

## ICT as a Game-Changing Toolset for 21st Century Integration and Accessibility of Indian Knowledge System

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**Abstract:** Information and communication technologies (ICTs) have become potent tools in the dynamic 21st-century landscape, capable of reshaping economies, educational systems, and society. India is leading the way in a high-tech transition that might bring together traditional knowledge and innovative discoveries. The country has its roots in a varied range of knowledge traditions, ranging from ancient scriptures to current inventions. India has an extensive diversity of knowledge systems that have been woven together over millennia by the experiences of many different communities. These systems cover an astounding range of knowledge, from astronomy and ecological management to conventional medicine and agriculture. The centuries-old wisdom that has been passed down through the generations is embodied in the ancient Indian knowledge system, which includes disciplines like Ayurveda, Yoga, Vedas, and other art forms. An exceptional chance to conserve, disseminate, and modernize India's intellectual and cultural legacy is presented by fusing this abundance of information with the technological capability provided by ICTs. Due to aging and environmental reasons, many priceless scriptures and manuscripts are susceptible to deterioration. With the use of cutting-edge technologies, digitization projects can guarantee the preservation of historical records, preserving them for future generations while opening them up to a worldwide audience. Furthermore, digital archives and repositories can act as online treasure troves, promoting extensive traditional knowledge inquiry and study in India. Through online platforms, webinars, and e-learning modules, individuals globally can access classes on Indian philosophy, art, medicine, and more. The democratization of knowledge fosters cross-cultural dialogue and advances awareness of the richness and diversity of the Indian knowledge system on a global scale. India's rich cultural and intellectual legacy may be preserved, disseminated, and brought up to date with great potential thanks to the synergy between ICTs and the Indian knowledge system. ICTs have the power to facilitate the seamless fusion of traditional knowledge with contemporary discoveries through digitalization, sharing, cooperation, and creativity. This will create a vibrant and diverse knowledge ecosystem in India and abroad. This research article tries to emphasize the transformative significance of ICTs in facilitating the seamless integration of the Indian knowledge systems.

**Keywords:** Digitization, Digital library, IKS, Technology, Online Platforms.

**Introduction:-**

India's civilization is one of the most intricate and richly intertwined in all of human history. A knowledge system spanning a wide range of disciplines, including medicine, astronomy, mathematics, and philosophy, pulsed in ancient India, from the sun-drenched coasts of the Indian Ocean to the towering peaks of the Himalayas. These systems, developed over thousands of years, were living wisdom that shaped the social and cultural structure of a thriving society. They went beyond simple academic pursuits. The whispers of this age-old wisdom, meanwhile, run the risk of becoming a far-off echo that only a few people can hear over the bustle of modern life (Mandavkar, 2023). This is where the transformative power of information and communication technologies (ICTs) shines as a beacon of hope, providing a game-changing toolkit for integrating and revitalizing India's massive repository of knowledge systems for the 21st century. The twenty-first century has seen a rapid and revolutionary integration of information and communication technologies (ICTs) into many parts of our lives. This connection has not only transformed how we interact and access information, but it has also provided new potential for the preservation, diffusion, and accessibility of traditional knowledge systems (Researcher, 2022). In the Indian setting, with its rich and diverse knowledge traditions, the use of ICTs has the potential to be a game-changing tool for the integration and accessibility of its knowledge systems. ICTs are a broad category of technologies that make information generation, processing, storing, and sharing easier. These technologies include, but are not limited to, social media, mobile devices, artificial intelligence, big data, and the internet (Díaz-Mendoza et al., 2023). The generation, distribution, and consumption dynamics of knowledge have undergone major changes due to the ubiquitous nature of ICTs. This offers the Indian context a special chance to use these technologies to not only protect and advance ancient knowledge systems but also to increase their accessibility to a worldwide audience. Enhancing accessibility is another benefit that could arise from the integration of ICTs with Indian knowledge systems. This richness of knowledge can be made accessible to a worldwide audience through digital platforms and online repositories, encouraging collaboration and understanding across cultural boundaries. ICTs can also help traditional practitioners and contemporary experts to share knowledge, which can result in the creation of novel solutions and the advancement of both fields of knowledge. India can preserve its rich cultural legacy and take the lead in international knowledge sharing by utilizing these technologies. The objective of the present research article is to investigate the several ways that ICTs can be used in the twenty-first century to strengthen Indian knowledge systems.

