

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 comparable but non-superimposable knowledge systems: 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; Mixed-Method; Quality of Life

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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. Modernity positioned the West as the center of rationality, progress, and civilization, while relegating peoples beyond its borders to subordinate positions (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 judgment 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 (Aprimadya et al., 2025; Miole, 2024). The Philippine Indigenous Peoples' Education policy provides a relevant alternative by framing Indigenous and non-

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Indigenous knowledge systems as interconnected and complementary (Miole, 2024). For design and built environment education, this suggests retaining useful technical methods while placing them in an accountable relationship with Indigenous-informed, narrative, and place-based approaches.

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). Recent work in architectural cognition and perception suggests that people may experience and interpret the same environment through different perceptual and conceptual frameworks, highlighting the value of multiple complementary ways of knowing (Proietti et al., 2025). 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 point to 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). The study aims 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?

The study has three objectives: (1) to identify the distinct insights generated by modified SOPARC and narrative inquiry at four selected stations; (2) to determine the degree of convergence, complementarity, and dissonance between the two evidence streams using the Chiral Matrix and Chiral Divergence Index (CDI); and (3) to establish how these relationships can inform methodological reflexivity, ethical translation, and culturally responsive design judgment in landscape architecture education.

2.0 Literature Review

2.1 Decolonial Pedagogy and Methodological Pluralism

Decolonial pedagogy examines how institutions recognize, produce, and evaluate knowledge, emphasizing the transformation of epistemological frameworks and curricular content. Its key practices include challenging dominant knowledge systems, fostering relational teaching, developing inclusive curricula, and engaging communities (Leenen-Young et al., 2021; Shahjahan et al., 2022). In design education, methodological pluralism brings technical observation and mapping into dialogue with storytelling, cultural protocols, and sensory experience. Recent studies suggest that Indigenous storytelling can highlight designers' positionality and mutual relationships, while studio, co-design, and place-based learning can promote reflective and culturally responsive knowledge co-production (Barcham, 2023; Gajendran et al., 2022; Ofosu-Asare, 2025). This perspective treats the two methods as distinct yet mutually informative.

2.2 Indigenous Methodologies and Relational Knowledge

Indigenous methodologies emphasize relationships, storytelling, ethics, community, place, and holistic understanding, recognizing knowledge as inseparable from context and human connection. Storywork and conversational methods are valid forms of inquiry when grounded in community knowledge systems and protocols (Kovach, 2021). In design practice, storytelling can acknowledge the designer's positionality and challenge neocolonial approaches (Barcham, 2023). These methodologies also hold technical inquiry accountable to relationships, cultural meaning, and community authority. Likewise, decolonizing pedagogy promotes reflexivity, multiple ways of knowing, and collaborative knowledge production (Leenen-Young et al., 2021; Miole, 2024; Ofosu-Asare, 2025). These approaches encourage culturally responsive, community-driven learning and design that value Indigenous knowledge systems as active contributors to contemporary educational and design practice (Ofosu-Asare, 2025).

2.3 Narrative Inquiry and Humanizing Design Education

Narrative inquiry explores how people interpret and experience space. In design studios, storytelling and narrative-based learning can foster empathy, creative thinking, communication skills, and the contextualization of design ideas (Lee et al., 2023; Strickfaden et al., 2023). These methods broaden attention beyond physical form to include sound, smell, movement, atmosphere, emotion, and social interaction. They also help students connect first-person perspectives with evidence-based design and understand the relationships among people, processes, and place (Kovach, 2021). In cultural landscapes, narrative inquiry can document sacredness, comfort, memory, and belonging alongside observable activities, thereby supporting culturally responsive and place-sensitive design judgment (Miole, 2024). By foregrounding lived experience, narrative methods can reveal meanings, values, and cultural relationships that may not be evident through behavioral observation or quantitative analysis alone (Barcham, 2023; Strickfaden et al., 2023).

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 way to record 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 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 extends beyond the corroboration of findings by enabling researchers to examine a phenomenon from multiple methodological perspectives and construct richer, more credible interpretations (Vivek et al., 2023). While convergence between quantitative and qualitative results may enhance confidence in observed patterns, divergence can illuminate contextual complexities, competing realities, and previously unrecognized dimensions of experience (Younas et al., 2023). Consequently, conflicting findings should not be resolved by privileging one dataset over another but by critically interrogating both datasets to understand the sources and implications of their differences (Murry et al., 2023). In this study, the relationship between the two streams is made explicit through an analysis of where findings converge, complement one another, and reveal productive tensions in interpreting spatial use and experience.

The literature supports decolonial reflexivity, Indigenous-informed narrative inquiry, behavioral observation, and mixed-method integration. However, it provides no studio-scale procedure for making agreement and disagreement visible at specific places and translating the comparison into design judgment. This study extends recent inclusive and decolonial design pedagogy (Barcham, 2023; Gajendran et al., 2022; Miole, 2024; Ofosu-Asare, 2025) through a station-based Chiral Matrix and heuristic CDI. It asks how students can compare structured counts with situated narratives without subordinating either form of knowledge.

