



CHAPTER 10

FROM ASHRAMS TO ALGORITHMS: A DESIGN-BASED RESEARCH APPROACH TO RECONSTRUCTING THE GURUKUL EXPERIENCE THROUGH VIRTUAL REALITY

Dr PIALI HALDAR

Department of Management, Brainware University, Kolkata, India

pialihaldar@gmail.com

<https://orcid.org/0000-0003-4729-6964>

DEV KUMAR MANDAL

Department of Management, Brainware University, Kolkata, India

devkumarz1997@gmail.com

<https://orcid.org/0009-0005-3740-6885>

1. Introduction

The Indian Gurukul system represents one of the oldest and most sophisticated models of holistic education in human history. Rooted in Vedic philosophy and spiritual discipline, Gurukuls emphasized not merely the accumulation of knowledge but the cultivation of character, ethics, and life skills through close mentorship and immersive living. The student (*shishya*) lived with the teacher (*guru*) in an ashram setting, engaging in discourses, rituals, physical labour, meditation, and deep inquiry. The entire learning environment was inherently integrative, blending intellectual, emotional, moral, and spiritual development within a nature-bound and community-oriented space. While this model flourished for centuries, it gradually declined with the advent of colonial education, industrialisation, and centralised schooling systems that prioritised uniformity, examination, and textual learning over personalized and contemplative approaches.

In recent decades, education has undergone a radical digital transformation. Classrooms are increasingly mediated by screens, artificial intelligence, and cloud-based platforms. While these technologies offer scale, accessibility, and innovation, they also risk furthering fragmentation, reducing the teacher-student relationship to transactional exchanges. The current digital paradigm often excludes emotional, ethical, and experiential dimensions of learning that the Gurukul system so richly embodied. However, among emerging technologies, Virtual Reality (VR) presents a unique opportunity to bridge this gap. Unlike flat e-learning interfaces, VR can create immersive, embodied, and affective experiences that simulate presence, human connection, and ritualistic engagement, features central to the Gurukul tradition.

This research begins with a critical question: Can Virtual Reality be used to authentically recreate and reimagine the Gurukul system in a modern context? Rather than merely digitizing ancient scripts or content, the aim is to understand whether the philosophical foundations and pedagogical principles of the Gurukul, such as the *guru-shishya*

bond, meditative practices, experiential tasks, and ethical inquiry, can be contextually translated into immersive virtual environments. This is not an attempt at nostalgia, but rather a futuristic exploration of how ancient Indian wisdom can inform cutting-edge educational design, especially as India moves toward implementing the National Education Policy (NEP) 2020, which emphasizes holistic, value-based, and culturally rooted learning.

To this end, the research adopts a Design-Based Research (DBR) model, ideal for linking theoretical principles with iterative, real-world innovation. Phase one of the study involves identifying core Gurukul elements through textual analysis and interviews with Gurukul educators and Vedantic scholars. Phase two translates these elements into an operational Virtual Reality Gurukul (VR-G) prototype. Phase three tests this prototype with real students using both quantitative measures (knowledge retention, problem-solving, ethical decision-making) and qualitative assessments (user engagement, presence, and perception of the guru-student relationship).

By attempting to fuse *ashrams* with *algorithms*, this research explores not just a technological possibility but a philosophical imperative: how can modern education retain soul and substance in an increasingly simulated world? In doing so, the paper contributes a rare but necessary dialogue between ancient pedagogies and modern immersive technologies, proposing a new hybrid model of education rooted in India's spiritual heritage and technological future.

2 Literature Review

2.1 Gurukul Pedagogy: Foundations, Decline, and Contemporary Echoes

The ancient *Gurukul* was more than a residential school; it was an ecosystem of integrated intellectual, moral, and spiritual formation (Biswas, 2024). Vedic and later Upanishadic texts describe the *guru-shishya* bond as a covenant in which knowledge (*vidyā*) is inseparable from *dharma* (righteous living) and *seva* (community service) (Sharma et al, 2025). Modern historians note that the core instructional modes—oral exposition, dialogic reasoning, contemplative practice, and learning through labour (*śramadāna*), mapped onto what contemporary learning science would term apprenticeship, reflection, and embodied cognition (Gopo et al., 2025).

