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Epistemological Chirality in Landscape Architecture Pedagogy: A Dual-Method Studio at Angkor Wat Temple, Cambodia

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Abstract

This study introduces epistemological chirality, a framework for examining two knowledge systems that are comparable but non-superimposable: a Western-centric quantitative approach and an Indigenous-informed qualitative approach. Eight students in two teams completed 10-minute scans at four selected stations. Group A used modified SOPARC. Group B used narrative inquiry, sensory mapping, and micro-interviews. Analysis using a Chiral Matrix and Chiral Divergence Index (CDI) revealed convergence at ritual nodes, complementarity in transitional and construction spaces, and dissonance where counts suggested activity, but narratives conveyed emptiness. In this setting, divergence presented a pedagogical resource for reflexivity, ethical translation, empathy, and responsive design.

Keywords: Landscape architecture; Pedagogy; Narrative inquiry; SOPARC

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1.0 Introduction

Western-centric teaching methods in higher education are historically linked to European imperialism and the colonial ordering of knowledge. European modernity positioned Europe as the center of rationality, progress, and civilization while categorizing non-European peoples as inferior (Fúnez-Flores et al., 2025; Kovach, 2021). This hierarchy worked through universities, curricula, and research methods as well as through political and economic domination. It legitimized Western sciences as the normative standard of valid knowledge and often displaced Indigenous forms of knowing (Fúnez-Flores et al., 2025; Leenen-Young et al., 2021).

The legacy persists in design education. Western pedagogies have commonly been treated as universal markers of quality and professionalism, while non-Western contributions are marginalized or treated as supplemental content (Barcham, 2023; Ofosu-Asare, 2025). A decolonial response therefore requires more than adding Indigenous material to an unchanged curriculum. It requires examining whose knowledge is authorized, what methods are treated as rigorous, and how design judgement relates to land, culture, and community (Leenen-Young et al., 2021; Miole, 2024; Ofosu-Asare, 2025).

This concern is particularly relevant in Southeast Asia. Asian higher education has been shaped by Western institutional models, academic cultures, curricula, and evaluation systems, even where these interact with local and Indigenous processes (Jung, 2018). The Philippine Indigenous Peoples' Education policy provides a relevant alternative by framing Indigenous and non-Indigenous knowledge systems as an interface rather than a hierarchy (Miole, 2024). For design and built environment education, this suggests the need to retain useful technical methods while placing them in an accountable relationship with Indigenous-informed, narrative, and place-based approaches.

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This paper develops epistemological chirality as a framework for this relationship. In architecture and science, chirality refers to related forms that are mirror-like but cannot be superimposed, such as left and right hands (Avnir & Huylebrouck, 2013). In this paper, epistemological chirality describes two ways of reading the same cultural landscape: a Western-centric quantitative stream that records observable use, and an Indigenous-informed qualitative stream that interprets lived experience. Both are directed toward the same place, yet neither can replace the other.

Guided by decolonial theory, this study examines how coloniality persists through knowledge hierarchies, institutional norms, and the presumed universality of Western thought (Fúnez-Flores et al., 2025; Leenen-Young et al., 2021). Its purpose is to evaluate how a dual-method studio can compare spatial observation with qualitative lived experience in a complex cultural landscape. The study asks: How does a dual-method studio reveal convergence, complementarity, and dissonance between quantitative observations and qualitative lived experience?

Specifically, the study aims to: (1) identify the insights generated by modified SOPARC and narrative inquiry at selected stations; (2) assess the degree of convergence, complementarity, and dissonance between the two evidence streams using the Chiral Matrix and Chiral Divergence Index (CDI); and (3) examine how these relationships can strengthen methodological reflexivity, ethical translation, and culturally responsive design judgement in landscape architecture education.

