

# Transforming English Language Learning in Teacher Education through Indian Knowledge Systems and Artificial Intelligence

Sutapa Kar<sup>1</sup>, DR. Kalitoli K Chishi<sup>2</sup>

<sup>1</sup>Research Scholar, Faculty of Education, ICFAI University Tripura

<sup>2</sup>Assistant Professor, Faculty of Education, ICFAI University Tripura

## ABSTRACT

This study explores the integration of Artificial Intelligence (AI) and Indian Knowledge Systems (IKS) to transform English language learning in teacher education. The rapid expansion of digital technologies has reshaped teaching and learning, creating the need for culturally responsive and technology-enhanced pedagogies. While AI offers personalised learning, adaptive assessment, and intelligent tutoring systems, existing approaches often lack cultural grounding and contextual relevance. At the same time, IKS provides holistic, value-based, and community-centred learning traditions that can enrich English language teaching and promote intercultural competence. However, research integrating AI, English language learning, and IKS remains fragmented and largely conceptual, with limited empirical and classroom-based studies. This review synthesises recent scholarship to examine how AI tools can support multilingual learning, inclusive education, and teacher professional development while preserving indigenous knowledge traditions. The study also highlights the role of teacher education in developing competencies that combine pedagogy, culture, and technology through frameworks such as TPACK. By analysing current literature, the study identifies key gaps, including the absence of validated frameworks, limited focus on ethical AI use, and insufficient attention to teacher readiness and culturally responsive AI tools. The findings suggest that integrating AI with IKS can create inclusive, ethical, and context-sensitive English language learning environments aligned with the goals of the National Education Policy 2020 and global digital education initiatives. Overall, the study proposes a conceptual direction for future research and practice to support culturally grounded innovation, equitable access to learning, and the preparation of future-ready teachers in India.

**Keywords:** Indian Knowledge Systems (IKS), Artificial Intelligence in Education (AI), English Language Learning, Teacher Education, Technology-Enhanced Learning

## Introduction:

The rapid expansion of digital technologies and artificial intelligence (AI) has transformed the landscape of teacher education and language learning across the world. In this context, rethinking English language education through culturally responsive frameworks has become increasingly important. The integration of Indian Knowledge Systems (IKS) with AI offers a promising pathway to create inclusive, ethical, and context-sensitive English language learning environments. The National Education Policy 2020 emphasises the revitalisation of indigenous knowledge and multilingual education as key priorities for

transforming Indian education (Government of India, 2020). At the same time, AI-driven tools are reshaping pedagogical practices by enabling personalised learning, intelligent assessment, and adaptive teaching systems (UNESCO, 2021).

Teacher education plays a central role in this transformation because teachers must develop the competencies required to integrate culture, pedagogy, and technology effectively. The Technological Pedagogical Content Knowledge (TPACK) framework proposed by Punya Mishra and Matthew J. Koehler highlights the importance of blending technological, pedagogical, and content knowledge for meaningful technology integration. However, existing approaches often overlook indigenous epistemologies and culturally grounded learning practices.

IKS including traditions such as storytelling, community-based learning, and holistic knowledge systems can enrich English language teaching by fostering contextualised communication, intercultural competence, and critical thinking. Integrating AI with IKS in teacher education can support multilingual learning, culturally responsive pedagogy, and equitable access to educational resources. Therefore, this study explores how combining AI and IKS can transform English language learning in teacher education by promoting inclusive, ethical, and culturally grounded teaching practices for the 21st century.

### **Operational definition:**

#### **Indian Knowledge Systems (IKS):**

Indian Knowledge Systems (IKS) represent India's traditional and indigenous knowledge developed across fields such as education, health, ecology, and philosophy. The Ministry of Education (2020) emphasises integrating IKS into modern education to promote culturally rooted and value-based learning through the National Education Policy. The Indian Knowledge Systems Division supports research and curriculum development to connect traditional wisdom with contemporary education (Kapoor & Sharma, 2021).

#### **Artificial Intelligence in Education (AI):**

Artificial Intelligence (AI) in education refers to the use of intelligent technologies to support personalised learning, automated assessment, and data-driven decision-making. According to UNESCO (2021), AI can enhance teaching efficiency, expand access to quality learning, and reduce educational inequality. Similarly, NITI Aayog (2018) highlights AI's potential to transform India's education system by enabling adaptive learning, intelligent tutoring, and digital skill development.

