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The Integration of Emerging Technologies and Digital Platforms in Sanskrit Language Pedagogy: A Systematic Literature Review

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Abstract

This systematic literature review examines the integration of contemporary digital technologies, e-learning platforms, and Artificial Intelligence (AI) into Sanskrit language pedagogy. While modern languages have widely adopted digital and AI-driven instructional tools, classical and morphologically complex languages like Sanskrit present unique educational opportunities and structural challenges. Guided by the Technological Pedagogical Content Knowledge (TPACK) framework, this study investigates how these emerging digital environments can be effectively merged with traditional pedagogical methods to enhance instructional practices, educator preparedness, and student learning outcomes. Adopting a rigorous Systematic Literature Review (SLR) methodology, the research synthesizes empirical data from peer-reviewed studies focused on digital language instruction, e-learning applications in complex languages, and the technological readiness of educators. The thematic analysis reveals three primary findings. First, the continuous use of e-learning platforms and generative AI significantly improves language proficiency and cognitive capabilities, facilitating a transition in Sanskrit education from traditional rote memorization to dynamic, interactive learning. Second, a critical gap exists in educator preparedness; although technological self-efficacy is gradually increasing, language teachers require targeted professional development to effectively translate theoretical digital knowledge into practical, real-time classroom scaffolding. Third, the adoption of Large Language Models (LLMs) in academia introduces profound ethical challenges regarding academic integrity, fairness, and student dependency, which necessitates robust institutional oversight and human monitoring. The study concludes that the successful digitization of Sanskrit education relies heavily on enhancing instructors' TPACK and implementing formalized AI policies within school curricula. Ultimately, a balanced, critical pedagogy is required to honor Sanskrit's rich structural legacy while equipping learners with the essential 21st-century digital fluency.

Keywords: *Sanskrit Pedagogy E-Learning Artificial Intelligence TPACK Framework Digital Literacy*

Introduction:

Digital technologies, AI and Large Language Models are rapidly developing and integrating and dramatically altering the worldwide education scene (Almufarreh et al., 2025). Current research is focused on popular worldwide languages but application of these new technologies to classical and morphologically complicated languages like Sanskrit present a different set of educational potential and problems (Ayanwale et al., 2025). This systematic literature review explores the effects of contemporary digital technologies, e-learning platforms, and AI-based frameworks on teaching methodologies, teacher preparation, and student success in Sanskrit education (Dahri et al., 2024). The technology and Sanskrit education have had few intersections historically compared to English or any other modern foreign language. Empirical research have shown that the prolonged use of e-learning platforms can considerably increase students' language proficiency in

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morphologically complex and classical languages such as Sanskrit, Hindi, Japanese and Korean (Librenjak, Kocijan, & Janjic, 2016). More broadly, digital pedagogy has seen the successful application of digital storytelling, digital literacy assessment and communicative approaches in the domain of foreign languages by educators (Al-Amri, 2020; Alakrash & Razak, 2021). Moreover, elementary teachers and academic instructors are incorporating digital technology to develop strong and interactive practices (Aleksieva et al., 2025; Karsenti et al., 2020). The move from static Computer-Assisted Language Learning programs to dynamic AI-powered educational environments needs an assessment of these tools' ability to handle the intricate grammatical structures of the Sanskrit language. Karataş et al. (2024) argues that technologies offer a revolutionary teaching paradigm for early adolescents and university students that mimic tailored and human-like interventions.

Background of the Study:

The use of technology in the pedagogy of Sanskrit is necessary for the modernisation of the teaching and making the language more accessible to the learners of today. Modern language training requires active learning and systematic inquiry. This can be greatly supported by conversational design choices in Large Language Model such as tale and Socratic procedures (Bhuttah et al., 2024; Bucklin et al., 2021). AI-assisted problem-based learning provides a way for educators to combine old educational traditions with modern digital interfaces for deeper cognitive engagement (Mukesh et al., 2020). Moreover, generative AI platforms can be the potential digital language assistants that can help promote the self-determination theory and improve student engagement (Slamet, 2024).

