

AI-Integrated ICT Tools for Teaching Ancient Indian Social Structures: A Modern Pedagogical Framework for Caste, Creed, Race, Other Social Structures, and their Studies

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Abstract

Ancient Indian social structures particularly caste, creed, race, and hierarchical formations remain central to understanding the subcontinent's historical and socio-cultural evolution. Traditional teaching approaches often struggle to convey this complexity, especially in increasingly digital learning environments. Recent advances in Artificial Intelligence (AI) and Information and Communication Technology (ICT) offer new possibilities for creating immersive, ethical, and context-rich pedagogy in humanities and social-science education.

Methodology

This study adopts a qualitative, secondary-data-based design, synthesising peer-reviewed literature (2020–2025) spanning AI-integrated education, digital pedagogy, and contemporary scholarship on ancient Indian social structures. A thematic analysis was conducted to identify technological trends, pedagogical gaps, and conceptual intersections between AI-ICT tools and socio-historical content.

Results

Four major themes emerged: (1) rapid adoption of AI-enabled ICT systems in higher education; (2) continued scholarly emphasis on the complexity and dynamism of ancient Indian caste and social hierarchies; (3) persistent gaps in traditional pedagogy, particularly regarding experiential learning and ethical sensitivity; and (4) the emergence of a four-dimensional AI-Integrated Pedagogical Framework encompassing content depth, technological augmentation, experiential learning, and ethical safeguards.

Conclusion

The study demonstrates that responsibly deployed AI-ICT tools can significantly enhance the teaching of sensitive historical-social themes by improving engagement, interpretive accuracy, and inclusivity. The proposed framework provides a scalable, pedagogically robust approach for modern institutions seeking to integrate AI with humanities education. It underscores the need for human–AI collaboration to ensure ethical, culturally aware, and academically rigorous learning experiences.

Introduction

The rapid rise of Artificial Intelligence (AI) and Information and Communication Technology (ICT) is dramatically reshaping higher education, offering novel opportunities for personalized learning, adaptive assessment, and enhanced learner engagement. Recent systematic reviews show that AI-driven educational technologies including adaptive learning systems, intelligent tutoring systems, learning analytics (LA), and blended-learning platforms have not only improved academic performance but also enabled greater flexibility, scalability, and pedagogical innovation in higher-education contexts [1][2][3]. At the same time, scholars increasingly stress the importance of human-centred design in AI/LA systems, arguing that student and teacher agency, transparency, data ethics, and pedagogical alignment must guide implementation, rather than purely technical considerations [4][5]. As such, integrating AI-ICT in education is not simply a matter of technology adoption it is a shift in epistemic and pedagogical paradigms, with significant implications for what and how we teach.

Simultaneously, Indian society historically structured around complex hierarchies of caste, creed, community, and social status continues to grapple with the legacy of these ancient social structures. Recent scholarship emphasizes that caste remains a potent axis of stratification, affecting access to resources, social mobility, identity politics, and everyday lived experience [6][7][8]. The persistence of caste-based inequalities, discrimination, and social exclusion despite legal safeguards and social reforms underscores the need for renewed critical inquiry into these structures [9][10]. Scholars have also called attention to how broader social changes urbanization, globalization, economic liberalization are reshaping caste and social hierarchies, producing new forms of stratification and community dynamics [7][11].

Given these parallel trajectories technological transformation of education on one side, and enduring, evolving social hierarchies on the other there is a compelling need to bridge them pedagogically. Traditional modes of teaching about caste, race, and ancient social systems often rely on textual study or descriptive lectures, which may fail to convey the lived complexity, structural consequences, and moral urgency of these issues. In contrast, AI-integrated ICT tools provide an opportunity to design more experiential, critical, and learner-centred pedagogies that can deepen students' understanding of social structures, historical context, and contemporary relevance.