#### **English Language Learning:**

English language learning refers to the process of developing skills in listening, speaking, reading, and writing to communicate effectively in global contexts. It is widely recognised as a key tool for international communication, education, and employment. The British Council (2013) notes that English proficiency supports access to global knowledge, academic mobility, and career opportunities. Additionally, organisations such as the United Nations use English as a working language, highlighting its importance in global cooperation and intercultural communication.

#### **Teacher education:**

Teacher education refers to the formal preparation and continuous professional development of teachers to improve their pedagogical knowledge, subject expertise, and classroom practices. The UNESCO (2020)

emphasises that effective teacher education is essential for achieving quality and inclusive education worldwide. In India, the National Council for Teacher Education highlights the need for innovative, technology-integrated, and learner-centred teacher training to meet 21st-century educational demands.

### **Technology-Enhanced Learning:**

Technology-Enhanced Learning (TEL) refers to the use of digital tools, online platforms, and multimedia resources to improve teaching and learning experiences. According to UNESCO (2021), TEL promotes flexible, personalised, and accessible education by supporting online learning, blended learning, and digital collaboration. The Organisation for Economic Co-operation and Development (2019) highlights that technology can enhance student engagement, digital skills, and lifelong learning opportunities.

### **Rational of the study:**

1. To examine the current status of English language teaching in teacher education
2. To explore the role of Indian Knowledge Systems in English language pedagogy
3. To investigate the potential of Artificial Intelligence in English language learning
4. To analyse the integration of AI and IKS in teacher education
5. To develop a conceptual framework

### **Critical Analysis of English Language learning in Indian Knowledge systems:**

Recent research highlights an increasing convergence of English language learning, Artificial Intelligence (AI), and Indian Knowledge Systems (IKS). AI innovations such as MLP–LSTM speech recognition models show strong potential for enhancing English learning through personalised feedback and improved reading and speaking support, although many studies still prioritise technological performance over classroom application and cultural relevance (Orosoo et al., 2024). At the same time, IKS research emphasises its roots in holistic, multidisciplinary traditions derived from classical texts like the Vedas and Upanishads, with scholars advocating its integration into modern education to promote cultural identity, ethical values, and sustainable innovation (Mandavkar, 2023; M. K. et al., 2023; Aithal & Srinivasan, 2025; Khan & Sharma, 2024). Digital technologies are increasingly viewed as powerful tools for preserving and sharing IKS globally, though concerns about privacy, equity, and cultural misrepresentation remain significant (Pareek, 2025; Agase et al., 2025). Studies combining TPACK and IKS further reveal that technology integration often lacks deep cultural contextualisation, underscoring the need for community-driven and culturally responsive pedagogies (Deb et al., 2026). Additionally, research on pedagogical knowledge stresses the complexity of English teaching and the importance of holistic teacher development (Dadvand & Behzadpoor, 2020). Overall, the literature points to strong potential for integrating AI, English learning, and IKS while highlighting the need for empirical evidence, ethical frameworks, and culturally grounded teaching models.

### **Critical Analysis of Artificial Intelligence in Indian Knowledge Systems:**

Recent studies highlight the expanding role of Artificial Intelligence (AI) in transforming education, offering important insights for its integration with Indian Knowledge Systems (IKS). AI-powered tools such as neural network–based reading systems have shown improvements in learning efficiency, time management, and personalised learning in English language and literature (Chen, 2024), while systematic reviews of AI in school science reveal positive impacts on achievement, teaching practices, and skill development through intelligent tutoring, adaptive learning, and chatbots, though ethical concerns and

limited focus on user experience remain (Heeg & Avraamidou, 2023). Human-centred approaches in higher education emphasise ethical AI frameworks that prioritise privacy, interoperability, and collaboration between teachers, students, and AI tools to support equitable and personalised learning (Airaj, 2024; Albalawi, 2020). Co-design research further identifies practical AI intervention points in classroom teaching, ensuring alignment with real pedagogical needs (Belghith et al., 2025). AI also supports inclusive education, particularly for students with ADHD, by enhancing self-regulation and academic performance while raising concerns about data governance and institutional readiness (Deep et al., 2025). Bibliometric evidence confirms rapid growth in AI research in STEM education, focusing on personalised learning and instructional automation (Jantakun et al., 2024). Overall, the literature indicates strong potential for integrating AI with IKS to promote inclusive, ethical, and personalised education, while highlighting the need for greater cultural contextualisation, ethical governance, and real-world implementation.

