Propagation of Ancient Indian Knowledge through IKT Courses in Open Schooling

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Abstract

"Let's Go Back to Our Roots"

"Let's go back to Indianness and experience the richness of ancient Indian culture" is a call to rediscover and immerse ourselves in the profound heritage of India. It invites us to explore the long-standing customs, works of art, schools of thought, and knowledge that have shaped this country. The abovementioned quote encourages returning to the fundamentals and learning about the rich tapestry of Indian history and culture, which stands for spirituality, harmony in diversity, traditional arts, music, dance, cuisine, rituals, and philosophy like as yoga and Vedanta. India has always been viewed as having a rich and diversified knowledge legacy as it is the home of one of the oldest and most sophisticated civilizations in the world, including the Indus Valley civilization and the Vedic culture. The vibrant Indian method of living a life is made known to the entire world through the rich traditional practices of Ayurveda, meditation, and yoga. The ancient Indian sciences are incredibly helpful in today's times because of their timeless concepts, all-encompassing viewpoint, and ability to address modern challenges. This paper explores the diversity of ancient Indian knowledge and the necessity of incorporating it into the country's contemporary educational system. Additionally, it also describes NIOS's initiative to incorporate IKT subjects into the open school curriculum, which was prepared specifically for Indian open school learners. The major objective of introducing IKT subjects was to prepare citizens of tomorrow who are not only academically competent but also emotionally balanced, socially responsible, and environmentally sensitive. This paper was written with the goal of communicating best practices and increasing the general awareness of the numerous programmes provided by NIOS and encouraging more people to engage with it and utilize its resources.

Keywords: Indian Knowledge System, NEP 2020, NIOS, Open school curriculum, Open school Learners and Education System
Journal of Teacher Education and Research (2023). DOI: 10.36268/JTER/18206

Introduction

India is often referred to as a country with a rich and diverse knowledge tradition due to several reasons. The Indus Valley Civilization and the Vedic Civilization, two of the oldest and most developed civilizations in the world, originated in India. These ancient cultures achieved remarkable strides in a variety of scientific fields, aiding in their continued development and evolution. The huge body of knowledge and insight contained in ancient Indian science has been produced and amassed over many centuries (Murty, 2018). Due to their ageless principles, holistic approach, and capacity to address contemporary issues, the ancient Indian sciences have a prominent place in modern education. Early Indian scholars made pioneering contributions to fields like mathematics, astronomy, metallurgy, medicine, and architecture. About the beauty of Indian Vedant Knowledge, it is said:

भारतीयानां परं ज्ञानं महत्त्वं यत्र संश्रयः।
आद्याम् देवीमाहात्म्यं वेदाः प्राचीनकाः स्मृताः॥

The verse means that "The highest knowledge lies in India, where ancient scriptures and the great essence of Goddess reside. The Vedas and ancient texts illuminate this truth." Another verse states:

सर्वं ज्ञानं मयं वेद्यं, वेदान्तार्थैकचिन्मयम्।
आदित्यवर्णं तत्त्वं, यन्मूर्त्याद्याः प्रचक्षते॥

The meaning of this verse is that the knowledge which is gathered, is an exploration of consciousness, with the essence of Vedanta being the realization of pure consciousness. It likens this realization to the illuminating and pervasive nature of the sun that

enlightens all forms and manifestations. India has a long-standing tradition of Ayurveda, a system of traditional medicine that dates back thousands of years. Ayurveda is a holistic approach to healthcare, focusing on balance and harmony in the body and mind (Deshpande, 1997). Not only this, India is considered the birthplace of yoga, a system of physical, mental, and spiritual practices aimed at achieving spiritual awakening and self-realization. Yoga has gained immense popularity worldwide for its health and wellness benefits. Indian philosophy is diverse and includes various schools of thought such as Vedanta, Samkhya, Nyaya, and Jainism, among others. These philosophies have had a profound influence on thought and discourse globally. Further, India's significant contribution to mathematics and astronomy can never be ignored. Ancient Indian mathematicians devised the decimal system, zero as a placeholder, and the concept of infinity. Additionally, Indian astronomers made notable advancements in understanding celestial bodies and their movements. Furthermore, India has a vast literary heritage in various languages, including Sanskrit, Tamil, Hindi, and many others. This includes ancient epics like the Mahabharata and Ramayana, as well as the works of philosophers, poets, and playwrights. India's

cultural diversity contributes to a rich tapestry of knowledge, traditions, languages, art forms, and rituals. This diversity enriches the collective knowledge and understanding of humanity.

Due to its comprehensive and timeless approach to a variety of facets of life, ancient Indian knowledge is frequently seen as relevant and helpful to the present world. Ayurveda and yoga, which date back to ancient India, place an emphasis on a person's whole health by taking their physical, mental, and spiritual well-being into account (Deshpande, 1997). Natural and holistic approaches to wellbeing are gaining popularity in today's fast-paced environment. Yoga and meditation, which have their roots in traditional Indian practices, are widely known for fostering emotional harmony, stress reduction, and mental clarity. These techniques provide useful tools for managing stress and enhancing general mental well-being in contemporary society when mental health issues are common. In addition, traditional Indian philosophy, which has its roots in a symbiotic relationship with nature, promotes eco-friendly and sustainable living. The need for peaceful coexistence with the environment is highlighted by ideas like "Ahimsa" (non-violence) and "Prakriti" (nature), which are crucial viewpoints in the current sustainability movement. This historical knowledge base continues to inspire modern scientific research and advancements in many ways:

- Philosophical and ethical frameworks: Indian philosophical traditions like Vedanta, Jainism, and Buddhism provide deep insights into reality, ethics, morality, and the nature of the human situation. These philosophical frameworks can offer insightful direction for resolving challenging moral and ethical conundrums in the modern world.
- Spirituality and inner development: India's spiritual legacy includes a variety of routes to enlightenment and spiritual development. The spiritual practices and wisdom of ancient India provide direction and resources for inner development in a time when people are looking for deeper meaning and purpose.
- Interconnectedness and Unity in Diversity: Ancient Indian philosophy places a strong emphasis on unity in variety, encouraging respect, toleration, and collaboration amongst many cultures, religions, and philosophical viewpoints. This ancient concept of togetherness is essential for promoting harmony and peace in a globalized society with varied societies.
- Time-Tested Societal Norms: Ancient Indian culture was characterized by clearly defined institutions that promoted equality, justice, and social harmony. The ideas of "Dharma" (obligation) and "Karma" (activity) are still relevant today and provide insightful guidance for creating a just and equitable society.