**Transformative Significance of ICT:**

Through the digitization of historical locations, artefacts, and manuscripts, technology plays a critical role in the preservation, transmission, and enrichment of Indian culture by guaranteeing its accessibility to a worldwide audience. The sharing of customs, rituals, and folklore is made easier by platforms like social media and online discussion boards, which promote cross-cultural dialogue and understanding. By using immersive ways to engage with

India's many traditions, languages, and art forms, educational apps and virtual reality experiences help bridge gaps in geography and generational perspectives. Also, to ensure the legacy of old literature and endangered languages for future generations, language study programs and digital libraries are helpful. Indian culture survives in the digital age, maintaining its richness while embracing innovation, with the help of these innovations in technology.

### **Digitalization of Traditional Texts:**

The methodical process of transforming old manuscripts, scriptures, and other traditional documents into digital formats is known as the "digitalization of traditional texts." This conversion makes it possible to preserve and make available priceless intellectual and cultural treasures that could otherwise be lost or subject to physical decay. These manuscripts are carefully scanned, preserved in electronic databases, and made everlasting by cutting-edge digitalization and scanning procedures. Global knowledge transmission and the preservation of delicate materials are made easier by digitalization. Texts are frequently encoded in machine-readable formats throughout this process, making it simpler to index, search, and integrate into many digital platforms (Oppenheer, 2011). Traditional writings can withstand the test of time by embracing the digital sphere. Additionally, by making their material accessible to a wider audience, they can overcome geographical limitations and offer chances for academic research, instruction, and cross-cultural interchange.

### **Online Learning Platforms for Traditional Education:**

Online learning systems for traditional education reflect a paradigm change in the transmission of traditional knowledge. These platforms use information and communication technologies (ICTs) to provide courses, workshops, and educational resources based on traditional Indian wisdom. Embracing the digital sphere, these platforms cross geographical boundaries, giving a global audience access to all aspects of India's cultural legacy. They combine multimedia components, interactive modules, and expert-led workshops to provide compelling and immersive learning experiences (Magawi, 2019). These platforms' versatility enables a variety of learning styles, allowing students to pace their education according to their preferences. As a result, while meeting the demands of a broad and widely distributed audience, online learning platforms help to preserve and revitalise conventional education, guaranteeing its continuation in the modern day.

### **Knowledge Sharing through Social Media:**

Social media broadens the reach of traditional knowledge, breaking down geographical barriers and democratising access to varied ideas. It is an effective instrument for cultivating a sense of cultural identity, encouraging dialogue, and ensuring that ancient wisdom remains relevant in the digital era, involving both amateurs and professionals in a global conversation (Gaál et al., 2015). Knowledge sharing on social media is a dynamic process in which individuals and groups distribute, exchange, and discuss traditional Indian knowledge across several internet channels. Using the participatory element of social media, users can

contribute thoughts, articles, films, and information about cultural practices, historical viewpoints, and traditional wisdom. These social media sites—such as Facebook, Instagram, and Twitter—promote online communities focused on particular fields of conventional wisdom (Yaqub & Alsabban, 2023). Users can engage in widespread involvement by connecting, collaborating, and contributing to the preservation of cultural heritage through hashtags, groups, and pages devoted to these themes.

### **Creation of Digital Archives:**

Digital archives function as all-inclusive repositories, guaranteeing the durability of priceless cultural heritage that could otherwise be lost or degraded physically. These archives make a wealth of traditional knowledge easily accessible, enabling researchers, academics, and members of the public to study and explore these materials from a distance. Archives that have been digitally digitized not only protect sensitive items but also foster cooperative efforts in knowledge preservation as organizations and communities help to grow these online databases. This procedure uses cutting-edge technologies to scan, classify, and arrange a variety of resources, such as old manuscripts, records, photos, and artifacts (Banad, 2022). By adopting this technology strategy, digital archives ensure that India's rich cultural heritage is widely accessible, democratising access to it and promoting the global diffusion of traditional knowledge.