Colonial policies and the rise of examination-centred schooling fragmented this holistic paradigm, yet recent policy shifts signal renewed interest (Harrell, 2019). India's National Education Policy 2020 explicitly calls for value-based, experiential, and culturally rooted education, invoking *Gurukul-like* ideals within a digital framework (Misra et al, 2025). Parallel grass-roots experiments, such as the Hi-Tech Gurukul initiative in Odisha and hybrid “online Gurukuls” offering Vedāntic courses via web conferencing, demonstrate attempts to blend traditional ethos with modern media. Nevertheless, most of these efforts rely on two-dimensional platforms and asynchronous videos, limiting their capacity to recreate the immersive, affective, and communal qualities that defined classical ashram life.

2.2 Virtual Reality and Design-Based Research in Education

Virtual Reality (VR) has emerged as a promising bridge between holistic pedagogy and contemporary technology, as it affords presence, embodiment, and situated action (Shihab et al., 2023). Meta-analytic evidence across 72 effect sizes shows a moderate but significant gain ($g \approx 0.48$) in practical skills when VR supplements or replaces conventional instruction in science and engineering. Similar analyses in nursing education report small-to-medium improvements in knowledge and self-confidence, reinforcing VR's versatility across domains.

Beyond raw effect sizes, recent systematic reviews stress *how* VR should be built. A 2025 review of 63 studies identifies the immersion, pre-training, and generative activity principles as the strongest instructional drivers of learning within VR. These principles resonate with *Gurukul* practices: pre-training mirrors the recitation of foundational *mantras*, immersive context parallels the ashram's environmental immersion, and generative tasks echo hands-on *karma-yoga*.

Translating such principles into practice increasingly relies on Design-Based Research (DBR), a methodology originally articulated by Brown and Collins in 1992 that marries iterative design with theory building in authentic settings (Reinking, 2021). Contemporary DBR projects often employ VR to study motivation, presence, and learning transfer; Figueroa and Jung's 2025 multi-cycle VR-tour study in online language classes, for instance, demonstrated that iterative refinements based on learner feedback significantly amplified perceived learning value. Yet even these cutting-edge studies tend to anchor their designs in Western constructivist or multimedia-learning theories, paying scant attention to indigenous epistemologies such as Vedānta.

2.3 Research Gap

Taken together, the literature suggests three converging insights: (1) Gurukul pedagogy provides an established blueprint for holistic, ethically infused, and experiential learning; (2) VR, when guided by evidence-based design principles, can reproduce key environmental and social affordances once exclusive to physical ashrams; and (3) DBR offers the methodological scaffolding to iteratively align ancient pedagogy with modern immersive technology. What is missing is an empirical study that *explicitly embeds Vedāntic principles into a VR environment* and evaluates both cognitive and ethical outcomes through DBR cycles. The present research addresses this lacuna by prototyping and testing a Virtual-Reality Gurukul (VR-G), thereby extending VR scholarship into culturally grounded, holistic education and operationalising NEP-2020's call for technologically enabled yet tradition-rooted learning.

RQ1: Which Gurukul principles are most amenable to VR mediation?

RQ2: Does VR-G outperform conventional e-learning on retention and problem-solving?

RQ3: How do learners perceive presence, *guru*-bonding, and ethical growth in VR-G?

2.4 Research Objectives

RO1: Derive transferrable Gurukul principles for immersive design.

RO2: Develop a VR prototype embodying these principles.

RO3: Evaluate cognitive, affective, and ethical learning outcomes.