National Education Policy (2020) and Indian Knowledge System

The development of logical reasoning, systematic investigation, and empirical observation were all highly valued in the ancient Indian scientific tradition. Additionally, it emphasized the value of reflection, introspection, and knowledge of human psychology. As vital as it is to recognize and value the contributions of ancient Indian science, it is also crucial to assess this knowledge in the context of its day and combine it with current scientific discoveries and critical thinking in order to address the problems of the modern world. The importance of traditional methods, knowledge systems, and old Indian sciences in the field of education is recognrecognizedised and emphasized by the recently launched Education poemphasizedlicy

i.e. National Education Policy (NEP) 2020. Additionally, NEP 2020 intends to develop an educational ecosystem that is founded in India's traditional knowledge, values, and wisdom systems, fostering a holistic and culturally enriching educational environment for students. The multidisciplinary approach promoted by NEP 2020 encourages the fusion of numerous fields, including Indian knowledge systems, the arts, sciences, humanities, and vocational studies. This strategy seeks to provide pupils a wider perspective and a deeper comprehension of several disciplines. The policy also emphasizes the inclusion of Indian philosophical, scientific, artistic, literary, and cultural traditions in all levels of curricula. The goal of this integration is to foster pride in India's traditions and heritage. NEP 2020 also places a strong emphasis on using and promoting Indian languages in the classroom. To maintain linguistic and cultural diversity, it promotes the inclusion of regional languages, literature, and cultural elements in the curriculum. According to the guidelines mentioned in NEP, the curriculum should include Indian arts, music, dance, theatre, and other kinds of culture. The goal of this integration is to encourage students' creativity, enjoyment of the arts, and sense of cultural identity.

NEP 2020 also recognizes the importance of indigenous practices and traditional knowledge systems including Ayurveda, Yoga, and meditation. In order to foster a more thorough understanding of health, well-being, and holistic living, it encourages the integration of these practices into secondary and higher education. The policy also promotes the teaching of Indian history, tradition, and culture in a more thorough and objective manner, taking into account a variety of viewpoints and contributions from many communities and locations throughout India. Not only this, the NEP also emphasizes the significance of ethical and value-based education. In order to instill in students a sense of social responsibility and ethical behavior, it urges the integration of Indian values, ethics, and moral teachings from many philosophies and traditions into the curriculum. Moreover, research and innovation that incorporates Indian knowledge, customs, and needs are encouraged by the policy. By advocating ideas with a strong Indian context, it aims to close the knowledge gap between academia and socially useful requirements. The NEP 2020 is thought to aim to provide a more holistic and culturally sensitive learning experience that nurtures students to be well-rounded individuals with a deep appreciation for their roots and a global perspective. And, integration of the elements of Indian Knowledge, culture and heritage into the curriculum and making these the core component of the current education system will help India to achieve the above mentioned goal.

Contribution of India in various Domains: A Glance

Sustainable Agriculture

Ancient Indians promoted a harmonious coexistence with nature and had a profound awareness of the environment. The significance of eco-friendly living and ecosystem preservation was emphasized by concepts like "Ahimsa" (non-violence) and "Prakriti" (nature). Advanced agricultural methods and sustainable farming practices were used by the ancient Indians. Ancient Indian culture had a profound understanding of sustainable agriculture, putting a strong emphasis on symbiotic agricultural methods that were in tune with the cycles and rhythms of nature. To preserve soil fertility and stop soil erosion, ancient Indian agriculture placed a strong emphasis on crop rotation and diversification different crops were planted cyclically to make the best use of the soil's nutrients. Additionally, well-known organic agricultural practices were

common, use organic waste, compost, and animal dung as natural fertilizers. These chemical-free organic methods contributed to soil enrichment and improved crop development. The early Indian farmers were adept at managing and harvesting water. Utilizing step-wells, contour plowing, and other techniques helped farmers efficiently use and conserve their water supplies. In addition, it was typical to combine crops and trees. Crops and the environment benefited from agroforestry and silviculture because they helped to give shade, stop soil erosion, increase soil fertility, and serve as windbreaks. Additionally, conventional Indian farmers used natural pest management techniques like neem-based pesticides, companion planting, and biological pest control employing natural predators. These techniques caused less environmental damage. In addition, it has been proven via several scientific studies that farmers have kept and preserved native seeds for generations, enabling crop adaptation to regional conditions and lowering reliance on outside sources. Agriculture in ancient India placed a high value on crop timing. Seasonal cycles were used to coordinate planting and harvesting, increasing yields and sustainability. By using animal waste as natural fertilizer, plowing the land, and using agricultural waste as animal feed, livestock were integrated into agriculture, resulting in a symbiotic interaction between crops and livestock. Additionally, it was discovered that prehistoric Indian groups engaged in communal farming and shared resources and knowledge. As a result, cooperation and a sense of community were encouraged in agriculture. Terrace farming was a typical practice in hilly areas to stop soil erosion and make the best use of cultivable land that was available. Ancient Indian farming methods that emphasize resource conservation, environmental harmony, and the welfare of farmers and communities are examples of sustainable agriculture. These techniques can help modern agriculture become more sustainable while addressing current issues with food production and environmental sustainability.

Indian cosmology

Indian cosmology emphasizes the idea of cosmic time cycles and the cyclical nature of the cosmos, which are closely entwined with spiritual and philosophical ideas. The birth, evolution, and dissolution of the cosmos are described in the Puranas and other ancient scriptures using cosmological tales that span extremely long time cycles. Ancient Indian cosmology made significant contributions that still inspire and have an impact on the current world in diverse ways. It is anchored in Indian intellectual and spiritual traditions. It had complex hypotheses regarding the composition, beginning, and development of the universe. Modern cosmological theories share similarities with ideas like the interconnectedness of all life, the multidimensional cosmos, and the cyclical process of creation and dissolution. The universe was frequently represented in ancient Indian cosmology as having cyclical patterns of creation, preservation, and disintegration. This cyclical perspective emphasizes the significance of cycles in nature and the necessity of appropriate resource management, making it pertinent to current talks on sustainability. The yogic concept of consciousness is consistent with the ancient Indian cosmology as it is presented in literature like the Upanishads. Yoga emphasizes self-exploration, which is in line with contemporary mindfulness techniques and the study of consciousness. The connectivity of all living things and their unity with the universe are stressed in Indian cosmology. This integrated worldview, which emphasizes the need to protect and value the environment, is consistent with contemporary ecological and environmental views. The cosmology of ancient India smoothly combined scientific knowledge with spiritual and philosophical ideas. In order to promote a more comprehensive and meaningful knowledge of the cosmos and human existence, there is a growing interest in fusing science and spirituality today. The ancient Indians had a complex view of time that took into account long time periods and cyclical patterns. Modern scientific hypotheses regarding the age and evolution of the universe are consistent with this understanding. Ancient Indian literature' cosmological ideas promoted meditation and introspection on the nature of the cosmos and one's place within it. These age-old contemplative traditions are a source of inspiration for contemporary practices like mindfulness and in-depth reflection.