### **Virtual Museums and Exhibits:**

Virtual displays and museums make use of technology. Users of digital platforms can investigate historical exhibits, artworks, and artifacts in a virtual environment. The displays come to life with the use of sophisticated multimedia components like audio guides, movies, and 3D models, which further improve the user experience. Virtual museums facilitate worldwide accessibility, surpassing geographical limitations and enabling people from various places to interact with India's cultural diversity. (Radwan, 2022). Through navigating virtual galleries, users can learn about traditional methods, artistic expressions, and historical circumstances. These platforms frequently include instructional elements that enhance learning by offering contextual information. Through the integration of virtual technologies, museums and exhibits play a vital role in safeguarding cultural heritage, expanding its accessibility, and promoting the value of traditional knowledge in the digital era.

### **Collaborative Research Platforms:**

These virtual communities act as gathering places for academics, researchers, and specialists from various sectors to share knowledge and perspectives. Collaborative research platforms, which make use of digital communication tools, facilitate real-time collaboration, overcoming geographical limitations and promoting a worldwide community of researchers. Through cooperative initiatives, online forums, and shared databases, people can synergistically explore conventional knowledge (G. George et al., 2021). By including viewpoints from several fields, this collaborative method expands the scope and depth of research and advances our understanding of India's cultural legacy as a whole. These forums are essential for encouraging communication, developing creative solutions, and making sure

that traditional knowledge integration and preservation are gained from the combined knowledge of an international academic community.

### **E-Health and Traditional Medicine:**

Within the framework of conventional medicine, e-health signifies the merging of Information and Communication Technologies (ICTs) with traditional therapeutic methods. It entails utilizing digital technologies and platforms to improve the management, delivery, and accessibility of conventional Indian medical knowledge, especially concerning Ayurvedic systems. Virtual consultations, information sharing, and tailored treatment recommendations grounded in conventional therapies are all made possible by online health platforms. Geographical limitations are eliminated when people contact with traditional healers and practitioners via telemedicine (Iftikhar, 2023). These platforms also make it easier to incorporate paper medical records into computerized databases, which enhances research and healthcare coordination. When used in tandem with traditional medicine, e-health not only increases access to healthcare but also conserves and revives traditional therapeutic methods. It does this by fusing cutting-edge technology with age-old knowledge to provide a holistic approach to wellbeing.

### **Language Preservation and Translation Tools:**

These resources cover a variety of digital solutions, such as machine translation services, web platforms, and mobile applications. They ensure the preservation of linguistic and cultural legacy by helping to digitize classic literature. By making it easier to translate traditional material into widely spoken languages, translation technologies promote cross-cultural understanding and close communication gaps. Users are actively involved in the resuscitation of their native languages using interactive language learning experiences provided by mobile apps and web platforms. Social media platforms facilitate language advocacy by giving communities a platform to share and celebrate their linguistic heritage. Technologies for automatic speech recognition (ASR) help preserve spoken knowledge in traditional languages by transcribing oral traditions (Post, 2024). By fusing technological advancement with cultural preservation initiatives, these language translation and preservation tools in the digital age are essential to guaranteeing the survival and significance of traditional Indian languages.

### **Knowledge Mapping and Ontologies:**

Knowledge mapping and ontologies are the organized representation and organization of traditional Indian knowledge using information and communication technologies. Knowledge mapping uses visual tools to depict linkages, connections, and hierarchies within the knowledge system, resulting in a comprehensive perspective. Ontologies, on the other hand, define concepts and their relationships in a formalized fashion, allowing for a consistent understanding of terminology across various realms of traditional knowledge. These ICT-driven initiatives improve information accessibility and interoperability, promoting a methodical framework for organizing India's rich traditional knowledge. Knowledge mapping and ontologies make it easier to retrieve and navigate traditional texts, manuscripts, and cultural resources by connecting them semantically (Hunter, 2005). This organized

representation not only helps scholars conduct multidisciplinary research, but also helps to preserve and disseminate traditional knowledge, ensuring that India's complex cultural history is systematically documented and made understandable in the digital era.

#### **Remote Sensing and Agriculture:**

Remote sensing gives useful information on crop health, soil moisture, and environmental conditions, allowing farmers to make more educated decisions about irrigation, fertilization, and insect control. Remote sensing data can also help farmers discover diseases and stressors early on, allowing them to take corrective action on time (Tracextech, 2023). The technology improves precision farming operations, maximizing resource utilization and enhancing total agricultural yield. Remote sensing contributes to sustainable and resilient agriculture by giving real-time and historical data, allowing contemporary techniques to be integrated with traditional farming practices in India. The use of remote sensing technology in agriculture is consistent with the overall goal of harnessing modern tools to make informed decisions and promote agricultural sustainability.