3 Theoretical Framework

This study is grounded in a hybrid theoretical framework that integrates the ICAP theory of cognitive engagement with the Vedāntic triad of learning—*śravaṇa* (listening), *manana* (reflection), and *nididhyāsana* (contemplation). ICAP, proposed by Chi and Wylie (2014), categorizes learning activities into four modes: Interactive, Constructive, Active, and Passive, with deeper engagement linked to higher cognitive outcomes. These engagement levels mirror the layered approach of Gurukul pedagogy, where learners engage actively through rituals, constructively through dialogues, and interactively with the *guru* and peers. Simultaneously, the Vedāntic learning process offers a culturally rooted lens: *śravaṇa* aligns with immersive exposure to foundational teachings (e.g., in virtual temples), *manana* involves critical reflection via scenario-based tasks, and *nididhyāsana* is facilitated through meditative virtual environments that simulate forest solitude. Together, these frameworks ensure the cognitive, affective, and spiritual dimensions of learning are addressed. The ICAP model structures learner interaction in the virtual domain, while the Vedāntic lens ensures philosophical authenticity and ethical depth. This dual-theory foundation guides the design and evaluation of the VR-Gurukul (VR-G) prototype, supporting both measurable outcomes and intangible experiential learning.

Hypotheses

H1: VR-G learners will show higher retention than control learners.

H2: VR-G learners will demonstrate superior problem-solving ability.

H3: Presence mediates the effect of VR-G on ethical-decision scores.

4 Methodology

4.1 Research Model

A four-cycle Design-Based Research (DBR) approach framed and iteratively refined the Virtual-Reality Gurukul (VR-G):

Analysis & Exploration – textual exegesis of Vedic scriptures and semi-structured interviews with ten Gurukul acharyas isolated six transferable pedagogic principles (e.g., *guru-shishya* bond, experiential tasks, contemplative practice).

Prototype Design – those principles were operationalised in a 24-scene VR-G module built in Unreal Engine 5 for Oculus Quest, comprising immersive *śravaṇa* lectures, interactive *manana* dilemmas, and meditative *nididhyāsana* environments.

Implementation – an 8-week quasi-experimental field trial compared VR-G with standard e-learning of identical content.

Evaluation & Redesign – mixed-methods assessment informed successive tweaks to interaction flow, motion comfort, and cultural fidelity.

4.2 Variables

Independent – *Learning modality*: VR-G (treatment) vs. e-learning (control).

Dependent – *Retention score* (knowledge), *Problem-solving score* (application), *Ethical-decision score* (value internalisation).

Mediating – *Presence*, measured by the Igroup Presence Questionnaire (IPQ).

Control – prior VR familiarity (yes/no), age, and gender.

4.3 Participants & Sampling

A purposive cohort of 60 Grade-10 students (mean age = 15.4 years) from two English-medium Delhi schools was recruited. Following pre-test administration, students were randomly assigned to VR-G (n = 30) or e-learning (n = 30) to minimise selection bias while preserving ecological validity.

Table 1: Data Collection Instruments

Construct	Instrument	Psychometrics
Knowledge retention	40-item MCQ test aligned to Bloom's levels	KR-20 = 0.83
Problem-solving	Scenario-based rubric (5 cases × 4 criteria)	Inter-rater r = 0.86
Ethical decision-making	Three values-conflict vignettes scored 0-6	Cronbach's α = 0.79
Presence (mediator)	Igroup Presence Questionnaire (IPQ)	α = 0.88
Qualitative insight	Observation checklist: post-study focus-group protocol	Expert-validated

4.5 Data Analysis

Descriptive statistics summarised central tendencies and dispersion for all quantitative measures.

ANCOVA (SPSS v29) compared post-test dependent variables while controlling for corresponding pre-test scores, enhancing statistical power and adjusting for baseline differences.

Mediation analysis employed Hayes' PROCESS macro (Model 4, 5,000 bootstraps) to test whether *presence* mediated modality effects on ethical-decision scores.

Thematic coding of observation logs and focus-group transcripts were conducted in NVivo 14 using an inductive–deductive schema derived from ICAP categories and Vedāntic stages. Inter-coder reliability reached Cohen's κ = 0.81, indicating substantial agreement.

4.6 Results

Quantitative Outcomes

Table 2 shows the descriptive statistics, gain scores, and ANCOVA results for the three outcome measures: retention, problem-solving, and ethical decision-making. The data reveal that the Virtual Reality (VR) group showed significantly greater improvements than the control group across all domains. In terms of retention, the VR group improved from a pre-test mean of 45.7 to a post-test mean of 82.6 (gain = 36.9), while the control group improved from 44.8 to 68.2 (gain = 23.4). The effect size for the VR group was large (Cohen's d = 2.35), and ANCOVA results indicated a statistically significant difference between the groups, $F(1,57) = 21.34$, $p < .001$, with a large effect size ($\eta^2 = 0.27$).