Individuals and society can gain knowledge and direction in dealing with the problems of the modern world, fostering sustainable living, and promoting peace within oneself and with the environment by learning and incorporating the concepts and ideas from ancient Indian cosmology. But it's crucial to approach these lessons with an open mind and knowledge of their historical and cultural setting.

Ancient Indian Mathematics and Astronomy

Ancient Indian thinkers made important contributions to astronomy, mathematics (such as the decimal system, zero), and other scientific disciplines. Ancient Indian science incorporated the physical, mental, and spiritual facets of existence into a comprehensive perspective of the world. Instead of compartmentalizing information, it acknowledged how all phenomena are interrelated. For instance, the decimal system, algebra, trigonometry, and the concept of zero were all fundamental developments in mathematics. The shloka reflecting the significance and value attributed to mathematics in ancient Indian culture says:

गणितं परमानन्दं तद्वद्दया विना किम्।
यस्य वास्तविभूषोऽयं यान्यानि च पराणि च॥

The above verse means that "Mathematics is the supreme bliss. What more is there without compassion? It is like an ornament on a person, enhancing everything it covers and adorns." Ancient Indians had advanced knowledge of astronomy and mathematics. A high level of scientific learning was evident in the comprehension of celestial motions, precise astronomical observations, and the development of sophisticated mathematical concepts.

The field of astronomy and associated sciences have benefited greatly from the work of ancient Indian astronomers. They created sophisticated observational techniques and mathematical models to comprehend celestial events, yet their work was frequently intricately entwined with religious and philosophical views. Celestial bodies, their motions, and the idea of a cyclical world are mentioned in the Vedas, prehistoric Indian scriptures that date back to between 1500 and 500 BCE. Aryabhata, who lived in the fifth century CE and predicted the heliocentric model of the solar system, did so more than a thousand years before Copernicus. Aryabhata computed the length of a year, the diameter of the Earth, and the positions of several planets with great accuracy. Brahmagupta was another renowned individual who, in the seventh century CE, made ground-breaking discoveries in the fields of mathematics and astronomy. His writings covered the motion of celestial bodies, eclipses, and trigonometry, especially in the Brahmasphutasiddhanta. The astronomers of ancient India also created exact techniques for monitoring planetary locations and forecasting celestial phenomena. To measure time and investigate celestial movements, they built observatories with sophisticated equipment, such as the Jantar Mantar in Jaipur, Rajasthan.

Aryabhata (476–550 CE)

Aryabhata, a significant mathematician and astronomer, developed the idea of zero as a placeholder and offered an exact estimate of the value of (pi). He postulated a heliocentric model of the solar system, in which the Earth revolves around the Sun while rotating on its axis (Iyengar, 1991).

Brahmagupta (598–668 CE)

Brahmagupta made important strides in astronomy and mathematics. He developed guidelines for working with negative and zero-valued integers in mathematics, offered answers to quadratic equations, and estimated the positions of celestial planets.

Varahamihira (505–587 CE)

The "Pancha-Siddhantika," a treatise by Varahamihira, synthesised five significant astronomical schools that were popular at the period. His observations and computations on planetary motion, eclipses, and star positions were significant.

Bhaskara I (600–680 CE)

Ancient Indian astronomer and mathematician Bhaskara I made significant contributions to the fields of trigonometry and astronomy. He offered techniques for figuring out eclipses and provided precise planetary placements.

The "Aryabhatiya Bhashya," a key commentary on Aryabhata's work, was written by Aryabhata II (920 CE), also known as Mahasiddhanta. He calculated planetary positions and eclipses in addition to making contributions to trigonometry.

Bhaskara II (1114–1185 CE)

The sine table was one of the significant contributions made to trigonometry by Bhaskara II, commonly known as Bhaskaracharya. He investigated planetary motion and produced remarkably accurate calculations of the Earth's period in orbiting the Sun.

Surya Siddhanta

The "Surya Siddhanta" is an old book that offers thorough information about astronomy, including planetary positions, eclipses, and cosmology. It contributed formulas for computing celestial events and had an impact on ancient Indian astronomy.

Jyotisha Shastra

Jyotisha, the science of heavenly bodies, encompasses both astronomy and astrology. The comprehensive observational methods, calendars, and systems for predicting celestial occurrences based on planetary movements were created by ancient Indian astronomers.

These contributions laid the groundwork for the growth of mathematics and astronomy, not just in India but also in other parts of the world. The knowledge and methods created by early Indian astronomers established the foundation for later developments in the study of astronomy.

Arithmetic and Geometry of Ancient India

Geometry, fundamental arithmetic, and numerical notation were taught in school throughout the Vedic era. Ancient Indian manuscripts known as the Sulba Sutras, written between 800 and 200 BCE, contained mathematical information pertaining to the building of altars and other constructions. In the fifth century CE, Aryabhata made significant advances to trigonometry by offering precise sine and cosine tables and resolving irrational equations. The writings of Brahmagupta offered solutions to quadratic equations as well as instructions for arithmetic operations. With their treatises, Bhaskara I and Bhaskara II, in the seventh and twelfth centuries CE, respectively, improved mathematical knowledge.

Ancient Indian Physical Science

Ancient Indian scientists studied a variety of fields in the physical sciences, including astronomy, physics, and metallurgy. Aryabhata proposed a heliocentric model of the solar system and precisely determined the positions of the planets. Varahamihira made important advances in astronomy, geography, and mathematical methods for eclipse prediction. Through their research in mathematics, astronomy, and other related subjects, ancient Indian intellectuals made substantial contributions to our understanding of the physical universe. Some of the notable contributions of ancient Indian Physical Sciences are as follows:

Ancient Indian scientists contributed significant contributions to our understanding of classical mechanics, particularly during the era of classical Indian science. They looked at the fundamental ideas in physics such as motion, force, and equilibrium (Mandal, 2020).