#### **Digital Platforms for Art and Culture:**

Digital art and culture platforms have transformed how traditional Indian cultural expressions are shown, shared, and conserved. These platforms, which include websites, mobile applications, and virtual galleries, offer a dynamic environment for artists to showcase their work to a global audience. Traditional art forms can be archived more easily via digital platforms, ensuring their recording and accessible for future generations. Users can interact with artworks, learn about cultural contexts, and even take part in virtual events thanks to interactive elements. These mediums democratize art by breaking down geographical borders, allowing broad audiences to appreciate and comprehend India's rich cultural legacy. Social media broadens the reach of artistic activities, allowing artists to engage directly with fans and supporters (Bhaskar, 2023). The incorporation of technology not only preserves traditional art but also fosters innovation as artists experiment with new materials and styles in the digital arena. Overall, digital channels are critical to the modern-day preservation, distribution, and progress of traditional Indian art and culture.

#### **Crowdsourcing for Knowledge Documentation:**

Crowdsourcing for knowledge documentation uses the combined wisdom of a broad online community to help preserve and expand traditional Indian knowledge. This collaborative strategy entails assigning responsibilities such as data collection, transcription, translation, and archival activities to a large group of people. Crowdsourcing systems allow people with diverse backgrounds and levels of skill to contribute to the documentation of cultural practices, historical narratives, and traditional wisdom (Hargrave, 2022). This strategy speeds the knowledge documenting the process by utilizing crowd power and overcoming resource and expertise limits. It promotes inclusivity by allowing people from many backgrounds to contribute to the depiction of India's unique cultural heritage.

#### **Block chain for Authenticating Traditional Knowledge:**

Blockchain technology provides a secure and transparent foundation for verifying ancient Indian knowledge. Blockchain protects the integrity and authenticity of traditional literature, artifacts, and cultural activities by using decentralized and tamper-proof ledgers. Each piece of traditional knowledge may be cryptographically safeguarded on the blockchain, creating an immutable record of its origin and ownership (Times, 2021). This not only prevents unauthorized changes but also establishes a traceable chain of custody. The decentralized structure of blockchain lowers the possibility of intellectual property theft and unauthorized replication, increasing faith in conventional knowledge's legitimacy. Smart contracts can encode ownership rights and permissions, allowing traditional knowledge holders to be fairly compensated. By incorporating blockchain technology into the authentication process, India's cultural history may be conserved and protected, ensuring that traditional knowledge remains a valued and appreciated asset in the digital era.

### **Mobile Applications for Skill Development:**

These apps provide accessible and interactive platforms for developing and perfecting a wide range of traditional crafts, arts, and trade skills. Tailored courses and lessons given via mobile devices offer consumers the freedom and convenience of learning at their speed. These applications, which range from traditional handicrafts to agricultural methods, bridge generational divides by preserving and transmitting indigenous knowledge (Kerner, 2023). Gamification and virtual hands-on experiences boost engagement, making the learning process more immersive. Mobile apps also help to link skilled craftspeople and learners, building a community that cherishes and shares traditional knowledge. These applications use technology to revitalize traditional talents, ensuring their continuous relevance and transmission to future generations.

### **Augmented Reality (AR) for Cultural Heritage:**

The way traditional Indian heritage is perceived and understood is being changed by augmented reality (AR) applications for cultural heritage. Augmented Reality (AR) improves visitors' engagement with historical places, artifacts, and cultural exhibitions by superimposing digital information onto the real environment. With AR glasses or smartphones, users can examine real-time extra information about artifacts or explore realistic virtual reconstructions of archaeological sites. This technology gives consumers a dynamic and instructive experience by bridging the gap between the past and present (Lunkad, 2023). By showcasing customs, festivals, and historical occurrences, augmented reality applications help cultural organizations increase the accessibility and engagement of cultural heritage for a wider range of people. AR also helps to preserve cultural artifacts by offering virtual representations that can be accessed from anywhere in the world, decreasing actual wear and tear on sensitive things. Overall, AR applications for cultural heritage let people comprehend and appreciate India's rich history and traditions in a technologically enhanced and participatory way.