2.0 Literature Review

2.1 Decolonial Pedagogy and Methodological Pluralism

Decolonial pedagogy shifts attention from simply broadening curriculum content to examining how knowledge is recognized, produced, and evaluated within educational institutions. Comparative scholarship identifies critical examination of dominant knowledge systems, inclusive curriculum design, relational teaching, and meaningful engagement with communities as central practices of decolonizing curriculum and pedagogy (Shahjahan et al., 2022). In Pacific higher education, decolonizing practice involves positioning Indigenous ways of knowing as foundational to teaching and learning, while also recognizing the institutional conditions that shape whose knowledge receives authority (Leenen-Young et al., 2021). For design education, this orientation supports methodological pluralism: technical observation, mapping, and environmental analysis can be placed in dialogue with story, relational knowledge, cultural protocol, and sensory experience. Indigenous storytelling methodologies foreground the situatedness of the designer and promote mutuality in collaborative design processes (Barcham, 2023). Similarly, design education has shown that combining Western studio and co-design practices with Indigenous ways of knowing can support culturally responsive learning and knowledge co-generation (Gajendran et al., n.d.). This perspective informs the dual-method studio by framing quantitative and narrative inquiry as related, distinct, and mutually informative approaches to understanding place.

2.2 Indigenous Methodologies and Relational Knowledge

Indigenous methodologies foreground relationality, story, ethics, community, place, and holism. They differ from approaches that separate researcher, subject, and setting into discrete objects of analysis. Storytelling, storywork, conversational methods, and talk story are valid ways of gathering and interpreting knowledge when they are grounded in the epistemology and protocols of the communities involved (Kovach, 2021). Barcham (2023) similarly argues that Indigenous storytelling in design can foster mutuality, acknowledge the designer's situatedness, and prevent neo-colonial forms of practice. These approaches are not anti-technical; rather, they are technical methods to become accountable to relationships, cultural meaning, and community authority. Decolonizing pedagogy extends this orientation by emphasizing critical reflexivity, relational teaching, and the co-production of knowledge with communities. Across higher education contexts, curriculum decolonization is advanced through questioning dominant knowledge systems, centering multiple ways of knowing, and strengthening relationships among institutions, students, and communities (Leenen-Young et al., 2021; Miole, 2024; Ofosu-Asare, 2025).

2.3 Narrative Inquiry and Humanizing Design Education

Narrative inquiry provides a structured way to examine how people interpret, remember, and feel their way through space. In design studios, storytelling through written, visual, and spoken forms has been shown to heighten user empathy, strengthen multi-sensory conceptualization, and support holistic thinking across programming, concept development, and presentation stages (Carmel-Gilfilen & Portillo, 2016; Danko et al., 2006). Narrative methods also expand design attention from physical form to the experiential qualities of place, including sound, smell, movement, atmosphere, emotional response, and social interaction. In an empathy-centered design studio, narrative inquiry enabled students to integrate first-person perspectives with evidence-based design, producing solutions responsive to users, families, and workers (Carmel-Gilfilen & Portillo, 2016). Similarly, Danko et al. (2006) found that narratives encouraged designers to consider the interconnected relationships among people, process, and place. For cultural landscapes, narrative inquiry provides a means of documenting sacredness, comfort, sensory conditions, memory, and belonging alongside observable activity. It positions lived experience as an integral source of design knowledge and supports landscape architecture students in developing empathetic, culturally responsive, and place-sensitive design judgement.

2.4 SOPARC and Systemic Behavioral Observation

The quantitative stream in this study draws on the System for Observing Play and Recreation in Communities (SOPARC). Developed for direct observation of people, physical activity, and contextual conditions in community settings, SOPARC offers a systematic means

of recording users, activity types, and environmental features (McKenzie et al., 2006). Reliability testing found very high agreement for user counts and contextual characteristics, while later reviews identified the tool's flexibility, low participant burden, and adaptability to different observation purposes (Evenson et al., 2016). Its limits are equally relevant: SOPARC captures a moment in time, uses broad categories to maintain observer reliability, and cannot independently establish what a place means to those who use it (Evenson et al., 2016). The modified protocol used in this study retained SOPARC's observational discipline while adding categories relevant to ritual, tourism, local roles, and heritage context.