Acoustics: The understanding of acoustics has been advanced by ancient Indian intellectuals, particularly those who studied music and sound. They looked at musical scales, the characteristics of sound, and the science behind creating and interpreting sound.

Optics: The science of light and perception was one area in which ancient Indian thinkers made significant contributions. They researched lens and mirror characteristics, refraction, and reflection.

Heat and Thermodynamics: The work of ancient Indian intellectuals on metallurgy, smelting, and the use of fire in diverse applications demonstrates their knowledge of heat and thermodynamics.

Mathematical and geometric advances were made by ancient Indian mathematicians in the fields of geometry, algebra, number theory, and trigonometry. Modern physics and other sciences are based on these mathematical concepts.

Astronomy and cosmology: The understanding of celestial bodies, their motions, and the structure of the cosmos was greatly advanced by ancient Indian astronomers. In order to forecast planetary placements, eclipses, and other astronomical events, they used sophisticated mathematical models.

The use of compasses and the mention of magnetic materials in numerous ancient texts show that ancient Indians were aware of magnetic qualities, though not in the modern electromagnetic sense.

Material Science: Metalworkers and craftspeople in ancient India had a thorough understanding of the various types of materials and their qualities. In order to create numerous tools, buildings, and artefacts, this expertise was put to use.

It's vital to remember that ancient Indian scholars studied natural phenomena holistically and in relation to one another, frequently weaving philosophy, spirituality, and religious ideas into their work. Their contributions to our understanding of the physical universe laid the groundwork for following generations of scientific study. The methods and jargon employed in antiquity, however, were different from modern physics as a formalised scientific field.

Trade, Commerce, and Economics of Ancient India

Over several millennia, ancient India had a bustling trade, commerce, and economic system. The subcontinent served as an important international commerce centre, drawing merchants and traders from all over the world. The flow of commodities and ideas was aided by historic trade routes like the Silk Road and marine routes. Ancient India had a long history of commerce, trade, and economic

institutions that made a substantial contribution to the country's historical and cultural advancement. Ancient India was linked to other parts of the world by established trading networks. Indian traders traded goods with Central Asia, the Middle East, Southeast Asia, and Europe via the Silk Road and the Spice Route, two important trading routes. Around 2500–1500 BCE, the Indus Valley Civilization developed a sophisticated urban culture and a well-functioning economic structure. They traded goods including cotton, cereals, pottery, and beads with Mesopotamia and other places. The ancient Aryans traded items like spices, cereals, and precious metals with their neighboring peoples. Commerce between the Aryans and other civilizations was aided via trade routes. In addition, one of the earliest instances of coins being used as a medium of commerce is said to have occurred in ancient India. During the Maurya and Gupta eras, punch-marked coins were widely used, which facilitated trade and commerce. Guilds and merchant organizations were an integral part of ancient Indian culture, regulating trade, establishing standards, resolving conflicts, and guaranteeing ethical commercial practices. The banking and lending systems were well-organized. The "Shroffs" and "Sarraf" were significant moneylenders and bankers who offered traders and the general public financial services. Additionally, the ancient cities and towns of India had active markets and commercial hubs that demonstrated a thriving economy. Important commercial hubs included Taxila, Ujjain, and Pataliputra (modern-day Patna). To control commerce and raise money, the rulers of India employed a variety of taxing and monetary measures. Trade, agriculture, and other economic activities were all subject to taxes. These contributions highlight the advanced economic structures, trading networks, and economic wealth of ancient India. These practices' legacy has continued to have an impact on India's and other countries' contemporary economic environments. Additionally, trade expanded significantly during the Maurya and Gupta eras (about the 4th century BCE to the 6th century CE). Under Emperor Ashoka, the Mauryan Empire built up a vast trade network with other parts of the subcontinent and beyond, promoting economic prosperity. The Gupta Empire was well-known for its thriving commerce in spices, silk, and other priceless goods. In addition, the Arthashastra, a prehistoric book credited to Kautilya (Chanakya), gave in-depth explanations of economic theories, taxation, trade laws, and government. It emphasized the significance of a sound economic foundation, equitable taxation, and effective governance for the state's general prosperity.

Ancient Indian architecture

The varied cultures, ideologies, and aesthetic sensibilities that have shaped the subcontinent over millennia are evident in the architecture of India. Its legacy still has an impact on contemporary urban planning and architectural designs, protecting a rich history that reflects India's historical and cultural diversity. The Indus Valley Civilization, which flourished between 3300 and 1300 BCE, is when the first buildings were constructed. Cities like Mohenjo-Daro and Harappa demonstrated advanced urban planning at that time, with well-planned roadways, drainage systems, and multi-story brick structures. India's ancient architecture had a big impact on the rest of the world, influencing design aesthetics, engineering methods, and architectural styles. The Indus Valley Civilization, which flourished between 3300 and 1300 BCE, is when the earliest architectural endeavors were created. Cities like Mohenjo-Daro and Harappa demonstrated complex urban planning with well-organized roadways, drainage systems, and multi-story buildings. These contributions have had a long-lasting influence on the area of architecture and continue to serve as an inspiration for designers and

architects everywhere. Indian architects were forerunners in the field of structural engineering as they created novel methods for building enormous stone structures, such as temples and palaces, without the use of cement, instead depending on exact interlocking and gravity. The elaborate features and distinctive forms of the old Indian temple architecture are well known. The Nagara, Dravida, and Vesara styles are indicative of various geographical and historical eras. The Nagara style of temple architecture, which includes shikhara (towers) and mandapas (halls), developed in the northern areas. With its elaborate sculptures and tall spires, the Kandariya Mahadeva Temple in Khajuraho is a beautiful example of the Nagara style. Temples with magnificent carvings and precise architectural design include those in the Khajuraho Group of Monuments and those in Tamil Nadu. Stupas, like the Great Stupa at Sanchi, and viharas (monastic homes), in addition to temples, made important architectural contributions in ancient India. Stupas were significant in the early stages of Buddhism and were large buildings designed to keep relics. Indian architects were masters at creating structures out of solid rock formations, such as temples, caverns, and monasteries. The Ajanta and Ellora Caves are prime examples of this feat of architecture.