### **ICTs in Indigenous Governance:**

Within indigenous groups, these technologies offer platforms for open communication, consensus-building, and democratic government. Indigenous leaders can reach a larger audience using ICTs to spread information about community projects, land management, and cultural events. E-governance technologies improve accessibility and accountability for community members by streamlining administrative procedures. ICTs also enable indigenous people to negotiate contemporary issues, protect cultural heritage, and fight for their rights while retaining their identity. ICTs support traditional Indian communities' self-determination and sustainable development in the modern digital environment through these technological interventions.

### **Digital Storytelling Platforms:**

Digital storytelling platforms are online environments that use multimedia elements to present and preserve traditional Indian stories, folklore, and narratives. These platforms generate immersive and compelling storytelling experiences through the use of text, graphics, audio, and video. These platforms enable storytellers to convey cultural history digitally, reaching a wider and more diverse audience via websites, apps, and social media channels. Digital storytelling not only preserves old tales but also provides new methods to portray them, making them more accessible and relatable to modern audiences. These sites frequently promote community interaction, allowing users to share their tales and viewpoints (Smeda et al., 2014). In the internet age, storytelling has evolved into a dynamic instrument for preserving, promoting, and continuing ancient Indian narratives throughout generations.

### **AI for Preservation and Restoration:**

Artificial intelligence (AI) is critical to the preservation and restoration of traditional Indian artifacts, manuscripts, and cultural heritage. AI technology, such as computer vision and machine learning algorithms, allows for the automatic examination and categorization of historical things, which aids in their preservation by recognizing degradation tendencies (Das et al., 2022). AI-powered systems can help in the restoration process by digitally reconstructing damaged or deteriorated aspects of cultural items (Sinha, 2022). Furthermore, these technologies help to organize and catalogue large cultural archives, making them more accessible for research and public participation. Artificial intelligence applications streamline conservation efforts, providing a scalable and effective solution to the issues faced by India's huge cultural heritage. By merging technology and cultural preservation, AI promotes the long-term preservation of traditional knowledge and artifacts for future generations.

### **Remote Education for Rural Communities:**

Information and communication technologies (ICTs) are used in remote education for rural communities in India to close educational disparities and give them more authority. No matter where they live, kids in rural communities may access high-quality education thanks to digital learning resources, smartphone applications, and internet platforms (Haleem et al., 2022). Teachers can engage with students in real-time in virtual classrooms, creating a positive learning atmosphere. This strategy tackles issues about the dearth of competent educators and educational resources in rural areas. Localized e-learning modules encourage the inclusion of traditional knowledge in the curriculum, guaranteeing cultural relevance.



Furthermore, distance education encourages skill development, providing individuals with practical information for improving their livelihoods. Remote learning has a transformative impact on the rural-urban educational divide and inclusive development in previously underprivileged communities by democratizing access to education.

### Smart Heritage Cities:

Smart Heritage Cities combine current technology with cultural preservation tactics to produce sustainable and technologically sophisticated urban environments that protect historical and traditional heritage. These cities use information and communication technologies (ICTs) to improve urban planning, infrastructure management, and historical conservation. Sensors, data analytics, and smart grids are examples of digital technologies that increase resource utilization, traffic flow, and overall municipal services. The merging of augmented reality (AR) and virtual reality (VR) allows inhabitants and visitors to have immersive experiences that highlight the city's rich cultural legacy. Smart Heritage Cities prioritize the preservation of historical structures, objects, and traditions, striking a balance between modern conveniences and the need to maintain and promote the city's unique identity (Soler et al., 2019). Smart technologies contribute to sustainable development, transforming these cities into innovation models that harmoniously mix technology breakthroughs with cultural heritage protection.

### Conclusion:

In summary, information and communication technologies (ICTs) have the potential to transform education, give people more power, and create a vibrant digital society. Through adopting new technologies and encouraging ICT education, we can build a more affluent, inclusive, and connected future for everybody. ICTs are more than just tools; they are a revolutionary link that opens doors for the treasures of Indian knowledge to reach the bright minds of the twenty-first century. ICTs are essential to the growth of a country because they promote innovation, inclusivity, and connectedness while giving people and communities unparalleled access to resources and information. By appreciating the knowledge of the past and embracing technological progress, we open the door to a future in which age-old voices resound, enhancing our lives and showing the way toward a livelier, globally interconnected society.

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