2.5 Mixed-Method Triangulation and Epistemic Divergence

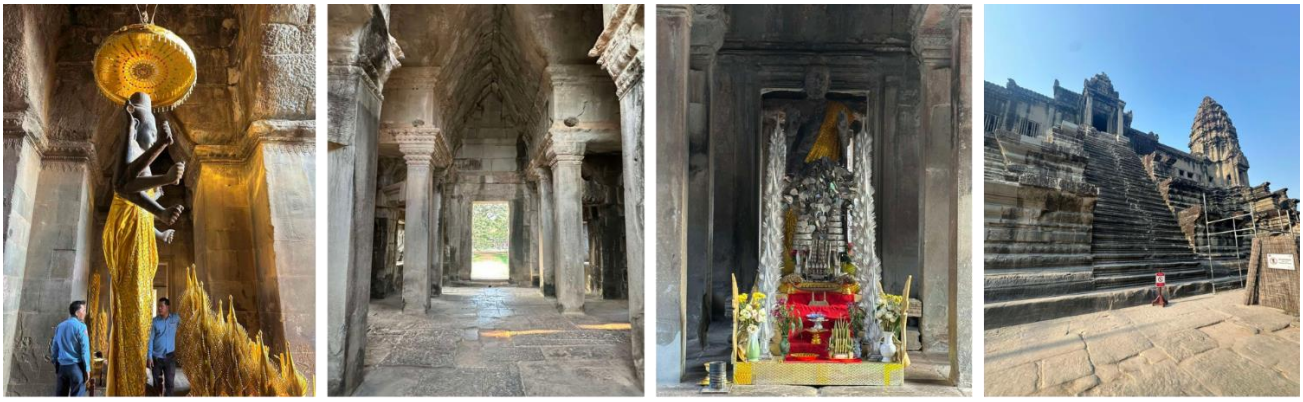
Mixed-methods triangulation provides the bridge between these streams. Triangulation can improve confidence through convergence, but it also permits recognition to multiple realities and deeper understanding through divergence (Hussein, 2009). Moffatt et al. (2006) show that conflicting quantitative and qualitative findings can be used to interrogate both datasets rather than privileging one. This study adopts that principle. Its purpose is not to prove which method is correct, but to identify the conditions under which they converge, complement one another, or reveal tensions. Mixed-method integration is strengthened when researchers make the relationship between datasets explicit. Qualitative and quantitative methods may address related aspects of a phenomenon through different theoretical assumptions, generating findings that are convergent, complementary, or divergent (Hussein, 2009; Moffatt et al., 2006).

3.0 Methodology

This study used a dual-method comparative field design. Quantitative observations and qualitative narrative data were collected at four selected stations, then independently synthesized using the Chiral Matrix and Chiral Divergence Index (CDI) to identify convergence, complementarity, and dissonance.

3.1 Research Site and Participants

The fieldwork was conducted at Angkor Wat Temple, Cambodia, on March 26, 2026. As a living cultural landscape, the site brings together ritual, tourism, conservation, heritage interpretation, and everyday movement. Eight Master of Tropical Landscape Architecture (MTLA) students from the University of the Philippines were organized in four two-person subgroups: A1 and A2 for modified SOPARC observation, and B1 and B2 for narrative inquiry. Groups A1 and B1 followed the sequence from Station 1 to Station 4, while A2 and B2 followed a reverse sequence from Station 4 to Station 1. This route enabled each station to be observed twice during different morning time slots.



Station 1: Statue of Vishnu | Station 2: South Library | Station 3: Hall of Thousand Gods | Station 4: Construction Area Near Bakan

Fig. 1: Four selected stations within the Angkor Wat Temple
(Source: Author)

The four stations were selected purposively to represent contrasting spatial conditions. Station 1, the Statue of Vishnu, was a ritual node marked by incense, offerings, prayers, guides, tourists, and local visitors. Station 2, the South Library, was a liminal setting used for resting, photography, and brief visual engagement, but with limited interior occupation. Station 3, the Hall of Thousand Gods, was an enclosed heritage and ritual space where monks, tourists, guides, staff, and interpretive needs overlapped. Station 4, the construction area near the entrance to Bakan, was a circulation threshold affected by active heritage conservation, scaffolding, noise, heat, and dust. This selection was informed by Whyte's (1980) observation that public activity often concentrates on transitions along pedestrian flows, and near clearly defined spatial features.