Ancient Urban Planning

Cities in ancient India were carefully planned, with well-organized streets, water supplies, drainage systems, and public amenities. The Indus Valley Civilization's ancient city of Mohenjo-daro is a prominent example of this sophisticated urban planning. Palaces with opulence, elaborate carvings, and great utilization of space and ventilation, such as the Palace of Mysore, were common. They combined aesthetic beauty with practicality by using components of regional building forms. Stepwells were unusual architectural constructions made to allow access to water, such as Rani ki Vav in Gujarat. They had intricate carvings and architectural layouts that reflected the appealing and useful features of ancient Indian architecture. Incorporating elaborate carvings, sculptures, and geometric patterns, it also demonstrated a high level of artistic harmony. The patterns frequently had symbolic and spiritual connotations. The legacy of ancient Indian architecture continues to influence modern designers and is evidence of the country's inventiveness and rich cultural past.

The study of "Rasa," also known as "Rasashastra" or "ancient Indian chemistry," has a long history that goes back thousands of years (Purwar, 2016). This prehistoric science specialized in the investigation of matter, including its characteristics, changes, and potential therapeutic uses. The concepts of ancient Indian chemistry have value in the current world in a number of ways, despite the fact that the techniques and terminology used were distinct from those of modern chemistry. It helped the holistic medical system known as Ayurveda to emerge. Ayurveda emphasizes natural and holistic healing while incorporating the knowledge of minerals, metals, and plants to make medications. Natural cures are becoming more and more regarded as valuable nowadays as Ayurveda gains prominence on a global scale. Ancient Indian metallurgists possessed advanced metal and alloy working knowledge and produced high-quality goods. Their knowledge of the composition, processing, and use of different alloys is still useful in contemporary metallurgy and materials science. The current pharmaceutical industry has its roots in the understanding of ancient Indian chemistry, particularly in the creation and formulation of medicines. Understanding old customs can spur creativity and lead to better medical development. In addition, the chemists of ancient India created methods for extracting, distilling, and purifying chemicals that are being used today. These old procedures can be used

as historical examples to comprehend the genesis of chemical processes. Indian ancient chemistry is widely renowned for using organic, natural ingredients. The ancient practices offer insights for utilizing renewable resources and reducing environmental effects in the modern world, where sustainability is vital. According to the literature, ancient chemists thoroughly researched plants and their medicinal characteristics. This information is pertinent to modern phytochemistry, biochemistry, and the creation of plant-based medicinal research. India is skilled at dying clothes with natural materials. Today, this understanding can be helpful in researching environmentally friendly and sustainable dying procedures for the textile sector. As a result, ancient Indian chemistry contributed to the creation of many spices and culinary techniques. Nowadays, modern cuisine and nutrition are thought to profit greatly from knowledge of the chemical composition of spices as well as their therapeutic capabilities. The present craze for natural and organic cosmetic products is in line with the fundamentals of traditional Indian chemistry. We can merge traditional knowledge into contemporary scientific practices by learning and adopting the fundamentals of ancient Indian chemistry, encouraging a more comprehensive and sustainable approach to chemistry, medicine, and several other fields. It's crucial to carefully incorporate this information alongside recent scientific discoveries.

Ancient Indian knowledge in Physiology and Medical Science

Traditional systems like Ayurveda have a strong foundation in physiology and medical science, and this knowledge has greatly advanced our understanding of the human body, health, and diseases. These contributions are the result of centuries of research, experimentation, and a focus on the whole person. Ancient Indian medical science was founded on the principles of Ayurveda, one of the oldest holistic healing systems in the world. It emphasizes the harmony of the body, mind, and spirit and divides people into various bodily kinds (called doshas) according to their innate traits. Ancient Indian doctors were adept in identifying illnesses by examining a patient's pulse (Nadi). Different pulse characteristics have been linked to particular medical diseases, offering helpful diagnostic data. The Indians had a thorough understanding of herbs and medicinal plants. These organic ingredients are used by Ayurveda to cure a variety of illnesses, with a focus on their therapeutic qualities and all-encompassing effects on the body. Some ancient books provided evidence that Indian physicians had a wide range of surgical skills. A thorough treatment of surgery, the ancient classic "Sushruta Samhita" includes information on surgical equipment, anesthesia, surgical techniques, and post-operative care. In addition, the ancient literature mentions the marma points, which were believed to be critical energy spots on the body where ligaments, joints, muscles, and veins converge. These ideas and their significance for preserving health, healing, and therapy were acknowledged by ancient Indian medical science.

Anatomy and Physiology

Ancient Indians were aware of the structure, organs, and functions of the human body, however, their knowledge of anatomy and physiology was not as thorough as modern anatomy. Through careful observation and dissection over many years, this understanding has developed. The traditional "Panchakarma" therapy uses a variety of cleansing and purifying techniques to remove toxins from the body, reestablish equilibrium, and advance health. It is noted for its detoxification and rejuvenation in Ayurveda. (Deshpande, 1997) Modern healthcare, alternative medicine, and lifestyle choices are all influenced by the ancient Indian understanding of physiology and medical science. For a more thorough understanding of health and well-being, many ideas from Ayurveda and other traditional systems are still being researched and incorporated into contemporary medical practices.

Elements of Ancient Indian Knowledge System

Ancient Indian philosophies and spiritual traditions offer a solid foundation for developing moral ideals, ethical standards, and a sense of responsibility towards oneself and society. These principles are necessary for promoting a just and peaceful society. In the fields of mathematics, astronomy, metallurgy, medicine, and other sciences, ancient India made tremendous advancements. The decimal system, the concept of zero in mathematics, and the contributions made to algebra and trigonometry are noteworthy. Understanding these contributions makes it easier to appreciate how scientific thought has evolved over time. Works by Kautilya, such as the Arthashastra, provide insights into statecraft, economics, diplomacy, and governance. Understanding the fundamentals of sound governance and efficient management still requires reference to the governance and management ideas outlined in these publications. Early Indian philosophies like Buddhism and Jainism promoted inclusion, non-violence, and social harmony. These lessons are highly relevant in a world that still struggles with the challenges of social justice and inclusivity. Ayurveda, the traditional medical system, offers a comprehensive approach to healthcare with a focus on natural cures and prevention. Its importance is expanding as more individuals look for supplementary and alternative treatments to mainstream medical procedures. These techniques can help students live balanced, healthy lifestyles by incorporating them into their schooling. Yoga, a tradition with roots in India, is today practiced all over the world. It is widely acknowledged for its advantages in the realms of the physical, mental, and spiritual, making it a necessary tool for sustaining a healthy lifestyle. Yoga and meditation techniques can assist students in controlling their stress and anxiety as well as enhancing their mental health. These techniques encourage mindfulness and relaxation, which improve attention span, clarity of thought, and emotional stability. Hinduism, Jainism, and Buddhism are some of the ancient Indian philosophical traditions that place a strong emphasis on moral and ethical principles. By incorporating these traditions' teachings into the curriculum, educators can help students develop morality, empathy, and respect for others. The Vedas and Upanishads, two ancient Indian writings, stress the value of maintaining the environment's sustainability and fostering harmony with nature. These lessons can encourage sustainable practices and build a sense of environmental responsibility in students who get environmental education. Mathematics, astronomy, metallurgy, and medicine were all greatly advanced by ancient India. Students who learn about these historical
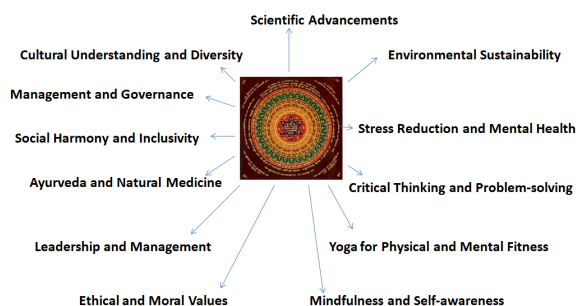
Figure 1: Elements of Ancient Indian Sciences