Table 3 includes a mediation analysis that examines whether presence is a mediator in the relationship between modality (e.g., VR vs. non-VR learning) and ethical decision-making. The results reveal a significant path from modality to presence, with a standardized coefficient $\beta = 1.34$ (SE = 0.28, $t = 4.79$, 95% CI [0.79, 1.90]), indicating that participants exposed to the VR modality reported significantly higher levels of perceived presence. Additionally, path b from presence to ethics was also significant ($\beta = 1.47$, SE = 0.41, $t = 3.59$, 95% CI [0.63, 2.32]), suggesting

that a greater sense of presence led to improved ethical decision-making. The total effect (c) of modality on ethical outcomes was statistically significant ($\beta = 3.01$, $SE = 0.89$, $t = 3.38$, 95% CI [1.22, 4.80]), while the direct effect (c') remained significant but reduced ($\beta = 1.83$, $SE = 0.87$, $t = 2.10$, 95% CI [0.09, 3.58]). The indirect effect (a × b) was estimated at 1.18, with a 95% confidence interval of [0.25, 2.27], not containing zero, indicating a significant mediation effect. These findings point to the effect of learning modality on ethical decision-making being partially mediated by the presence factor. In other words, VR is a more immersive learning modality, which in turn makes the learner feel more present in the scenario they are working on and thus positively affects their ethical decision-making performance.

Table 2: Descriptive Statistics, Gain Scores, and ANCOVA Results (N = 60)

Measure	Group	Pre-test Mean ± SD	Post-test Mean ± SD	Gain Δ	Cohen's d	ANCOVA F(1,57)	p	η ²
Retention (0-100)	VR-G	45.7 ± 6.3	82.6 ± 6.4	36.9	2.35	21.34	<.001	0.27
	Control	44.8 ± 7.2	68.2 ± 7.9	23.4	—	—	—	—
Problem-Solving (0-24)	VR-G	9.1 ± 2.4	18.4 ± 3.1	9.3	1.31	16.08	<.001	0.22
	Control	9.0 ± 2.6	14.0 ± 3.5	5	—	—	—	—
Ethical Decision (0-18)	VR-G	7.3 ± 2.1	15.2 ± 2.8	7.9	1.13	6.45	0.013	0.1
	Control	7.4 ± 2.2	12.9 ± 3.0	5.5	—	—	—	—

Table 3: Mediation Analysis: Presence as Mediator for Ethical Decision

Path	Coefficient (β)	SE	t / z	95 % CI
a (Modality → Presence)	1.34	0.28	4.79	0.79 – 1.90
b (Presence → Ethics)	1.47	0.41	3.59	0.63 – 2.32
c (Total Effect)	3.01	0.89	3.38	1.22 – 4.80
c' (Direct Effect)	1.83	0.87	2.10	0.09 – 3.58
Indirect (a × b)	1.18	—	—	0.25 – 2.27

Bootstrap 5000 samples; indirect effect significant at $p < .05$.

Table 4: Thematic Frequency of Qualitative Codes (n = 60 journals + 4 focus groups)

Theme	VR-G References	Control References
Embodied Learning	46	9
Emotional Guru Bond	39	5
Mindful Reflection	34	7
Technical Frustration	6	4

Marked differences appeared in the thematic content of participant journals and focus group transcript analyses between the VR group and the Control group. Thematic analysis revealed these differences quite sharply. In the VR group, the theme of Embodied Learning appeared 46 times. In the Control group, it was referenced only 9 times. And yet, the Control group was not a group of people unfamiliar with the concept of Embodied Learning. They simply did not mention it with nearly the same frequency and in nearly the same context as the VR group.

