany, chemistry and the care of the mind.
5. **Empirical and Practical Science:** IKS was not restricted to abstract ideas or metaphysics. It had a strongly practical side, which can be seen in several fields:
   i) **Mathematics and Astronomy:** the concept of zero, the decimal system, an approximate value of pi, and the calculation of solar and lunar eclipses (Plofker, 2009).
   ii) **Metallurgy:** ancient India had the technology to extract zinc and to make rust-resistant iron, as the Iron Pillar of Delhi shows (Balasubramaniam, 2002).
   iii) **Medicine:** the Charaka Samhita describes herbal medicine in detail, and the Sushruta Samhita does the same for surgery, including plastic surgery.
6. **Pluralism and Local Knowledge:** IKS does not have a single centre. Local traditional knowledge grew up in line with the geographical and cultural variety of different regions. From Assam one can point to handicrafts, the silk and jute industries, indigenous herbal medicine and rainwater harvesting.
7. **Linguistics and Computational Structure:** Grammar as well as linguistics reached a very high level in ancient India. Panini's Ashtadhyayi, the grammar of Sanskrit, is regarded by many scholars as an exceptionally ordered and almost mathematical model of language, and researchers have drawn comparisons between it and the formal methods used in computer science and artificial intelligence (Bhate & Kak, 1993; Kiparsky, 2009).

Principles of IKS

IKS rests on a handful of basic philosophical and scientific principles, which are discussed briefly below.

1. **Oneness and Interconnectedness:** The most significant principle of IKS is the unity of all creation and nature, humans, animals as well as the universe are strongly bound together. The phrase 'Vasudhaiva Kutumbakam' (the whole world is one family) is a eminent expression of this idea.
2. **Dharma:** Here dharma does not mean only a form of worship or membership of a community. It stands for the natural law, morality, social order and the duty to protect that hold the universe together. Its main purpose is to keep nature and society in balance.
3. **Ecological Sustainability:** IKS does not treat nature merely as something to be used. Nature is regarded as sacred. The guiding idea is to take from it only what is needed and to live without damaging it.
4. **An Integrated View of Knowledge:** IKS did not split knowledge into religious and scientific parts. Medicine, physics, mathematics, the arts as well as spirituality were joined together. Knowledge was gained mainly through three routes: direct perception, which is knowledge from experience as well as observation; inference, which is a conclusion reached by reasoning and analysis; and testimony, which is the word of a trusted and experienced person.
5. **Pragmatism and Experience:** Indian knowledge was never purely theoretical. It was strongly action-oriented (kriya-pradhan). Whether in medicine, agriculture, astronomy or metallurgy, each field placed weight on experiment and practical use.
6. **Context, Pluralism and Adaptability:** IKS is not fixed; it keeps moving. How principles and knowledge are used can change with time, place as well as circumstance. In the same way, it accepts that indigenous knowledge develops according to local geographical and social needs.

Results and Discussion

The need for IKS in modern higher education

Holistic Education: Western education systems often approach problems from separate, specialised angles. IKS offers a more holistic kind of education by linking science, art, philosophy and public affairs.

Other Ways of Solving Problems: Traditional knowledge and ecologically sensitive ways of living can help in meeting present-day challenges such as climate change, declining mental health and scarce resources.

Moving Beyond a Colonial Mindset: Preserving and practising indigenous knowledge can give students confidence in, and respect for, their own heritage.

Potential of IKS in research

Bringing IKS into modern research is not only a theoretical matter. It has a wide range of practical uses:

Medicine and Public Health: Preventive healthcare can be developed by combining Ayurveda and Yoga with modern medicine and genomics (Patwardhan, 2014).

Agriculture and Water Management: Older farming practices such as organic farming and rainwater harvesting can be applied in climate-resilient agriculture today.

Technology and Computer Science: The structure of Sanskrit grammar, especially Panini's Ashtadhyayi, is seen as a highly computational model that can inform work in artificial intelligence (AI) and natural language processing (NLP).
Sustainable Architecture: Traditional architecture and local building techniques can be used to design low-cost, climate-friendly housing.

Policy Initiatives and Implementation (National Education Policy 2020)
NEP 2020, the policy of the Government of India, gives special importance to IKS. Three of its provisions are worth noting.
A Multidisciplinary Approach: Students of science or commerce can also take IKS courses alongside their major subjects.
IKS Cell and Research Funding: An IKS Centre has been established under the Ministry of Education, and it funds basic research in this area.
Translation and Digitisation of old Writings: Knowledge held in palm-leaf manuscripts and other unpublished texts is being translated into modern languages and made available to researchers.