3.2 Data Collection

Data were collected through two parallel observation streams at each station and morning time slot. The Group A pair recorded users, activities, roles, and environmental conditions, while the corresponding Group B pair documented interactions, sensory qualities, atmosphere, and cultural meaning. Group A used a modified SOPARC sheet to record temperature, shade, surface condition, ritual and commercial elements, soundscape, user counts, age and gender categories, observed roles, and activity types. Group B used

observational walk logs, sensory mapping, and micro-interview prompts to record notable interactions, immediate impressions, visual and auditory cues, olfactory and tactile experience, and voluntary responses concerning users' reasons for being present and their first impressions of the station. Thus, each station generated two paired quantitative and qualitative records, enabling comparison of both methodological differences and short-term variation in spatial use.

The two teams collected data independently. Following the fieldwork, the author synthesized the completed data sheets through the Chiral Matrix analysis. This author-led process compared the two datasets station by station and generated the CDI scores used in the subsequent interpretation.

3.3 Chiral Matrix and Chiral Divergence Index

The Chiral Matrix organized comparisons at each station. Group A data were summarized through total observed individuals, activity patterns, roles, and environmental conditions. Group B data were summarized through lived atmosphere, narratives, sensory qualities, and cultural meaning. Chiral tension points were then identified and scored each station using the CDI. The CDI rubric shown in Table 1 was developed for this study and is conceptually informed by chirality as related but non-superimposable forms (Avnir & Huylebrouck, 2013), and mixed-methods approaches that interpret convergence, complementarity, and divergence across datasets (Hussein, 2009; Moffatt et al., 2006).

Table 1. CDI rubric

Parameters	What to check	0	1	2
Actor and activity match	Do the same people, roles, and actions appear in both streams?	Actors and activities match closely	Some overlap, but different emphasis or missing actors	Major mismatch in who is present or what they are doing
Environmental consistency	Do both streams describe the same physical conditions or spatial features?	Same key features and conditions	Some common features, but different details	Different spatial reading of the place
Interpretive alignment	Do the two streams tell the same story about what the place means?	Meaning is consistent	Meaning overlaps partly, but differs in emphasis	Meaning is fundamentally different or contradictory
Epistemic gap	How far apart are the ways of knowing?	Both streams can be integrated easily	Some translation needed between quantitative and qualitative frames	The streams rely on very different assumptions, categories, or values
Tension level	Are there visible contradictions or friction points?	No major tension	Moderate tension, but reconcilable	Strong tension that cannot be resolved without losing important meaning

(Source: Author)

Five CDI parameters were used: actor and activity match, environmental consistency, interpretive alignment, epistemic gap, and tension level. Each parameter received a score from 0 to 2. A score of 0 indicated strong alignment or little divergence, 1 indicated partial alignment or moderate divergence, and 2 indicated strong divergence. The five scores were added. Totals of 0 to 3 represented Low CDI or convergence; 4 to 6 represented Moderate CDI or complementarity; and 7 to 10 represented High CDI or dissonance. The CDI is therefore a heuristic index that makes interpretive difference visible; it is not a claim of statistical significance or objective truth.

4.0 Findings

A Chiral Matrix that synthesizes the two observation rounds conducted at each station is shown in Table 2. By aggregating the paired observations, the matrix foregrounds recurring patterns of convergence, complementarity, and divergence between the quantitative and qualitative methods rather than scan-specific variation.

Station 1 showed the clearest convergence. Group A's evidence of incense, prayer, visitors, guides, and ritual activity corresponded closely with Group B's descriptions of offering, reverence, and worship. The quantitative and qualitative streams emphasized different dimensions, but they did not produce a major contradiction. The low CDI indicates that measurable use and lived meaning were mutually reinforcing.

Station 2 showed the greatest divergence. Group A counted measurable occupations, including vendors or workers and tourists, whereas Group B emphasized that few people entered the library itself and characterized it as empty, transitional, or a place for rest. The contrast indicates that the quantitative scan boundary and the qualitative place-boundary were not identical. Bodies counted around the library did not necessarily constitute meaningful occupation of the library. This high to moderate CDI was the strongest example of the chiral gap.

Stations 3 and 4 showed moderate CDI. At the Hall of Thousand Gods, both streams recognized ritual and tourism, yet the qualitative data added odor, solitude, physical texture, and visitors' desire for interpretive signage. At the construction area, both streams recognized circulation and heritage work, while the narrative stream foregrounded heat, noise, dust, fatigue, and ethical concern about visible modern conservation techniques. These were not contradictory accounts; they were complementary readings of the same place.