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 into 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 as shown in Figure 2. This route enabled each station to be observed twice during different morning time slots.



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

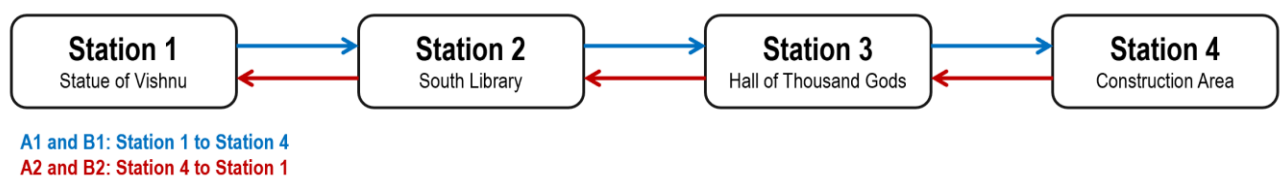


Fig. 2: Routes and station allocation of the four groups
(Source: Author)

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 recent evidence demonstrating that social interactions and public activity tend to cluster around spatial edges, visual landmarks, and other clearly defined features within public spaces (Loo & Fan, 2023).

3.2 Data Collection

Data were collected through two parallel observation streams at each station during morning time slots. Group A used a modified SOPARC sheet to record user counts, demographics, activities, roles, environmental conditions, and site features. At the same time, Group B documented interactions, sensory experiences, atmosphere, and cultural meanings through walk logs, sensory mapping, and brief voluntary interviews. Together, these paired quantitative and qualitative records enabled comparison of methodological perspectives and short-term patterns of spatial use.

The two teams collected data independently. After fieldwork, the author synthesized the completed data sheets using 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 (Murry et al., 2023; Younas et al., 2023).

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

The 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 significant elements: incense, offerings, prayer, guides, and a sacred atmosphere. Group A's evidence of visitors, guides, and ritual activity corresponded closely with Group B's descriptions of shoe removal, kneeling prayer, reverence, and worship. These elements address Objective 1 by showing the distinct but compatible contributions of counts and narratives, and Objective 2 through the low CDI: measurable use and lived meaning were mutually reinforcing.

Station 2 significant elements: counted presence around the library, limited interior entry, rest, photography, and relief from heat. Group A counted workers, vendors, and tourists within the observation area, whereas Group B characterized the library interior as empty or transitional. The significant finding is a boundary mismatch: operational presence did not equal meaningful occupation. This directly addresses Objective 2 because the high-to-moderate CDI was the clearest instance of dissonance followed by complementarity.

Stations 3 significant elements: ritual and tourism activity, monk blessing, odor, rough stone, solitude, and a need for interpretation. Both streams recognized ritual and tourism, while the narrative data disclosed sensory and affective conditions not represented in the counts. The moderate CDI addresses Objectives 1 and 2 by showing complementarity between the scale of use and the quality of experience.

Station 4 significant elements: circulation, heritage work, scaffolding, heat, dust, noise, fatigue, and awe. Quantitative observation documented movement and the construction context, whereas narrative inquiry foregrounded embodied discomfort and ethical concern about visible conservation techniques. The moderate CDI addresses Objectives 1 and 2 by demonstrating that use patterns and lived heritage experience are inseparable but non-superimposable.

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

and CDI Scores Across Four Angkor Wat Stations									
Station	Group A: Modified SOPARC, A1/A2	Group B: Narrative Inquiry, B1/B2	CDI Parameters:					CDI Interpretation	
			AAM	EC	IA	EG	TL		
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.	A1-B1	0	0	0	1	0	Low, 1-3. Convergence: observed ritual activity and lived sacred meaning aligned.
			A2-B2	1	0	0	1	1	
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.	A1-B1	1	1	2	2	1	High to moderate, 7-5. Dissonance in the first round, then complementarity: counted presence did not equal meaningful inhabitation.
			A2-B2	1	1	1	1	1	
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.	A1-B1	1	0	1	1	1	Moderate, 4-5. Complementarity: shared ritual and tourism reading, but narrative added sensory and affective depth.
			A2-B2	1	1	1	1	1	
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.	A1-B1	1	1	1	1	1	Moderate, 5. Complementarity: observation documented use and setting, while narrative documented embodied heritage experience.
			A2-B2	1	1	1	1	1	

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

Across the four stations, the comparison clarifies Objective 3. At Station 1, convergence supports confidence in an interpretation when observable ritual and narrated sacred meaning align. At Station 2, dissonance requires reflexivity about scan boundaries and the meaning of occupation. At Stations 3 and 4, complementarity translates sensory, cultural, and emotional evidence into questions about interpretation, comfort, and conservation practice. The comparison encourages students and designers to examine what each dataset excludes, whose experiences are represented, and what spatial responses emerge from the difference between them.