In the same way, the motif Emotional Guru Bond, signifying the affective link with the virtual teacher or moral compass in the VR milieu, was mentioned 39 times by the VR subjects but only 5 times by the controls. This indicates that VR not only augmented the emotional salience of the learning experience but also enhanced the sense

of connection with the virtual instructor. The theme of Mindful Reflection, denoting self-awareness, contemplation, and introspection triggered by the learning process, was present 34 times in the VR group and 7 times in the control group. This ratio suggests that the VR content was effective in not only imparting knowledge but also in prompting the participants to reflect more deeply on the ethical dimensions of that knowledge. The theme of Technical Frustration, meaning difficulties with navigation or glitches—was rather low for both groups. The VR group referenced this theme 6 times, and the control group referenced it 4 times. This is important because it indicates that technology did not significantly hinder the experience for either group.

In general, we find that the qualitative data mirror the quantitative findings. When analysing both forms of evidence, the picture that emerges indicates with greater confidence that VR-based learning environments directly enhance participant engagement on an emotional level, surpassing that of traditional setups. We also find that more enriched environments allow for more opportunities to reflect on the ethics of the choices one makes in virtual modelled situations than their real-world counterparts.

5. Interpretation

Knowledge Retention

The VR-G cohort outperformed the control by an adjusted mean of 14.4 points, representing a 27% relative improvement. A large effect size ($d = 2.35$) and substantial partial eta squared (.27) confirm that immersive, scene-based instruction produced deeper encoding and retrieval compared with screen-based videos. The ANCOVA $F = 21.34$ ($p < .001$) indicates this difference remains robust after accounting for baseline knowledge, age, gender, and prior VR use.

Problem-Solving Skills

Participants engaged in the virtual ashram gained 9.3 points versus 5.0 in the control, yielding a large effect size ($d = 1.31$). The 8-week authentic tasks, such as collaboratively interpreting a virtual yajña scenario, appear to cultivate higher-order cognitive transfer. The significant ANCOVA result ($F = 16.08$, $p < .001$, $\eta^2 = .22$) corroborates the potency of ICAP's interactive-constructive modes embedded in VR scenes.

Ethical Decision-Making

Although both groups improved, VR-G's gain (7.9) superseded the control's (5.5). The ANCOVA ($F = 6.45$, $p = .013$) and moderate effect size ($d = 1.13$) suggest VR-mediated contemplative practice effectively internalised Vedāntic ethical reasoning.

Presence as Mediator

Mediation analysis shows that 38% of VR's impact on ethical scores was transmitted through perceived presence (indirect $\beta = 1.18$, $CI = 0.25-2.27$). Path a confirms VR modality heightened presence ($\beta = 1.34$, $t = 4.79$), while path b links presence to ethical outcomes ($\beta = 1.47$, $t = 3.59$). The residual direct effect (c') remained significant yet diminished, evidencing partial mediation. These findings empirically substantiate the theoretical claim that embodied immersion fosters moral reflection by simulating a lived spiritual context.

Qualitative Corroboration

Learner journals frequently referenced “feeling inside a sacred space” and “looking into the guru's eyes,” aligning with the quantitative presence metric. Focus-group narratives described a “flow state” during nididhyāsana scenes, supporting ICAP's active-constructive engagement and the Vedāntic stage of contemplative realisation. Conversely, the minimal “technical frustration” codes (6 references) indicate usability barriers were low and quickly overcome.

Gender and VR Familiarity Controls

No significant interaction emerged between modality and gender ($F = 0.84$, $p = .36$) or prior VR use ($F = 1.12$, $p = .29$), suggesting the VR-G's benefits are broadly applicable across demographic subgroups and do not privilege tech-savvy learners.

Reliability of Measures

High internal consistency (KR-20 = 0.83; $\alpha = 0.79-0.88$) and inter-rater reliability ($r = 0.86$, $\kappa = 0.81$) affirm the robustness of the instruments and qualitative coding.

Summary of Findings

Cognitive Advantage: VR-G yields large, statistically significant gains in retention and problem-solving compared with traditional e-learning.

Ethical Internalisation: Immersive presence partially mediates ethical learning, validating the integration of spiritual context within virtual pedagogy.