Rationale of the Study:

The use of generative AI and digital e-learning in education is generally applauded, but there is no empirical synthesis on its organised usage in classical language studies. Moreover, we lack enough information about the range of factors influencing the evolution of large-scale language models in low resource and rural educational contexts (Goyal et al., 2025). These gaps have been identified by studies conducted by Goyal et al. Furthermore, the ethical issues associated with the use of Artificial Intelligence models in institutions need to be addressed, especially its impact on regulatory frameworks and the digital divide (Chan, 2023; Kormos & Wisdom, 2023).

Theoretical Framework:

This systematic review was guided by the Technological Pedagogical Content Knowledge (TPACK) framework. The TPACK paradigm claims that effective teaching using technology is achieved through the intersection of Technological Knowledge, Pedagogical Knowledge and Content Knowledge.

- It is vital to improve Technological Pedagogical Content Knowledge of educators through technology enhanced content and language integrated learning teaching (Adipat, 2021).
- Teachers' intention to employ artificial intelligence positively connects to their digital competence and attitudes towards TPACK frameworks (Alieto et al., 2024).
- Theoretical frameworks in higher education need to be systematically structured in order to sustain the empirical validity and operational logic of educational research (Daniel & Harland, 2017).

Synthesis of these domains for Sanskrit teachers implies mastery of digital platforms not merely as tools for information delivery but as structural tools that clarify complicated morphological norms without compromising traditional pedagogical ideals.

Research Question:

How contemporary digital technologies, e-learning platforms and AI based models may be effectively combined with classical pedagogical frameworks to increase learning outcomes and instructional methodologies in Sanskrit language education?

Objectives of the Research:

1. To investigate the effect of frequent use of e-learning tools on student language performance and acquisition in Sanskrit (Librenjak, Kocijan, & Janjic, 2016).
2. Evaluate language teachers' TPACK and readiness to use developing digital tools in classroom education (Adipat, 2021).
3. To identify the instructional benefits, such as better critical thinking, as well as the ethical issues of adopting digital environments in academia (Almufarreh et al., 2025).

Methodology of Research:

This study adopts a Systematic Literature Review (SLR) technique to provide a robust, transparent and replicable synthesis of the extant empirical studies. SLRs are of great importance in educational research because they combine information from several domains to form coherent paradigms.

In higher education research methodology, the research process must be done in a rigorous step-by-step manner so that selection bias is reduced and qualitative findings are validated (Daniel & Harland, 2017). A systematic research approach helps researchers to progress from simply observing to the development of instructional strategies, and is a key feature of contemporary educational enquiry (Daniel & Harland, 2017).

Search Strategy and Sources of Data:

Electronic databases were examined extensively for peer-reviewed papers. The search employed factors consistent with digital competency, digital innovation in language education, and teachers' readiness to integrate 21st century learning (Rubio-Gragera et al., 2023; Tyan et al., 2020).

Criteria for Inclusion and Exclusion:

Studies were included if they reported empirical data that specifically addressed language instruction, e-learning in complex/classical languages, or the technological preparedness of language teachers. To fill the gaps in the literature, studies summarising the use of digital platforms in general language training, e.g., case studies of Zoom or augmented reality applications, were presented (Belda-Medina & Calvo-Ferrer, 2022; Cheung, 2021).

Thematic Analysis and Discussion:

Theme 1: E-Learning and its Effect on Acquisition: The move from traditional rote learning to digital contexts brings significantly beneficial consequences for classical language learners.

- Empirical research suggests that persistent use of e-learning platforms increases language proficiency in Sanskrit and comparable morphological languages (Librenjak, Kocijan, & Janjic, 2016).
- Generative Artificial Intelligence further affects cognitive capabilities by giving students with quick replies, enabling interactive rather than passive reading environments (Essel et al., 2023; Borchers et al., 2026).