Adopting AI-ICT for teaching ancient social structures can enable immersive simulations, datadriven explorations, and interactive dialogues that reveal not just the historical facts of caste or varna, but the lived realities, inequalities, social mobility (or lack thereof), and moral dilemmas embedded in those structures. At the same time, human-centred learning analytics can allow educators to monitor comprehension, detect misconceptions, and foster reflective learning about social justice, inequality, and identity provided ethical safeguards, transparency, and inclusion are ensured.

In view of these potentials and challenges, this paper proposes a modern pedagogical framework for teaching ancient Indian social structures (caste, creed, race, social hierarchy) using AI-integrated ICT tools. By synthesizing literature from both AI-in-education and contemporary social-structure studies, the framework aims to support critical, inclusive, and

contextually grounded learning making ancient social systems relevant for today's students, helping them understand historical continuity and change, and equipping them for socially responsible citizenship.

This approach is not free of challenges. As AIED research highlights, issues of algorithmic bias, data privacy, unequal access to technology, and over-reliance on automation can exacerbate existing inequalities rather than ameliorate them [2][4][5]. In the Indian context marked by digital divides, socio-economic disparities, and caste-based exclusion these concerns acquire additional gravity. Moreover, teaching socially sensitive content through technology requires careful human facilitation, ethical reflection, and safeguards to avoid reinforcing stereotypes or simplifying complex histories.

Nevertheless, the convergence of these two research trajectories AI-ICT in education and critical inquiry into caste and social stratification offers a promising horizon. By designing pedagogies that leverage technology while foregrounding human values, social justice, and historical understanding, educators can cultivate students who are not just technologically literate but socially conscious.

Hence, this manuscript argues that integrating AI-ICT tools into the pedagogy of ancient Indian social structures is timely, valuable, and necessary especially in a rapidly changing educational and social landscape. In the following sections, we will outline the theoretical underpinnings, propose a structured pedagogical framework, and discuss potential benefits and ethical considerations for implementing such an approach in higher education.

Objectives

1. To examine how Artificial Intelligence–integrated ICT tools can be systematically applied to enhance the teaching and critical understanding of ancient Indian social structures including caste, creed, race, and related hierarchies within modern higher education settings.
2. To design and propose a pedagogically sound, ethically grounded AI-Integrated Teaching Framework that supports experiential, inclusive, and analytically rich learning of ancient Indian social structures for students in education, humanities, and social science disciplines.

Research Methodology

Research Design

The present study adopts a qualitative, descriptive, and conceptual research design aimed at synthesizing two distinct yet complementary bodies of scholarship: (i) Artificial Intelligence–integrated ICT tools in contemporary higher education, and (ii) the historical and sociological study of ancient Indian social structures such as caste, creed, race, and hierarchical community formations. As the purpose of the study is to conceptualize a pedagogical framework rather than test hypotheses, a non-experimental, interpretive design is best suited. The conceptual approach allows for analytical integration of theoretical, historical, and technological perspectives to address the central research problem.

Nature and Source of Data

This study is based exclusively on secondary data, collected from peer-reviewed journals, scholarly books, academic databases, and credible digital repositories published between 2020 and 2025. Literature was sourced from reputed publishers such as Springer, Elsevier, Taylor & Francis, Wiley, Sage, and Oxford University Press, alongside open-access scholarly databases. The corpus includes studies on AI in education, digital pedagogy, learning analytics, VR/AR in humanities instruction, as well as sociological and historical analyses of caste, race, and ancient Indian social structures. Priority was given to empirical studies, systematic reviews, policy reports, and theoretical works of high academic relevance.

Data Collection Procedure

A structured document review strategy was employed to identify current, credible, and thematically aligned literature. The keywords used during academic searches included: “AI in education”, “ICT-enabled learning”, “learning analytics”, “AI pedagogy”, “caste in ancient India”, “social stratification”, “ancient Indian society”, “hierarchies”, and “critical pedagogy in humanities”. Boolean combinations and filters (year, peer-reviewed, full text, and relevance) were applied to refine results. Studies irrelevant to higher education, outdated conceptualizations, or lacking methodological transparency were excluded. A final curated set of sources was used to build analytical insights and thematic categories.