Role and Importance of the Indian Knowledge System in Higher Education
IKS has a large role to play in higher education. It enriches the present education system with indigenous wisdom, scientific heritage and human values, so that institutions do not have to depend only on Western models.

1. **Role of IKS in Higher Education**
   - **Interdisciplinary Curriculum:** IKS helps in building curricula that bring ancient Indian mathematics, astronomy, architecture and philosophy together with science, the social sciences, commerce and technical education.
   - **Multidisciplinary Research:** It encourages higher education institutions to test ancient manuscripts, medical practices (Ayurveda) and traditional technologies through scientific validation.
   - **Preservation and Digitisation:** With the help of modern information technology, palm-leaf manuscripts, oral knowledge and endangered arts can be preserved and made ready for study.
   - **Local Languages and Cultural Priorities:** IKS stresses sharing knowledge through local and regional languages, which makes higher education easier to follow and open to more people.

2. **Importance of IKS in Higher Education**
   - **Holistic, Value-based Education:** IKS supports character, morality, a sense of social responsibility and the mental growth of students, in place of education aimed only at a degree or a job.
   - **New Directions for Research and Innovation:** Traditional methods of treating disease, eco-friendly architecture and rainwater harvesting suggest alternatives that modern research can examine.
   - **Sustainable Development and Climate Solutions:** The old principle of using resources without harming nature matters a great deal at a time of global warming and frequent natural disasters.
   - **Cultural Pride and Decolonization:** Freed from a colonial mindset, students become aware of the richness of their country's history, science and culture, and can grow into self-respecting global citizens.
   - **Computer Science and AI:** The hierarchical structure of Panini's grammar is considered very useful for developing computational linguistics and AI.
   - **Local Economies and Indigenous Industries:** Scientific study of jute, silk, handicrafts, herbs and traditional farming in Assam and the North East can strengthen local industry and create jobs.

Role of the Indian Knowledge System in Research
IKS plays a key part in research in the following ways.

1. **Multidisciplinary Opportunities:** IKS brings technology, science, medicine, philosophy and the arts together, which makes it possible to compare ancient Indian theories with contemporary scientific views.
2. **Natural Medicine and Pharmacology:** Texts such as the Charaka Samhita and Sushruta Samhita can improve modern drug discovery, medicinal plant research and work on natural medicine.
3. **Environmental Sustainability:** Traditional knowledge about revering nature, sustainable agriculture and conservation can be applied to environmental science and climate research.
4. **Ancient Mathematics and Astronomy:** Studying the formulas of Aryabhata, Bhaskaracharya and Varahamihira can help keep the basic principles of ancient Indian mathematics and astronomy alive and useful in modern science.
5. **Architecture and Urban Planning:** Research on vastu shastra and on the construction of old forts and temples can suggest new approaches to natural light, ventilation and earthquake-resistant building.
6. **Ancient Metallurgy and Material Science:** Early Indian metallurgy, such as the Iron Pillar of Delhi and the Tamra Shastra, can be studied to understand old chemical processes and to develop modern methods of making durable products.
7. **Linguistics and AI.** Sanskrit grammar, particularly Panini's, is very regular and mathematical, and it can be put to wide use in research on AI, NLP and computing.
8. **Mental Health and Yoga:** Scientific research on yoga, meditation and pranayama supports modern medicine in promoting mental health, managing stress and developing mindfulness.
9. **Traditional Agriculture:** Studying old agricultural systems such as Vrikshayurveda, along with indigenous methods of saving seed, can lead to organic farming practices and new ways of improving soil fertility.
10. **Ethics, Philosophy and Governance:** Research in economics, ethics and Indian philosophy can help shape ethical and fair guidelines for management, political science and the global order.

Conclusion
Bringing Indian knowledge systems into higher education and research is not a journey backwards but a step forward. Joining earlier knowledge with present-day technology can help make India a knowledge-based economy, and it may also point the wider world toward a more secure and workable future.

Adopting IKS in current higher education and research honours the past, but it is also a forward-looking step for meeting the important challenges ahead. Combining long-standing practical knowledge with contemporary scientific approaches and technology can help build an education system that is inclusive, lasting and grounded in values. It can encourage researchers and students to produce world-class innovation rooted in indigenous knowledge, and so help India regain its distinct identity as a leader and guide in the welfare of humankind.

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