### **Comparison between English Language learning and Artificial intelligence in Indian Knowledge Systems:**

English language learning and Artificial Intelligence (AI) play complementary yet distinct roles in strengthening and globalising Indian Knowledge Systems (IKS). English primarily acts as a global communication bridge that enables the translation, documentation, and international dissemination of indigenous knowledge. Through English, traditional knowledge such as Ayurveda, Yoga, and philosophical texts can reach global academic, cultural, and policy communities, enhancing visibility and cross-cultural dialogue. However, the use of English also raises concerns about cultural misinterpretation, Western dominance in knowledge production, and the risk of losing indigenous linguistic richness if not handled sensitively.

In contrast, AI contributes mainly as a technological enabler that transforms how IKS and English learning are taught, accessed, and preserved. AI-driven tools such as speech recognition, intelligent tutoring systems, adaptive learning platforms, and analytics improve personalised learning, accessibility, and efficiency in education. AI also supports inclusive learning environments, enhances teacher productivity, and enables large-scale digital preservation of indigenous knowledge resources. Nevertheless, AI integration brings ethical challenges, including data privacy, algorithmic bias, digital divides, and the need for responsible governance.

While English focuses on communication, global reach, and knowledge exchange, AI focuses on innovation, personalisation, and scalability in learning environments. Both share common goals of expanding access, supporting lifelong learning, and promoting interdisciplinary education. When combined, English and AI can create culturally responsive, globally connected, and technologically advanced models of education. However, successful integration requires culturally grounded pedagogies, ethical frameworks, teacher training, and empirical research to ensure that technological innovation respects and sustains indigenous knowledge traditions.

### **Research Gap:**

- Lack of empirical studies integrating AI, English language learning, and Indian Knowledge Systems (IKS) in a single pedagogical framework.
- Limited research on teacher education focused on AI- and IKS-based English language pedagogy.

- Insufficient classroom-based implementation studies; most research remains conceptual or technology-focused.
- Absence of a validated conceptual framework combining AI, IKS, and English language teaching.
- Limited focus on culturally responsive AI tools tailored to Indian educational contexts.
- Lack of research on ethical and responsible AI use in IKS-based language education.
- Minimal exploration of teacher readiness, training, and digital competence for integrating AI and IKS.
- Insufficient attention to student learning outcomes and engagement in AI-IKS-supported English learning.
- Limited studies from the Global South/Indian context, creating a geographical research gap.
- Lack of interdisciplinary models linking pedagogy, technology, and indigenous knowledge.

### Need of the Study:

1. **Culturally responsive teacher education:** English language teacher education in many contexts still relies heavily on Western pedagogical models. There is a strong need to integrate Indian Knowledge Systems (IKS) so that future teachers can connect English learning with local culture, values, and indigenous epistemologies.
2. **Bridging the gap between tradition and technology:** Artificial Intelligence (AI) is rapidly transforming education, but its integration often ignores indigenous and culturally grounded knowledge. This study is needed to create a balanced framework where AI enhances rather than replaces traditional knowledge systems.
3. **Addressing limitations of existing ELT frameworks:** Current models like TPACK focus on technology integration but do not adequately consider cultural knowledge or lifelong-learning perspectives. A new approach is needed that combines pedagogy, technology, and indigenous knowledge for holistic teacher preparation.
4. **Supporting personalised and inclusive learning:** AI enables adaptive learning, real-time feedback, and data-driven instruction. Integrating AI with IKS can make English learning more inclusive, especially for diverse learners from rural and indigenous backgrounds.
5. **Promoting sustainable and ethical education:** IKS emphasizes sustainability, community learning, and ethical knowledge use. Combining these values with AI can support responsible technology use and align education with sustainable development goals.
6. **Strengthening Global South perspectives:** Most research on AI in education is dominated by Global North contexts. This study is needed to contribute empirical and conceptual insights from India and similar contexts.
7. **Enhancing teacher readiness for future classrooms:** Future teachers must be equipped with interdisciplinary competencies that combine cultural awareness, digital literacy, and innovative pedagogy.

### Role of English Learning globally:

English plays a central role in global communication, education, and economic development. It is widely recognised as the world's lingua franca, enabling interaction among people from diverse linguistic backgrounds (Crystal, 2003). International organisations such as the United Nations use English as one of their official working languages, highlighting its importance in diplomacy and global cooperation.