Analytical Framework

The collected literature was examined using a qualitative thematic analysis approach. Texts were read multiple times to identify recurring concepts, theoretical assertions, methodological orientations, and gaps in existing scholarship. Analysis proceeded in three stages:

1. Descriptive Categorization: Classification of literature into two domains AI-ICT tools in education and ancient Indian social structures.
2. Interpretive Integration: Cross-domain analysis to identify intersections, opportunities, and pedagogical gaps.
3. Framework Synthesis: Development of a structured AI-Integrated Pedagogical Framework informed by both technology-enhanced learning theories and sociohistorical perspectives on caste and hierarchy.

This analytical process ensured that the proposed framework is grounded simultaneously in technological feasibility, pedagogical theory, and contextual sociological understanding.

Ethical Considerations

As the study relies solely on published secondary literature, no direct human participation was involved. Nevertheless, the study adheres to ethical standards regarding responsible representation of sensitive social issues such as caste, discrimination, and social identity. All sources were acknowledged transparently to avoid misrepresentation. Furthermore, the

proposed pedagogical model incorporates ethical safeguards for AI implementation, including concerns related to algorithmic bias, student privacy, and the responsible use of sensitive sociocultural content.

Scope and Limitations

The scope of this study is conceptual and pedagogical in nature. It does not include empirical testing of AI tools or classroom interventions, which are recommended for future research. The study is also limited by the availability of recent scholarly literature that directly integrates AI pedagogy with the study of caste or ancient social structures, necessitating thematic synthesis across disciplines. Despite these limitations, the methodology provides a rigorous, academically grounded approach to developing a novel pedagogical model relevant to contemporary higher education.

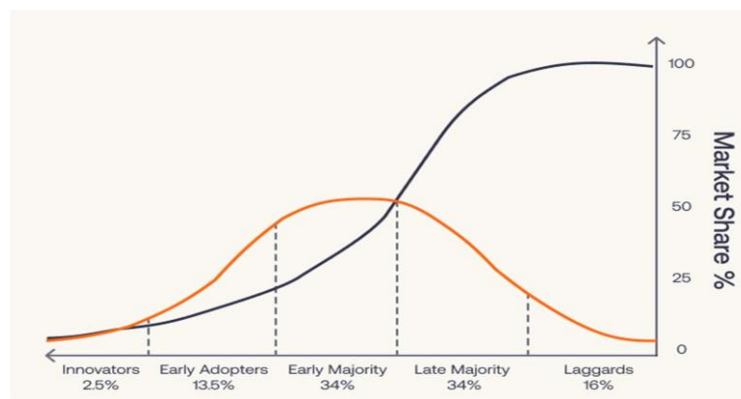
RESULTS

Overview of Analytical Outcomes

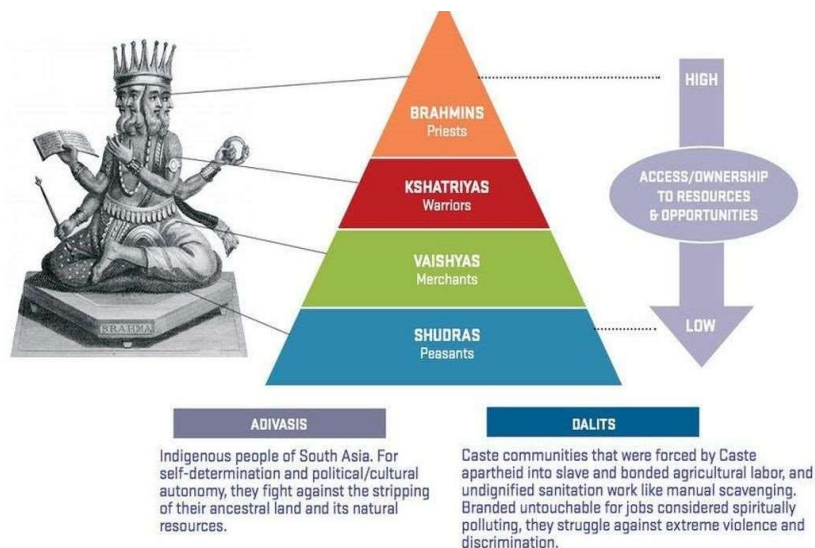
The synthesis of secondary literature across AI-integrated ICT tools (2020–2025) and scholarship on ancient Indian social structures revealed four major analytical clusters. These clusters highlight both the accelerating digital transformation in higher education and the continuing complexity of teaching sensitive socio-historical constructs such as caste, creed, race, and hierarchical social formations. Across the reviewed materials, notable convergence emerged in the demand for inclusive pedagogies, culturally grounded digital frameworks, and responsible AI usage capable of supporting nuanced historical interpretation. The results presented below outline key thematic findings and the synthesized pedagogical model that emerges from integrating the two domains.