developments may develop a greater respect for India's scientific legacy and develop a greater interest in STEM fields. Understanding the rich cultural heritage and variety of India is made possible by studying the ancient Indian sciences. It promotes tolerance and diversity by fostering a deeper awareness of various cultures and viewpoints. Practises like Vipassana meditation and mindfulness can improve self-awareness, emotional intelligence, and empathy, which supports both individual and social development. These elements are essential in contemporary education if we want to create well-rounded people. In ancient Indian philosophical texts, critical thinking, analytical reasoning, and logical argumentation are encouraged. Integrating these lessons can aid in the growth of students' analytical and problem-solving skills. Early Indian writings on governance, economics, and management, such as Kautilya's *Arthashastra*, are still relevant today. Understanding governance frameworks and improving leadership abilities can both benefit from the extraction of pertinent principles. By incorporating the ethical precepts found in ancient Indian scriptures into the teaching of contemporary science and technology, we can encourage future scientists and technologists to act ethically and with responsibility. Self-Reflection, Self-Awareness, and Personal Progress: Indian philosophical and spiritual teachings promote self-reflection, self-awareness, and personal progress. These lessons are important for helping modern people gain emotional intelligence, resilience, and a sense of purpose.

National Institute of Open Schooling (NIOS)

The National Institute of Open Schooling is a significant educational institution in India that operates as an autonomous organization under the Ministry of Education, Government of India. Established in 1989, NIOS serves as the largest open schooling system in the world. Its main goal is to deliver high-quality education to everyone, including learners who are not in school, working professionals, and people who want to advance their education. At the secondary and senior secondary levels, NIOS offers a wide variety of courses in addition to career, life enrichment, and skill-development programmes. Some of the primary features that make NIOS an appealing option for students looking for a non-traditional and flexible education system are the flexibility of learning at one's own pace, the availability of multimedia and online study materials, and the opportunity for on-demand tests. It has been crucial in advancing inclusive and egalitarian education, reaching out to remote and underserved places, and enabling people to realize their educational and professional ambitions.

One of the two National Boards for secondary education, the National Institute of Open Schooling (NIOS), provides schooling through the open and distance learning (ODL) style. With the most courses offered and the most print and electronic resources, it is the largest open schooling system in the world.

Leveraging the knowledge of academicians from numerous reputable academic education institutions and organizations, NIOS produces its curriculum, self-learning materials, and media support programmes, covering the complete school education continuum from the primary to the pre-degree level.

Please use this scan code to visit NIOS website (https://www.nios.ac.in/)

Indian Knowledge Tradition Subjects at NIOS: An Initiative for Open School Learners

Para 4.27 of National Education Policy (NEP) 2020 refers to the traditional knowledge of India that is both sustainable and strives for the welfare of all. In order to become the Knowledge power in this century, it is imperative that we understand our heritage and teach the world the 'Indian way' of doing things. In order to incorporate these elements scientifically, IKT center has already been established at NIOS Head Quarter in 2022, and '*Bhartiya Jnana Parampra*' stream was launched for Session 2017-18 and the first exam was conducted in the month of March-April, 2018 to provide as an opportunity to the learners interested Indian Ancient Knowledge.

A visionary step towards a more thorough and well-rounded educational approach is the incorporation of elements of ancient Indian sciences into the contemporary Indian educational system (Figure 1). A tremendous storehouse of knowledge and wisdom can be found in the rich tradition of ancient Indian disciplines, including mathematics, astronomy, medicine, metallurgy, philosophy, and more. These topics are incorporated into the curriculum to help pupils understand India's significant contributions to science and technology over the centuries. It provides a deeper grasp of conventional practices, environmentally friendly technologies, holistic healthcare, and sustainable living, in line with sustainability and environmental consciousness concepts. Along with training students to successfully traverse the intricacies of the current world while respecting the wisdom of the past, incorporating ancient Indian sciences also fosters in them a sense of pride, cultural identity, and a larger perspective. By combining historical and contemporary knowledge, Indian education may lead the way in global educational breakthroughs by fostering innovation, creativity, and critical thinking.

Major objectives of introducing IKT subjects

NIOS intended to

- Preserving and promoting ancient Indian knowledge
- Make efforts to pass on the rich tradition of ancient knowledge to open school learners
- Create a sense of pride toward Indianness
- Establish ancient knowledge, skills, and values among the open-school learners
- Integrate the key elements mentioned in the recommendations of the National Education Policy-2020 in the open school curriculum
- To impart the lessons of life values and ideals to the open school learners from the elementary level (grade 3, grade 5, grade 8) and also at the Secondary (grade 10) and Senior Secondary level (grade 12)
- Presenting Traditional Knowledge in Modern Contexts

Based on the survey conducted by NIOS, it was found that there are nearly 6000 Gurukuls/Vidyapeeths/Institutions/ Educational Units in India teaching subjects of Indian knowledge tradition but there exists a problem of registration of Gurukuls. Also, the majority of the scholars of these gurukuls reported the problem of certification. Hence, to cater to this problem, NIOS launched IKT subjects for the learners of NIOS and also provided an opportunity for the scholars of Gurukuls to connect with NIOS for their studies and certification.