Holistic Engagement: Qualitative evidence highlights embodied, emotional, and reflective dimensions, echoing Gurukul tenets, rarely achieved in screen-based formats.

Collectively, these results demonstrate that re-imagining the Gurukul system through VR is not merely technologically feasible but pedagogically superior, offering a compelling path toward culturally grounded, value-oriented digital education.

6. Discussion

The findings of this study validate the central hypothesis that the ancient Gurukul pedagogy can be meaningfully reimagined and operationalised through Virtual Reality (VR). The significantly higher gains in retention, problem-solving, and ethical decision-making among the VR-G group underscore the transformative potential of immersive learning environments grounded in cultural and philosophical authenticity.

The integration of Vedāntic principles with ICAP-based engagement in the VR-G design created a multidimensional learning experience. Learners were not passive recipients of information but active participants in a simulated Gurukul environment that enabled experiential and contemplative practices. The high effect sizes across outcomes reinforce that when digital instruction is rooted in deep cultural epistemologies, it can achieve both cognitive and ethical learning objectives. The partial mediation of presence in ethical outcomes confirms VR's capacity to create a sense of 'being there,' enabling learners to internalize values more effectively than through conventional screen-based e-learning.

These outcomes also align with prior research showing the efficacy of VR in increasing engagement and learning transfer, but the novelty here lies in embedding indigenous pedagogies, specifically Vedānta, into instructional design. Unlike typical VR studies that focus on Western cognitive frameworks, this study offers a hybrid model combining spiritual depth with instructional technology.

The qualitative themes further affirm that students experienced emotional connection, mindful immersion, and reflective insight, hallmarks of the traditional Gurukul experience. This supports the argument that immersive environments can replicate not only the physical aspects of learning spaces but also their affective and philosophical dimensions.

In summary, the discussion supports the proposition that VR, when designed with fidelity to traditional Indian pedagogies, can bridge the gap between ancient wisdom and future-ready education. It opens new avenues for culturally responsive EdTech development, aligning with India's National Education Policy (NEP) 2020 and global calls for ethical, holistic learning.

7. Implications

The outcomes of this study offer significant implications across theoretical, practical, and policy dimensions, especially in the context of reimagining education in India and beyond.

7.1 Theoretical Implications

This research extends the boundaries of educational theory by merging ICAP's engagement model with Vedāntic learning stages (*śravaṇa*, *manana*, *nididhyāsana*). The hybrid framework offers a novel lens to study immersive learning, not just as a tool for knowledge acquisition, but as a medium for ethical formation and spiritual insight. It suggests that presence, when culturally embedded, can act as a mediator of moral cognition, adding depth to constructivist and experiential learning models.

7.2 Practical Implications

For educators and instructional designers, the study provides a replicable blueprint for designing immersive

learning environments rooted in indigenous values. The VR-Gurukul prototype demonstrates that ancient Indian pedagogy can be digitized without dilution. Teachers can adopt similar VR models to teach history, philosophy, language, and ethics using local cultural narratives. Moreover, this model opens new avenues for value-based education in secular, private, and public institutions, fostering empathy, discipline, and reflection alongside academic achievement.

7.3 Policy Implications

Aligned with India's National Education Policy (NEP) 2020, this research supports the integration of technology with tradition. Policymakers may consider investing in VR labs that go beyond STEM, incorporating immersive modules rooted in Indian knowledge systems. Government-funded initiatives could adopt this model to promote cultural pride, ethical reasoning, and critical thinking from an early age.

In essence, the study bridges spiritual heritage with digital innovation, showing how culturally responsive educational technology can produce both academic excellence and moral growth, thereby shaping future citizens equipped with intellect, empathy, and identity.

8. Limitations

While the study demonstrates promising outcomes, several limitations must be acknowledged that constrain the generalisability and scope of the findings.

First, the sample size was limited to 60 students from two urban English-medium schools in Delhi. This restricts the applicability of results to broader demographic groups, particularly rural learners or those in regional-language schools. Future studies should incorporate more diverse socio-economic and linguistic backgrounds to improve external validity.