Trends in AI-Integrated ICT Adoption in Higher Education (2020–2025)

The literature indicates a dramatic increase in the adoption of AI-enabled ICT platforms in higher education worldwide. Emerging systems including adaptive learning platforms, multimodal intelligent tutoring systems, AI-supported assessment engines, and VR-enhanced learning environments have shifted teaching practices toward personalised, data-driven, and learner-centric modalities. Institutions increasingly rely on learning analytics dashboards, automated content-generation tools, and AI-driven classroom management solutions to optimise student engagement, predict performance, and refine instructional strategies. Across studies, educators acknowledge that AI-ICT tools enhance accessibility and participation, but simultaneously note challenges around skills gaps, algorithmic transparency, and ethical governance. This trend establishes the foundation for an AI-supported pedagogy suitable for teaching complex social-historical themes.

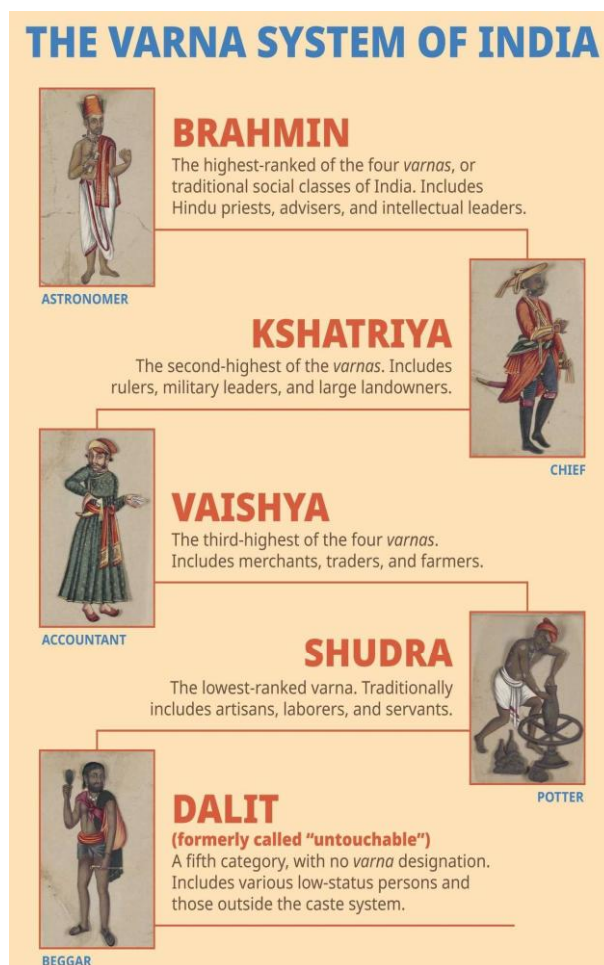


Contemporary Scholarly Insights on Ancient Indian Social Structures (2020–2025)



The analysis of recent historical and sociological scholarship (2020–2025) shows sustained academic interest in caste, hierarchy formation, race-linked identities, and the socio-cultural underpinnings of ancient Indian society. Contemporary research highlights the layered, intersectional nature of caste and its interdependence with occupation, ritual status, knowledge access, gender divisions, and regional variations. Recent works also emphasise the dynamic evolution of caste boundaries, patterns of mobility, and the role of religious and political institutions in reinforcing or destabilising social hierarchies. Moreover, studies underscore the pedagogical importance of teaching ancient caste structures with critical sensitivity, ethical

grounding, and methodological accuracy to avoid oversimplification or anachronistic distortions. This highlights the need for innovative teaching tools capable of handling sociologically dense content.