Please find the link to reach to the IKT content of NIOS:

https://www-nios-ac-in.translate.goog/online-course-material/indian-knowledge-tradition.aspx?_x_tr_sl=en&_x_tr_tl=hi&_x_tr_hl=hi&_x_tr_pto=tc

Ved Adhayanam   Sanskrit Vyakaranam   Bhartiya Darshanam

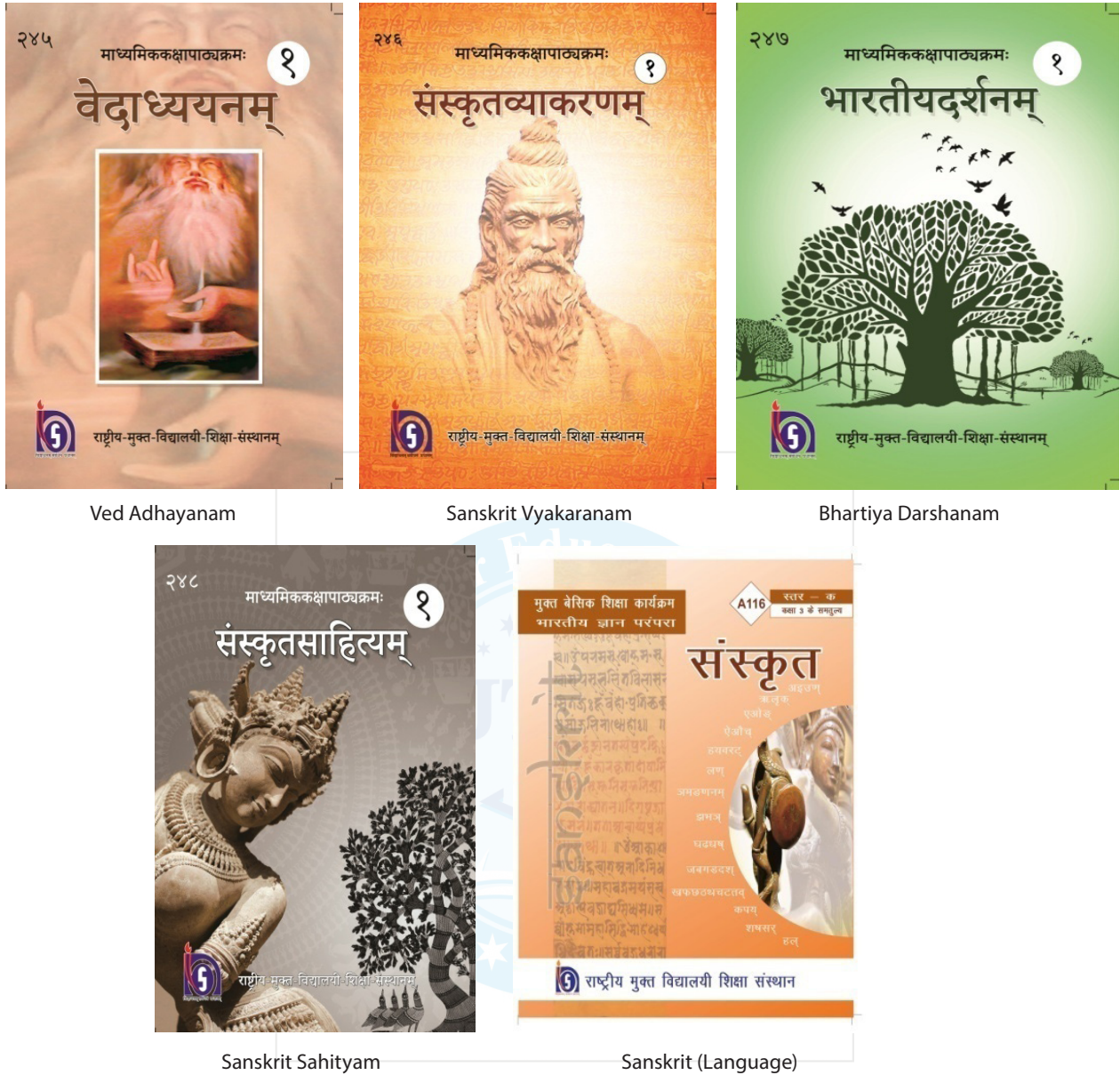Sanskrit Sahityam   Sanskrit (Language)

Figure 2: Subjects at the Secondary Stage and Senior Secondary Stage

Main Features of the IKT Curriculum

- 15 subjects at all three levels of the Open Basic Education Program are translated into Hindi and English language.
- The subjects were originally developed in Sanskrit medium. Figure 2 and 3 shows the cover page of the books of subjects included in different grades in NIOS i.e. at the Open Basic Education (grade 3, 5 & 8) levels, Secondary Stage and Senior Secondary Stage.
- Veda Adhyan
  - Narration of Ramayana Epic
  - Teachings of Bhagvad Geeta
  - Maheshwara Sutra by Panini
  - Samrasa shloka collection
  - Unitary Hymn (Ekatmak shlok)
  - Various Vedic Hymns
  - Vishnu Sahasranama Stotra
  - Shikshavalli
  - Bramhavalli
  - Bhruguvalli
  - Lalita Sahastra Naam Stotra
- Veda Adhyan (at Secondary and Senior Secondary Level)
  - History of Vedic Literature
  - Vedic Vocal Process (*swar prakriya*)
  - Vedic hymns – Agni suktas, Purusha suktas etc.
  - Vedic Yagya, Vedic God, Vedic Narrative, Veda Commentator
  - Various Philosophical dialogues
  - Vedic Codes
  - Brahmanical literature
  - Aranyaka literature
  - Vedanga literature
- Yoga Shastra
  - Shvashanabhyas (Respiratory exercises)
  - Yogic shukshma Vyayam (compound micro exercises)

Veda   Vigyanam   Yog

Vyavsaayikkaushalam   Sanskrit

Figure 3: Curriculum for Indian Knowledge Tradition at Open Basic Education (OBE)

- • Surya namaskar, Asanas and kriya
- • Yam, Niyam and Pranayaam
- • Hath Yoga
- • Krodh Prabhandhan Vyayam (Anger management exercises)
- • Concentration and memory-boosting exercises
- • Excerpts from Patanjali Yoga Sutras
- Vocational Skill
  - • Cow rearing, cleanliness and hygiene of Gaushala Garden care, Vegetable service, Organic farming
  - • watering plants, grafting
  - • Navgrah van, Making *Jeev-mitr* for farm
  - • Ayurveda in daily life
  - • Sewing and cutting, Methods of preparation and serving of food
  - • Ancient traditions of folk dance, folk music, and folk arts
- Science Subject
  - • origin of creation
  - • Panchmahabhoot
  - • Earth and Natural Resources
  - • Water, air, vegetation, and land conservation in Vedas
  - • New Concepts of Modern Science