The contrast across stations demonstrates that CDI is sensitive to the relationship between spatial condition and epistemic difference. At Station 1, ritual objects, embodied practices, and sacred interpretation were all visible to both teams, creating a strong basis for convergence. At Station 2, the difference arose partly from what each method treated as the relevant unit of analysis. Group A counted people within the broader observation area, whereas Group B focused on whether people entered, remained in, and

meaningfully engaged with the library. The high CDI therefore identified a mismatch between operational presence and experiential occupation rather than a simple data error.

Table 2. Chiral Matrix Comparing Quantitative Observations, Qualitative Narratives, and CDI Scores Across Four Angkor Wat Stations

Station	Group A: Modified SOPARC, A1/A2	Group B: Narrative Inquiry, B1/B2	CDI Parameters: AAM, EC, IA, EG, TL	CDI Interpretation
1. Statue of Vishnu	A1 N=23; A2 N=37; incense, prayer, monk or guide activity, tourists, locals, and ritual soundscape.	Offerings, shoe removal, kneeling prayer, guide explanations, reverence, sacred and holy atmosphere.	0, 0, 0, 1, 0	Low, 1. Convergence: observed ritual activity and lived sacred meaning aligned.
2. South Library	A1 N=13; A2 N=22; users including workers, tourists, locals, and guides; shaded uneven stone setting.	Few entered the library; outside use involved rest, photography, phone use, observation, and relief from heat.	1, 1, 2, 2, 1	High to moderate, 7/5. Dissonance in the first round, then complementarity: counted presence did not equal meaningful inhabitation.
3. Hall of Thousand Gods	A1 N=15; A2 N=35; shrine, incense, monk-related activity, tourist chatter, and interior stone conditions.	Monk blessing, prayer participation, guide interpretation, odor, rough stone, solitude, and desire for better interpretation.	1, 0, 1, 1, 1	Moderate, 4. Complementarity: shared ritual and tourism reading, but narrative added sensory and affective depth.
4. Construction area near Bakan entrance	A1 N=13; A2 N=8; users including tourists, locals, guides, limited workers, circulation, and construction-affected conditions.	Scaffolding, machinery, drills, heat, dust, drowsiness, sadness about conservation, and visitor awe.	1, 1, 1, 1, 1	Moderate, 5. Complementarity: observation documented use and setting, while narrative documented embodied heritage experience.

Note: AAM = actor and activity match; EC = environmental consistency; IA = interpretive alignment; EG = epistemic gap; TL = tension level.
(Source: Author)

At Station 3, the quantitative evidence established the scale of tourist and ritual activity, while the narrative evidence clarified the internal conditions of experience, including smell, material texture, moments of prayer, solitude, and the need for clearer interpretation. At Station 4, the comparison showed how conservation becomes part of visitor experience: measurable circulation and construction activity were inseparable from dust, heat, noise, fatigue, and awe. Together, these results show that the CDI is most useful when it leads to a more precise question about a place. Instead of asking which dataset is correct, students and designers can ask what each dataset excludes, whose experience is made visible, and what spatial response follows from the difference.

5.0 Discussion

The results demonstrate the relevance of cultural-landscape analysis to everyday well-being by showing how spatial conditions shape people's capacity to pause, move, rest, worship, learn, and feel at ease. Across the four stations, narrative accounts identified calm and reverence at the Vishnu shrine; opportunities for rest and relief from heat at the South Library; sensory conditions and interpretive needs at the Hall of Thousand Gods; and the effects of heat, dust, noise, and construction activity near the entrance to Bakan. Together, these experiential qualities form meaningful dimensions of physical comfort, psychological ease, cultural continuity, and respectful co-presence within a living heritage landscape.

The dual-method studio offers an expanded view of spatial conditions and public life. Quantitative observations establish patterns of crowding, movement, and role distribution, while narrative approaches articulate how users experience atmosphere, sacredness, comfort, connection, and fatigue. This integrated understanding can inform design decisions about shade, seating, access, visitor flow, wayfinding, and construction management in ways that enhance visitors' and workers' time in place.