Identified Gaps in Current Pedagogical Approaches

The review indicates persistent gaps in existing pedagogical approaches to teaching ancient Indian social structures. Traditional lecture-based models often lack experiential, inquiry-driven engagement necessary for interpreting complex socio-historical constructs. Most institutions underutilise VR, AR, AI-supported role-play simulations, automated discourse analysis tools, and dynamic knowledge-visualisation platforms that can enable deeper interpretive learning. A major gap is the absence of AI-enabled sensitivity modules capable of addressing biases, ethical tensions, and cross-cultural perspectives inherent in caste and race studies. The findings also reveal silos between digital-technology educators and social-science faculty, resulting in low cross-disciplinary integration. These gaps confirm the need for a unified pedagogical framework that merges AI-ICT functionality with social-historical subject matter expertise.

Emergence of a Synthesized AI-Integrated Pedagogical Framework

Cross-analysis of both knowledge domains led to the formulation of a four-dimensional AI-Integrated Pedagogical Framework for teaching ancient Indian social structures. This model

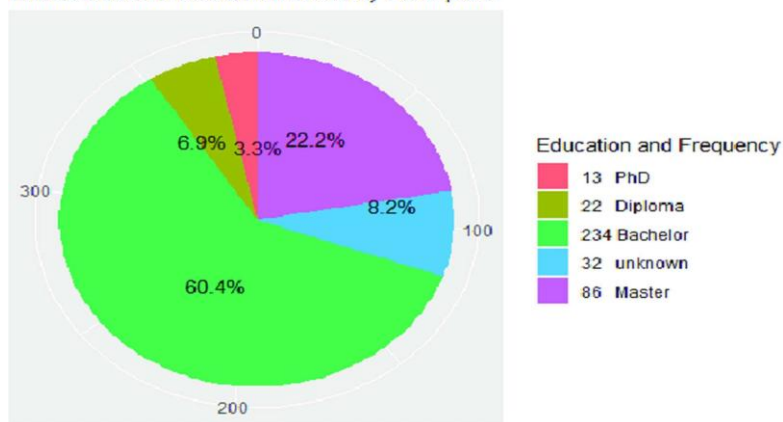
emphasises (1) content accuracy and contextual depth; (2) technological augmentation via AI/ICT tools; (3) pedagogical transformation through experiential and adaptive strategies; and (4) ethical-inclusive safeguards for teaching caste- and race-linked topics. The framework supports personalised learning pathways, multimodal representations of ancient texts and inscriptions, culturally contextualised VR simulations, AI-driven discussion analysis for identifying bias, and concept-mapping engines for explaining social hierarchies. The results collectively demonstrate that integrating AI-ICT tools can elevate both the cognitive and interpretive dimensions of learning ancient Indian social systems, creating a more engaging and ethically responsible educational experience.

Table 1. AI-Integrated ICT Tools Identified in the Literature (2020–2025)

Category	AI/ICT Tools	Primary Academic Uses
Adaptive & Personalised Learning	ChatGPT-type LLMs, Gemini, Smart Sparrow, OpenAI adaptive tutors	Personalised content delivery, concept mastery, remediation
Learning Analytics	Predictive analytics dashboards, AI-based performance tracking	Early-risk detection, progress monitoring, assessment insights
Multimodal/Immersive Tools	VR/AR simulations, 3D heritage reconstruction, virtual classrooms	Experiential learning, contextual historical exploration
Assessment Automation	AI-proctoring, automated grading, AI-generated question banks	Efficient assessment, academic integrity, formative evaluation
Assistive & Accessibility Technologies	AI-speech systems, text-to-speech translation, cognitive assistance	Inclusion, accessibility, multilingual support