- Sanskrit Language
  - • Learning Sanskrit as a language
  - • Understanding/Meaning of simple Sanskrit
  - • Development of knowledge in Sanskrit
- Sanskrit Grammar (at Secondary and Senior Secondary Level)
  - • Interpretation of Paniniya Ashtadhyayi as Original Text
  - • noun, conjunction, subjunctive, factor, inflectional clause, participle, suffix
  - • stree pratyay, trijant, tadhit prakran
- Sanskrit Literature (at Secondary and Senior Secondary Level)
  - • Ancient Sanskrit Literature and History
  - • Narration of Ramayana epic
  - • Narratives of the Mahabharata epic
  - • Excerpts from Panchatantra, Kiratarjuniya, Karnabhar, Uttar Ramcharit, Shuknasopadesh, Raghuvansh epic, Shivraj Vijay, etc.
  - • The main principles of Poetry - Kavya Darpan
- Indian Philosophy (at Secondary and Senior Secondary Level)
  - • General Introduction to Philosophy
  - • Indian Education Department and Introduction
  - • Shaddarshana - Nyaya, Vaisheshika, Sankhya, Yoga, Mimamsa, Vedanta

Table 1: Secondary level

Subject	2017-18			2022-23		
	Stream-1		Total	Stream-1		Total
	Block-1	Block-2		Block-1	Block-2	
Veda Adhyayan (245)	01	06	07	93	55	148
Sanskrit Vyakarana (246)	01	07	07	162	92	254
Bharatiya Darshan (247)	01	05	06	168	163	331
Sanskrit Sahitya (248)	07	08	15	226	185	407
Sanskrit (209)	2089	751	2840	7337	967	8304
Grand Total			2875			9444

Table 2: Senior Secondary

Subject	2017-18			2022-23		
	Stream-1		Total	Stream-1		Total
	Block-1	Block-2		Block-1	Block-2	
Veda Adhyayan (245)	02	04	06	58	19	77
Sanskrit Vyakarana (246)	06	12	18	86	35	121
Bharatiya Darshan (247)	02	06	08	126	77	203
Sanskrit Sahitya (248)	10	38	48	141	59	200
Sanskrit (309)	1224	2455	2679	1384	1200	2584
Grand Total			2759			3185

- Atheist Philosophy - Charvaka, Buddhist, Arhat
- Vivekananda Vedanta Contemplation

The on-demand examination system (ODES) in Bharatiya Darshan (247) and Sanskrit Sahitya (248) at the secondary level under the Bharatiya Jnana Parampara stream was introduced in 2019. The data of admission from the first session-2017-18 to the latest admission session in the IKT stream reveals a great leap in the interest of admission to the IKT course by the learner (Tables 1 and 2).

CONCLUSION

Ancient Indian wisdom has had a lasting impact on the modern world, making substantial contributions to several fields and influencing the structure of modern civilization (Majhi, 2023). Modern mathematics and computing are based on the core ideas of zero and the decimal system, which date back to ancient India. Modern integrative medicine and natural wellness techniques continue to draw inspiration from Ayurveda, a system of holistic health and wellness. The significant benefits of yoga and meditation on one's mental, physical, and spiritual health have made them popular worldwide (Narayan,1995). These practices have their roots in ancient Indian philosophy. In today's ecologically conscious society, the ancient ideals of sustainability, harmony with nature, and ethical behavior still have a powerful resonance. Additionally, in our fast-paced modern lives, the eternal philosophical lessons of unity, compassion, and self-realization from ancient Indian writings serve as a lighthouse for people looking for inner calm and enlightenment. In general, old Indian knowledge continues to advance and have an impact on how mankind develops in the direction of a future that is more harmonious, interdependent, and enlightened.

It is believed that individuals and society can gain from a more complete and holistic approach to well-being and advancement by incorporating the knowledge and techniques from ancient Indian sciences into modern education, healthcare, sustainable development, and numerous facets of modern life. A healthy and purposeful way of living today is made possible by the eternal ideas and revelations from ancient Indian sciences. Additionally, to ensure integration with the contemporary curriculum and alignment with the demands of the current generation, the ancient Indian sciences must be incorporated into contemporary education in a balanced manner (Nhalevilo, 2013). To train people who are not only academically competent but also emotionally stable, socially responsible, and environmentally sensitive, it is crucial to combine conventional wisdom with modern understanding.

For various reasons that are in line with the objectives and tenets of open and inclusive education, it is particularly crucial to incorporate disciplines relating to the Indian Knowledge Tradition into open school systems. Open schools serve a wide range of students, including individuals who may have left formal education or have difficulty attending traditional schools. By incorporating topics from the Indian Knowledge Tradition, instructors can reach a wider range of students, encouraging diversity and equal access to education. Open schools frequently cater to a diverse student body, which includes people from various cultural backgrounds. The inclusion of topics connected to Indian Knowledge Tradition aids in making the curriculum attentive to the needs and interests of a varied student body and culturally relevant. Additionally, open education systems strive to satisfy each student's particular learning requirements and preferences. Offering themes that are related to Indian Knowledge Tradition gives students the opportunity to select subjects that are relevant to their interests and backgrounds, increasing motivation and engagement. Indian Knowledge Tradition-related disciplines provide a holistic learning approach that includes not only academic knowledge but also cultural, spiritual, and ethical considerations. This fits with the comprehensive educational ethos sometimes connected to open schooling. The ancient knowledge systems of India are important and relevant worldwide. Understanding these customs can help open school students, who may be from different parts of the world, have a more comprehensive understanding of many cultures and civilizations. Numerous disciplines are covered by topics from the Indian Knowledge Tradition, including philosophy, yogic shastra, the Vedas, the Scientific Foundation of Indian Knowledge, and others. This promotes interdisciplinary learning and gives open-school pupils a well-rounded and adaptable educational experience. The inclusion of subjects from the Indian Knowledge Tradition is thought to be in line with the fundamental principles of open education, providing students with a more inclusive, adaptable, and sensitive educational experience. It gives students the freedom to embrace their cultural background, personalize their educational path, and interact with a wide variety of courses that enhance their learning.

In conclusion, this article indicates that by integrating the timeless wisdom from ancient Indian knowledge with contemporary practises, society can benefit from a more sustainable, harmonious,

and balanced way of life. And, it's crucial to modify and advance this knowledge in a way that fits the modern world while honoring its foundations and core principles.

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