Theme 2: Educator Preparedness, Digital Literacy and TPACK: One subject that recurs in the literature is the varying readiness of educators to adopt new technologies.

- Teachers' pedagogical orientation and technological self-efficacy are key factors influencing their use of technology in online and digital classrooms (Souza, 2021; Taghizadeh & Yourdshahi, 2020).
- However, despite pre-service teachers' reported rise in readiness in computer-assisted language learning, the transfer of theoretical knowledge to practical and real-time scaffolding is obviously lacking (Park & Son, 2020).
- The process-oriented approaches stress the need for intensive graduate training in the design of digital materials to attain the real technological competence (Metzner et al., 2025).

Theme 3: Ethical challenges and pedagogical innovations: The adoption of new-age technologies has both cognitive benefits and structural tensions.

- Enabling dialogic social learning and memory consolidation via Socratic inquiry with conversational AI models (Patania et al., 2025; Neagu et al., 2026).
- However, the use of big language models in academia has significant ethical problems related to fairness, authenticity, and dependence of the students (Shahzad et al., 2024; Hossain, 2026; Zaimoğlu & Dağtaş, 2025).
- Tools that act as the "Shiksha Copilots" or AI assistants in education need human monitoring to prevent a collapse in academic integrity, especially when generating structurally complicated lessons (Dennison et al., 2025; Nygren et al., 2025; Hauk & Soujon, 2025).

Implications for Education:

The results of this systematic review have important and practical significance for the stakeholders of classical and global language education. By focusing on these characteristics, schools may convert Sanskrit teaching from rote learning to a dynamic, tech driven and fluid process.

Chan (2023) advocates for schools to have a formalised approach of teaching AI policy within the normal lectures. This is part of the process of modifying the course and setting new regulations. E-learning should play an important role in the curriculum of Sanskrit. The lessons should include digital tools and mobile-assisted project-

based learning should be immediately included to the criteria for fundamental communication skills (Benlaghrissi & Ouahidi, 2024; Jeong, 2022).

- **Teacher Training and Professional Development:** Current and future instructors need to know more about technological pedagogical content in order to improve the digital advantage. Training programs could train teachers on the technical use of software, and how the AI interventions impact students' critical thinking and cognitive load (De La Puente et al., 2024).
- **Mental Health and Student Engagement:** The use of AI technologies should be intentionally targeted at improving academic engagement and mental health, lowering the anxiety that is often associated with learning difficult classical languages.

Conclusion:

This systematic literature study provided a thorough synthesis of the junction of developing digital technologies, generative Large Language Models, and the traditional teaching of Sanskrit. There is conclusive evidence that the incorporation of continuous e-learning platforms considerably boosts students' language performance, closing the gap between historical grammatical traditions and modern digital literacy (Librenjak, Kocijan, & Janjic, 2016). AI-based conversational bots are revolutionary instructional tools that reduce emotive filters, personalise early stages of language acquisition, and encourage deeper Socratic inquiry.

On the other hand, to recognise that potential, it is required to surmount massive structural impediments. There is a need for strong institutional regulatory frameworks as the ethical concerns of ChatGPT and Large Language Model-assisted writing in academia pose significant challenges to academic integrity and intellectual authenticity (Almufarreh et al., 2025; Chan, 2023). "The success of the digitisation of teaching Sanskrit will depend a lot on the willingness of the teachers. An important component is to improve the Technological Pedagogical Content Knowledge (TPACK) of instructors (Adipat, 2021). The technology benefits won't translate into cognitive benefits without targeted professional development to prepare instructors to assess AI as a collaborative teaching partner, not as a passive novelty. Ultimately, the integration of these instruments calls for a balanced, critical pedagogy, one that respects the enormous structural legacy of Sanskrit while equipping its learners with the digital fluency expected of the 21st century.

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