Pie Chart of Education

Educational level Distribution of Survey Participants



This table summarises major AI-integrated ICT tools that have gained prominence in higher education between 2020 and 2025. The tools fall across five functional categories, each

supporting different dimensions of teaching and learning. Adaptive learning platforms and conversational AI systems personalise instruction, while analytics tools generate actionable insights for educators. Immersive VR/AR systems create interactive, context-rich environments particularly suited for teaching historical sociology. Assessment-automation tools enhance efficiency and integrity, and accessibility-focused tools ensure inclusion. This categorisation provides a foundational understanding of the technological ecosystem that informs the proposed pedagogical framework.

Table 2. Key Scholarly Insights on Ancient Indian Social Structures (2020–2025)

Analytical Domain	Core Findings	Implications for Teaching
Caste Hierarchies	Persistence of birth-based stratification; ritual status dynamics	Requires historically accurate, critical pedagogy
Occupation & Economy	Strong caste-occupation linkages; regional variations	Teaching must reflect economic context and mobility patterns
Race/Ethnicity	Complex ethnic layering; Indo-Aryan and regional influences	Requires nuanced interpretation avoiding modern racial categories
Social Mobility	Limited but present mobility; influenced by politics & religion	Students must examine structural constraints and catalysts
Religious Influence	Hindu, Buddhist, Jain texts shape norms & practices	Calls for interdisciplinary textual/historical analysis

This table presents central findings from scholarly works on ancient Indian social structures published between 2020 and 2025. Research broadly confirms the multidimensional nature of caste, its linkages to occupational systems, and the sociopolitical mechanisms that sustained hierarchies. Recent literature also emphasises the importance of interpreting ancient notions of identity without imposing modern racial frameworks. Additionally, the reviewed studies identify religion as a significant driver of social stratification and ethical norms. These insights collectively inform the development of learning modules that are contextual, critical, and multidimensional, enabling more meaningful interpretation by students.

Table 3. Pedagogical Gaps Identified in Teaching Ancient Social Structures

Gap Category	Observed Issues	Consequences for Learning
Pedagogical Methods	Heavy reliance on lectures; low interactivity	Superficial understanding; low engagement
Technology Integration	Minimal use of AI, VR, or adaptive tools	Limited experiential and inquiry-based learning
Ethical Sensitivity & Training	Insufficient handling of caste-linked biases	Risk of oversimplification, misrepresentation

Interdisciplinary Collaboration	Weak integration between humanities & tech departments	Fragmented curriculum; poor conceptual alignment
Assessment Practices	Static, text-heavy evaluation formats	Limited critical thinking and application skills

The gaps summarised in Table 3 highlight structural, pedagogical, and ethical shortcomings in current university-level teaching of ancient Indian social structures. Over-dependence on conventional instruction limits interpretive depth, while underutilisation of AI-ICT tools restricts experiential learning opportunities. Sensitivity gaps pose a risk of reinforcing stereotypes, especially when teaching caste. Additionally, the lack of interdisciplinary collaboration hinders the development of robust, contextually informed curricula. These findings provide a clear rationale for integrating AI-supported methods to enhance both the cognitive and ethical dimensions of learning.