The findings show that the pedagogical value of a dual-method studio lies in the chiral gap itself. Low CDI teaches students how convergence can strengthen interpretation. Moderate CDI teaches complementarity, showing environmental conditions must be read alongside sensory, cultural, and emotional evidence. High CDI teaches critical interrogation. It asks students to question whether a spatial boundary, a category of use, or a numerical count adequately represents lived experience. This use of divergence is consistent with triangulation and mixed-method research, which treats discrepancy as a source of deeper inquiry rather than as a failure of design (Hussein, 2009; Moffatt et al., 2006).

The results show implications for ethical translation. The South Library demonstrates that quantitative occupation and meaningful inhabitation are not interchangeable. A decision based solely on counts might treat the station as active, while a decision based solely on narrative might treat it as empty. Ethical translation requires designers to hold both readings together and identify why they differ. The aim is not to merge them into a false consensus but to design with awareness of what each method makes visible and what each obscures.

The findings also support operational empathy. At the construction area, numerical observation identified people, movement, and construction context. Narrative inquiry identified how that context felt: hot, dusty, loud, tiring, and ethically troubling for some observers. This makes empathy operational because experiential evidence becomes a basis for design criteria, including shade, rest space, interpretation, safer viewing, and communication of conservation work. Narrative inquiry therefore adds accountability to technical

observation rather than replacing it, consistent with evidence that narrative methods heighten empathy, responsiveness, and whole-person design thinking (Carmel-Gilfilen & Portillo, 2016; Danko et al., 2006).

Process transparency is equally important. The CDI makes visible how an interpretation is reached. Rather than presenting a final design judgement as neutral, it records actors matched, where environmental readings differed, where meaning overlapped, and where tension emerged. This aligns with decolonizing pedagogies that emphasize reflexivity, positionality, community knowledge, and critical examination of dominant epistemologies (Leenen-Young et al., 2021; Miole, 2024; Ofosu-Asare, 2025).

The results further point toward co-presence design. The observations documented different roles and practices, including prayer, guiding, tourism, cleaning, resting, and passage across shared spaces. Landscape architecture can respond by accommodating these overlapping activities through spatial arrangements that support ritual, tourism, conservation, interpretation, and rest.

In the age of Artificial Intelligence (AI), these lessons are increasingly urgent. AI can support classification, visualization, prediction, and pattern recognition. Yet it may reinforce the primacy of what is easily counted and optimized. Humanizing Data Expression argues that AI education must foreground storytelling and the perspective of people excluded from technological design (McBride et al., 2024). The Chiral Matrix offers a practical educational response. It ensures that data-driven observations remain in dialogue with lived experience, so AI can function as an assistant to interpretation rather than its replacement.

6.0 Conclusion and Recommendations

This study shows that a dual-method studio can reveal how quantitative observation and qualitative lived experience converge, complement one another, or diverge across a complex cultural landscape. At Angkor Wat, modified SOPARC identified users, activities, roles, and environmental conditions, while narrative inquiry captured sacredness, sensory conditions, rest, fatigue, awe, and cultural meaning. The Chiral Matrix and CDI provide a practical framework for ethical translation, operational empathy, process transparency, and co-presence design in landscape architecture education.

Future research should extend observation across times, seasons, and ritual calendars. The brief scans in this study show situated conditions, whereas repeated observations could identify whether CDI patterns remain stable. Future applications should involve local knowledge holders in reviewing station interpretations and CDI ratings. Such participation would strengthen relational accountability and reduce the risk that external observers define meaning without local validation. The framework should be applied across other Southeast Asian cultural landscapes. Comparative work could establish whether certain place types consistently generate convergence, complementarity, or dissonance.

Finally, future research should investigate how AI-assisted tools can support data organization, transcription, visualization, and scenario testing without displacing field presence, cultural humility, or human interpretation. Any use of AI should remain transparent about data sources, classification, and omissions, and should be evaluated against the narratives of people who live, work, worship, or care for the site.

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Paper Contribution to Related Field of Study

This paper contributes a transferable pedagogical framework for students and educators across fields that combine structured data with lived narrative and culturally situated knowledge. The Chiral Matrix and CDI support students in comparing evidence streams and developing critical, culturally responsive judgement, while giving educators a transparent procedure for teaching and assessing methodological reflexivity. The framework can be adapted to field-specific evidence, ethical protocols, and learning contexts.

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