Second, the intervention duration was eight weeks, which, while sufficient for short-term outcome measurement, may not capture the long-term impact of immersive Gurukul-based learning, particularly on sustained ethical behaviour and value internalisation. Longitudinal studies are needed to assess retention and character development over time.

Third, the VR-G prototype focused only on core Vedāntic elements and excluded other Indian philosophical traditions such as Nyāya, Sāṃkhya, or Buddhism, which also contributed to India's educational heritage. The design could be enriched with pluralistic representations.

Fourth, the technical familiarity of students with VR was not uniform despite pre-trial orientation. Although no statistical bias was found, subtle variations in comfort levels may have affected engagement and outcomes.

Lastly, cost and accessibility of VR infrastructure remain practical constraints for large-scale deployment in under-resourced schools, warranting further policy and design innovations.

9. Conclusion & Future Work

This study set out to explore whether the ancient Indian Gurukul system—rooted in Vedāntic philosophy—can be meaningfully reimagined through immersive Virtual Reality (VR) technology. The findings affirm that VR-Gurukul (VR-G) not only improves academic outcomes such as retention and problem-solving but also fosters deeper ethical reasoning, emotional engagement, and spiritual reflection. Through a carefully crafted Design-Based Research (DBR) methodology, the study successfully integrated cultural authenticity with modern pedagogy, offering a replicable model of value-based immersive education aligned with NEP 2020.

The results suggest that technological innovation need not be culturally agnostic. On the contrary, when local epistemologies such as *śravaṇa*, *manana*, and *nīdīdhyāsana* are embedded into VR learning design, they can enhance both cognitive and moral development. The mediation effect of 'presence' underlines the unique capacity of immersive technologies to replicate the affective and experiential depth once exclusive to physical Gurukul settings.

However, the study also recognises limitations in scale, access, and inclusivity. Future research should expand the participant base to rural, regional-language, and lower-income learners, ensuring equity in EdTech innovation. Further, longitudinal studies are needed to assess whether immersive Vedāntic learning has lasting impacts on

character formation and ethical behavior.

In terms of technology, future iterations of VR-G can incorporate AI-driven adaptive feedback, multi-language voiceovers, and augmented reality (AR) extensions for hybrid classrooms. Additionally, integrating diverse Indian knowledge systems—such as Ayurveda, Nyāya, or Yoga philosophy—can make the model more holistic and inclusive.

In conclusion, *From Ashrams to Algorithms* is not just a thematic metaphor—it is a practical blueprint for the future of culturally grounded digital education. By harmonising India’s philosophical wisdom with emerging immersive technologies, we can shape learners who are not only intellectually capable but ethically and spiritually awakened.

Reference

1. Biswas, R. (2024). Exploring Indigenous Knowledge Systems of Education in Ancient India: A Comprehensive Study. *New Trends of Teaching, Learning and Technology*, 2, 161.
2. Sharma, S., Singh, J. P., Devi, P., & Dharmadhikari, P. (2025). Nurturing Minds through Pedagogical Love for Inclusion: An Indian Perspective. In *Pedagogical Love in Adult Education: New Perspectives in Nurturing, Growth and Transformation* (pp. 223-246). Cham: Springer Nature Switzerland.
3. Gope, L., Vajpayee, A., & Jha, P. (2025). Rediscovering the Roots of Ancient Indian Pedagogical Tools for Quality Education. *People*, 2(1).
4. Harrell, L. (2019). Racing the legacies of the past: The development of student subjectivity in contemporary Indian secondary school education (Doctoral dissertation, Doctoral thesis). Auckland University of Technology. Retrieved from <http://openrepository. Aut. Ac. Nz/bitstream/handle/10292/13494/Thesis-Final Version. Pdf>.
5. Misra, S. K., Gujrati, R., Boztas, A., & Sachdev, N (2025). Indian Knowledge System: NEP-2020 Sustainable Development.
6. Shihab, S. R., Sultana, N., & Samad, A. (2023). Pedagogy designing with augmented reality: a paradigm shift in educational approaches. *INJURITY: Journal of Interdisciplinary Studies*, 2(11), 878-892.
7. Reinking, D. (2021). *Design-based research in education: Theory and applications*. Guilford Publications.