5.0 Discussion

The station findings link spatial conditions with everyday well-being and place-sensitive inquiry. Calm and reverence at the Vishnu Shrine, rest and relief from heat at the South Library, sensory and interpretive needs at the Hall of a Thousand Gods, and heat, dust, noise, and fatigue near the Bakan entrance show that activity counts alone cannot fully explain spatial experience. This finding supports narrative design research demonstrating how stories and multisensory evidence extend attention beyond physical form to the relationships among people, processes, and place (Barcham, 2023; Lee et al., 2023; Strickfaden et al., 2023).

The dual-method studio therefore provides a broader understanding of spatial conditions and public life. Modified SOPARC systematically identifies patterns of crowding, movement, user roles, and environmental features, consistent with its strengths as an adaptable direct-observation protocol (Evenson et al., 2016; McKenzie et al., 2006). Narrative inquiry, in turn, reveals how these conditions are experienced through sacredness, comfort, connection, fatigue, or exclusion. Integrating both methods can guide decisions on shade, seating, access, visitor flow, wayfinding, and construction management without treating either dataset as complete on its own.

The pedagogical value of this approach lies in the chiral gap. A low CDI indicates convergence and strengthens interpretation, while a moderate CDI highlights the complementary contributions of environmental and experiential evidence. A high CDI encourages students to examine whether their boundaries, categories, or counts adequately represent lived experience. Similarly, mixed-method research views discrepancies as productive sources of insight that can refine interpretations and generate richer understanding (Murry et al., 2023; Younas et al., 2023).

The South Library illustrates the importance of ethical translation. Activity counts may characterize the station as active, while a narrative focused on interior engagement may describe it as empty. Such discrepancy can reveal differences in constructs, boundaries, and underlying assumptions (Murry et al., 2023; Younas et al., 2023). Ethical translation requires designers to preserve both interpretations, explain why they differ, and avoid reducing them to a false consensus.

The construction-area findings further demonstrate operational empathy. Counts documented people, movement, and construction activity, while narratives captured heat, dust, noise, fatigue, and ethical concerns. These experiences can be translated into design criteria for shade, rest, interpretation, safer viewing, and clearer communication of conservation work. In this way, narrative inquiry complements technical observation by revealing experiential and contextual dimensions of place that inform more empathetic and responsive design decisions (Lee et al., 2023; Strickfaden et al., 2023).

The CDI also strengthens process transparency by showing where observed actors align, environmental readings differ, meanings overlap, and tensions emerge. It challenges the assumption that design judgment is neutral and reflects decolonial principles of reflexivity, positionality, community knowledge, and critical examination of dominant ways of knowing (Leenen-Young et al., 2021; Miole, 2024; Ofosu-Asare, 2025). The documented practices, including prayer, guiding, tourism, cleaning, resting, and passage, also support co-presence design that accommodates ritual, tourism, conservation, interpretation, and rest within shared spaces.

This approach becomes increasingly important with the use of AI, as classification and prediction may privilege what can be easily counted. Humanizing Data Expression instead emphasizes storytelling and perspectives often excluded from technological design (McBride et al., 2024). The Chiral Matrix keeps data-driven observation in dialogue with lived experience, positioning AI as an interpretive aid while human judgment remains central.

5.1 Implications for Pedagogy, Practice, and Quality of Life

In landscape architecture education, the Chiral Matrix can serve as a studio protocol. Students collect evidence, compare findings across stations, explain their boundary and category choices, and translate difference into clear design criteria. Assessment can consider both the final proposal and how transparently students integrate counts, narratives, positionality, and uncertainty. This approach supports reflective, relational, and culturally responsive design learning (Gajendran et al., 2022; Ofosu-Asare, 2025). It also prepares students to design environments that enhance quality of life by recognizing that human well-being emerges from interactions among the physical, social, cultural, and emotional dimensions of place. By integrating quantitative observations and lived experiences, students learn to identify how comfort, accessibility, belonging, cultural identity, safety, and opportunities for social interaction shape everyday spatial experiences. As a result, design decisions become more responsive to the diverse needs and aspirations of communities, fostering landscapes that support health, inclusion, resilience, and a stronger sense of place, all of which are essential components of a high quality of life.

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.

6.1 Limitation

The study recognizes several limitations. The 10-minute scans captured only brief snapshots and could not reveal temporal or seasonal patterns. The sample included eight graduate students whose observations may have differed based on their training, positionality, and interpretation. The qualitative data were drawn from brief field narratives and micro-interviews, providing short-term insights into user experience without sustained engagement with local knowledge holders. Therefore, Indigenous-informed refers to the study's methodological orientation and does not imply that the findings represent Cambodian Indigenous or local community knowledge. In addition, station boundaries, route order, weather, tourism, ritual activities, and ongoing construction reflected site-specific conditions. The CDI scores were based on author-led synthesis and should be treated as heuristic.

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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 Chiral Divergence Index (CDI) help students compare evidence streams, develop critical and culturally responsive judgment, and make their interpretive decisions more transparent. For educators, the framework provides a practical approach for teaching and assessing methodological reflexivity across diverse learning contexts. By fostering more inclusive and context-sensitive interpretations of people and place, the framework contributes to quality of life by informing design and planning decisions that enhance well-being, belonging, accessibility, and social inclusion

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