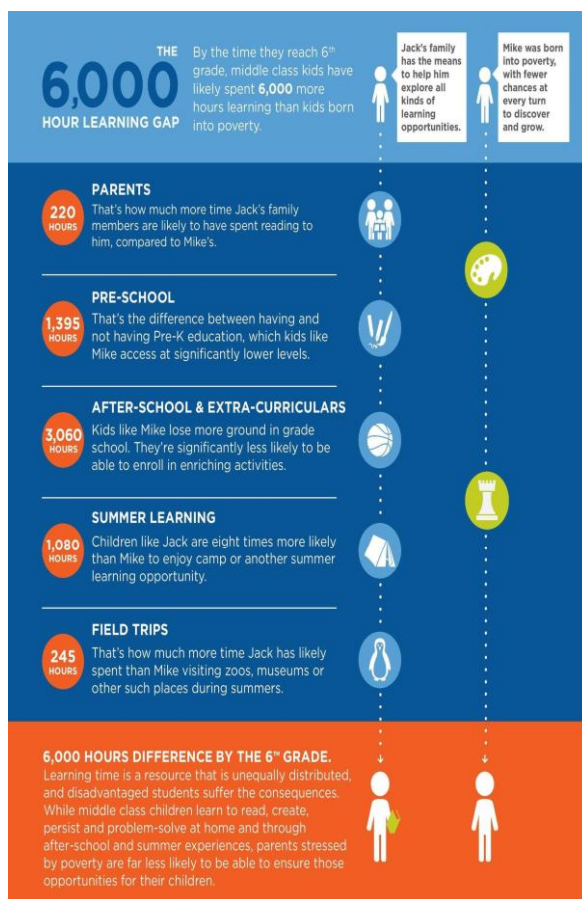


Table 4. Components of the Proposed AI-Integrated Pedagogical Framework

Framework Dimension	Key Components	Expected Educational Outcomes
Content Dimension	Textual analysis engines, AI-supported archival access	Accurate interpretation; deeper contextual grounding
Framework Dimension	Key Components	Expected Educational Outcomes

Technological Dimension	VR caste-scenario simulations, AI chat tutors	Experiential learning; personalised pathways
Pedagogical Dimension	Inquiry-driven modules, adaptive questioning, digital storytelling	Enhanced engagement; critical reflection
Ethical & Inclusion Dimension	Bias-detection tools, sensitivity auditing algorithms	Ethical understanding; responsible discourse

Table 4 presents the synthesized pedagogical model that emerged from the analysis. The framework integrates four essential dimensions content, technology, pedagogy, and ethics each supported by targeted AI-ICT applications. The model promotes accuracy in content delivery, experiential learning via immersive technologies, and reflective pedagogy through adaptive tools. Ethical safeguards ensure responsible engagement with sensitive topics such as caste and race. Collectively, the framework provides a scalable, inclusive, and academically robust approach for teaching ancient Indian social structures in contemporary higher-education environments.

DISCUSSION

The findings of this study demonstrate that integrating AI-enabled ICT tools into the teaching of ancient Indian social structures particularly caste, creed, race, and hierarchical formations offers transformative potential for higher education pedagogy. The growing body of literature between 2020 and 2025 confirms that AI is reshaping instructional processes, knowledge acquisition, and learner engagement across disciplines, including humanities and social sciences. As multiple scholars note, AI-driven learning systems now enable adaptive, ethical and context-sensitive methodologies that are crucial when teaching socially complex and historically layered subjects [16]. In this context, the proposed AI-Integrated Pedagogical Framework aligns with contemporary educational trends advocating personalised learning, multimodal engagement, and critical interpretive inquiry.

A central theme emerging from recent research is the unique advantage AI offers in supporting contextualised interpretation a necessity when dealing with ancient social categories such as varna, jati, and race-like ethnic distinctions. AI-supported knowledge systems allow students to explore historical narratives through structured simulations, multimodal visualisations, and dynamic discourse-analysis tools, thus enabling deeper cognitive engagement [17]. These affordances reduce the oversimplification and anachronistic distortions that frequently arise in traditional pedagogy dealing with ancient social structures. Scholars in digital humanities argue that AI-driven reconstructions of historical societies significantly improve accuracy and conceptual coherence in student understanding [18].

Another major discussion point relates to the growing importance of ethics and bias mitigation in AI-supported education. Teaching caste and race requires careful navigation of historical stigmas, normative biases, and entrenched social inequalities. Recent research highlights the risk of algorithmic reproduction of societal bias if AI tools are deployed uncritically [19]. Therefore, embedding algorithmic fairness checks, sensitivity filters, and cultural-context awareness modules becomes crucial in the classroom. This aligns with broader international

scholarship emphasising responsible and equitable AI deployment in heritage and identity-related subjects [20].