In education, English dominates academic publishing and international higher education. According to the British Council (2013), English is the primary language of scientific research, global scholarship, and online learning resources. Proficiency in English allows students and teachers to access international journals, participate in academic exchanges, and engage in cross-border collaboration.

Economically, English skills are strongly linked to employability and career mobility. Global businesses and multinational companies frequently adopt English as their working language, facilitating trade and professional communication (Graddol, 2006). In the digital era, English is also the most common language of the internet, technology, and artificial intelligence, enabling individuals to participate in the global knowledge economy.

Overall, English learning supports intercultural communication, global citizenship, and lifelong learning, making it a key competence in the 21st century.

### **Importance of AI in contemporary education system in India:**

Artificial Intelligence (AI) is playing a transformative role in the contemporary education system in India by improving access, quality, efficiency, and future readiness. The National Strategy for AI developed by NITI Aayog highlights education as a key sector where AI can support large-scale digital transformation and innovation. AI enables personalised learning by analysing student performance and delivering adaptive content, intelligent tutoring, and real-time feedback, allowing learners to progress at their own pace and addressing diverse learning needs in multilingual and socio-economically varied classrooms (Luckin et al., 2016). AI also enhances teacher productivity through automated assessment, data-driven insights, and administrative support, helping teachers focus more on student engagement and creative pedagogy. The introduction of AI as a subject by the Central Board of Secondary Education reflects the growing importance of digital and computational skills for future careers. Moreover, AI supports inclusive education by enabling speech recognition, translation, and assistive technologies that benefit learners with disabilities and those from different linguistic backgrounds. According to UNESCO (2021), AI has strong potential to reduce educational inequality and expand access to quality learning resources in developing countries. Overall, AI is helping India move toward a more adaptive, inclusive, and skill-oriented education system that prepares learners for the demands of the digital economy and lifelong learning.

### **Conclusion:**

This review highlights the emerging need to rethink English language teacher education through the integration of Indian Knowledge Systems (IKS) and Artificial Intelligence (AI). The analysis indicates that while AI is rapidly transforming educational practices through personalised learning, adaptive assessment, and data-driven decision-making, its application often lacks cultural grounding. At the same time, IKS offers rich pedagogical traditions rooted in holistic learning, community engagement, sustainability, and ethical knowledge practices. Bringing these two domains together presents a powerful opportunity to create culturally responsive and technologically enhanced teacher education.

The review further demonstrates that existing frameworks in English Language Teaching (ELT) and technology integration do not sufficiently address the intersection of cultural knowledge, lifelong learning, and complex-system perspectives. This gap limits the development of future-ready teachers who can respond to diverse classrooms and local educational needs. Integrating AI with IKS can help bridge this divide by supporting inclusive, context-sensitive, and learner-centred teaching practices.

Importantly, the study finds that there are limited review studies that systematically examine the convergence of AI, IKS, and English language teacher education. Most existing literature treats these areas separately, resulting in fragmented understanding and lack of comprehensive frameworks. This scarcity of reviews highlights the urgency for further conceptual and empirical research.

In conclusion, combining AI with Indian Knowledge Systems has the potential to transform teacher education by fostering culturally grounded innovation, ethical technology use, and inclusive learning environments. Future research should focus on developing practical models, conducting empirical validation, and exploring implementation strategies across diverse educational contexts.