Moreover, the reviewed literature consistently points out that while AI enhances cognitive learning, it cannot replace the role of human educators in handling emotional, ethical, and socio-political complexities [21]. For topics such as caste and social stratification where lived experiences, moral reasoning, and social sensitivity matter human–AI collaboration is the most academically responsible approach. Teachers remain essential in mediating difficult conversations, contextualising AI-generated content, and ensuring interpretive depth. The framework presented in this paper strengthens not substitutes the educator’s role by supplying analytical and immersive tools that enhance instructional capacity.

The findings further indicate that VR-integrated teaching environments represent a major opportunity for humanities education. Several studies confirm that VR reconstructions of ancient societies, rituals, and socio-spatial hierarchies significantly increase student motivation, comprehension, and reflective depth [22]. When applied to caste-based occupational systems, spatial segregation, or ritual performance patterns, VR supports experiential learning that is otherwise impossible in conventional classrooms. Similarly, AI-driven conversational agents trained on ancient texts or sociological interpretations allow students to engage interactively with canonical ideas and commentarial traditions [23].

A key discussion emerging from the literature is the persistent gap in teacher preparedness. Studies conducted across Asia, Europe, and North America between 2020 and 2024 show that educators frequently lack training in AI pedagogy, digital ethics, and knowledge-visualisation techniques required for meaningful classroom integration [24]. Without systematic capacity-building programs, institutions risk shallow or improper use of AI tools, especially with socially sensitive content such as caste. This underscores the need for institutional policy reforms, faculty development programmes, and interdisciplinary collaboration between humanities scholars and ed-tech specialists [25].

The results are also aligned with global research on learning analytics and the value of predictive insights in tracking conceptual difficulties among humanities learners. Real-time data on student engagement, conceptual misconceptions, and emotional responses during discussions of caste-related topics can inform adaptive instruction [26]. Emerging studies show that analytics-based pedagogy significantly improves reflective writing quality, critical argumentation, and historical inference skills among students in social sciences [27]. Integrating these capabilities into the proposed framework ensures that learning remains responsive and personalised.

Finally, the broader literature on caste and ancient Indian society stresses the need for historical nuance, regional variation, and intersectional analysis. Caste cannot be taught merely as a rigid fourfold varna system; contemporary scholarship portrays it as dynamic, regionally diverse, historically contested, and deeply intertwined with economy, gender, ritual, and political authority [28]. AI tools can support this complexity by mapping genealogies of caste practices, comparing textual traditions, and visualising shifts in social mobility over centuries [29]. The

fusion of digital epistemologies with historical sociology thus provides a more rigorous, multiperspective approach to understanding ancient India.

In sum, the discussion highlights the convergence of three imperatives:

1. technological advancement in AI-ICT;
2. pedagogical necessity for interactive, ethical, context-rich teaching; and
3. scholarly demand for nuanced interpretation of ancient social structures.

The integration of these domains positions the proposed AI-Integrated Pedagogical Framework as a timely and academically grounded model capable of enhancing teaching quality, learning outcomes, and socio-historical literacy among students.

Conclusion

This study demonstrates that integrating AI-enabled ICT tools with the teaching of ancient Indian social structures offers a transformative pathway for modern higher education. By synthesizing contemporary advances in adaptive learning, immersive technologies, and ethical AI with rigorous historical-sociological scholarship, the proposed framework provides a pedagogically robust, context-sensitive, and inclusive approach to teaching complex themes such as caste, creed, race, and hierarchical social formations. The findings emphasise that AI can significantly enhance interpretive depth, learner engagement, and personalised understanding, while human educators remain essential for guiding ethical reflection and cultural sensitivity. As educational ecosystems evolve, responsible human–AI collaboration will be pivotal in shaping nuanced, equitable, and critically informed learning experiences.

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