### Reference:

1. Agase, A., Shinde, N., & Rodage, A. T. (2025). Reclaiming Identity: The role of English in showcasing Indian knowledge systems at the international level. *Research Review Journal of Indian Knowledge Systems.*, 2(2), 194–200. <https://doi.org/10.31305/rrjiks.2025.v2.n2.020>
2. Airaj, H. (2024). Human-centred artificial intelligence in higher education: Ethical frameworks for equitable and personalised learning. *AI & Education Journal*.
3. Airaj, M. (2024). Ethical artificial intelligence for teaching-learning in higher education. *Education and Information Technologies*, 29(13), 17145–17167. <https://doi.org/10.1007/s10639-024-12545-x>
4. Aithal, S., & Srinivasan, D. R. (2025). Ancient Indian Knowledge Systems as Catalysts for Technological Innovation: Bridging Tradition with Digital Transformation. In *Zenodo (CERN European Organization for Nuclear Research)*. <https://doi.org/10.5281/zenodo.18357138>
5. Albalawi, A. (2020). Ethical considerations and governance of artificial intelligence in education. *International Journal of Educational Technology*.
6. Albalawi, A. S. (2020). Integrating AI into Education: Perspectives from Mathematics Teachers. *International Journal of Research in Education and Science*, 11(4), 896–921. <https://doi.org/10.46328/ijres.1316>
7. Belghith, Y., Riedl, M., Moore, R., Alemdar, M., & Roberts, J. (2025). Exploring AI intervention points in high-school engineering education: research through co-design approach. *Information and Learning Sciences*, 126(7–8), 472–490. <https://doi.org/10.1108/ils-04-2024-0042>
8. Bhattacharya, A., Shenolikar, S., & Hebbani, S. (2021). Exploring the significance of Indian logic in overcoming contemporary limitations in the Indian education system. *Asia Pacific Journal of Education*, 43(3), 805–819. <https://doi.org/10.1080/02188791.2021.1987186>
9. Chen, X. (2024). The role of artificial intelligence in English Language and Literature reading management. *International Journal of Information and Communication Technology Education*, 20(1), 1–16. <https://doi.org/10.4018/ijicte.343319>
10. Dadvand, B., & Behzadpoor, F. (2020b). Pedagogical knowledge in English language teaching: A lifelong-learning, complex-system perspective. *London Review of Education*, 18(1). <https://doi.org/10.18546/lre.18.1.08>
11. Deb, J. P., Choudhury, S., Sofal, F. A., & Pradhan, P. (2026). Integrating TPACK with IKS (Technological Pedagogical Content Knowledge with Indian Knowledge Systems): A Scoping Review. *INTERNATIONAL JOURNAL OF RESEARCH AND ANALYTICAL REVIEWS*, 13(1). <https://doi.org/10.56975/ijrar.v13i1.326627>
12. Deep, P. D., Ghosh, N., & Natoli, A. P. (2025). Artificial Intelligence for Supporting College Students with Attention-Deficit/Hyperactivity Disorder: Cognitive, Emotional, and Ethical

- Perspectives </b> *International Journal on Social and Education Sciences*, 8(1), 1–17. <https://doi.org/10.46328/ijonses.5915>
13. Heeg, D. M., & Avraamidou, L. (2023). The use of Artificial intelligence in school science: a systematic literature review. *Educational Media International*, 60(2), 125–150. <https://doi.org/10.1080/09523987.2023.2264990>
  14. Jantakun, T., Jantakun, K., & Jantakoon, T. (2024). Bibliometric analysis of artificial intelligence in STEM Education. *Higher Education Studies*, 15(1), 69. <https://doi.org/10.5539/hes.v15n1p69>
  15. Khan, S., & Sharma, M. (2024). An overview on Indian knowledge System. *Integrated Journal for Research in Arts and Humanities*, 4(4), 42–46. <https://doi.org/10.55544/ijrah.4.4.7>
  16. M, M. K., Aithal, P. S., & S, S. K. R. (2023). Literature Review on Indian Ancient University in Imparting Holistic and Multidisciplinary: to Create Indian Knowledge System (IKS). *International Journal of Philosophy and Languages (IJPL)*, 1–17. <https://doi.org/10.47992/ijpl.2583.9934.0009>
  17. Mandavkar, P. (2023). Indian Knowledge System (IKS). *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.4589986>
  18. Nigam, A., & Chandra, S. (2025). Revisiting Dharma in Ancient Indian Knowledge Tradition and Jurisprudential Inquiry: a textual-based analysis. *Asian Journal of Legal Education*, 13(1), 30–46. <https://doi.org/10.1177/23220058251382111>
  19. Orosoo, M., Raash, N., Treve, M., Lahza, H. F. M., Alshammry, N., Ramesh, J. V. N., & Rengarajan, M. (2024). Transforming English language learning: Advanced speech recognition with MLP-LSTM for personalized education. *Alexandria Engineering Journal*, 111, 21–32. <https://doi.org/10.1016/j.aej.2024.10.065>
  20. Pareek, B. M. (2025). Digital Tools and Technology for Promoting the Indian Knowledge System: A Research-Based Analysis. *Zenodo (CERN European Organization for Nuclear Research)*. <https://doi.org/10.5281/zenodo.17242584>
  21. UNESCO. (2021). AI and education: Guidance for policy-makers. Paris: UNESCO.