

FROM DIVERGENCE TO CONVERGENCE: A STUDY ON THE CO-CREATIVE PROCESS OF MULTICULTURAL TEAMS ADDRESSING SOCIAL DESIGN ISSUES

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ABSTRACT

This study explores how multicultural student teams transform culturally grounded divergence into integrative design outcomes when addressing social loneliness. Drawing on a six-month Global Project-Based Learning (PBL) programme involving Japanese and Estonian students, the research integrates cultural framing theory, relational reconciliation, boundary object mediation, and intergenerational capital. Using a qualitative case study supported by survey data, it identifies a non-linear three-phase process: culturally distinct problem framing, artifact-mediated negotiation with emergent cultural brokers, and convergence through hybrid integration rather than compromise. Findings reveal that generational differences created greater difficulty during solution development than cultural differences, while intensive face-to-face interaction strengthened trust and communication. The proposed Multilayered Reconciliation Model conceptualises cultural diversity as an epistemic resource activated through relational infrastructure, demonstrating how divergence can generate innovation in societal design collaboration.

Keywords: Multicultural co-creation, societal design, loneliness, cultural framing

1 INTRODUCTION

Loneliness has become a pressing social issue across societies shaped by aging populations, digital mediation, and shifting family structures. Yet loneliness is not merely an individual psychological state; it is culturally embedded in norms of belonging, autonomy, and relational obligation. In collectivist contexts, it may be framed as social withdrawal or failure of communal integration. Whereas in individualist contexts, it is often understood as emotional isolation despite structural independence. Such culturally situated interpretations shape problem definitions, responsibility, and intervention logics.

Multicultural Project-Based Learning (PBL) has emerged in design education to cultivate culturally sensitive innovation. PBL is an educational approach in which learners collaboratively address complex real-world problems through iterative inquiry and practical implementation. However, while diversity can enhance creativity, it may also generate misunderstanding, negotiation friction, and power asymmetries. The key paradox remains: how does cultural divergence become integrative innovation rather than fragmentation?

Existing research often treats culture as a static variable and focuses on communication barriers or outcome measures, leaving micro-process mechanisms underexplored. This study addresses that gap by examining how multicultural student teams reconcile divergent framings of loneliness through relational mediation, boundary objects, and generational dynamics, proposing a Multilayered Reconciliation Model of integrative convergence.

2 LITERATURE REVIEW

Cross-cultural collaboration is frequently associated with enhanced creativity and innovation, particularly in complex design contexts. Early cultural dimension theory conceptualised culture as a relatively stable attribute shaping communication styles and decision-making patterns [1]. While influential, such models risk essentialising actors and overlooking situational variability. In contrast, Swidler [2] reconceptualised culture as a dynamic interpretive “toolkit” activated through interaction. In design collaboration, this perspective highlights how culturally embedded problem framings shape

divergent understandings of social issues. Problem framing is central to design practice [3], especially in societal challenges such as loneliness, where relational norms and moral assumptions vary across contexts. Loneliness may therefore be interpreted differently depending on cultural expectations surrounding belonging and interpersonal relationships.

Research on team diversity presents a well-known paradox. The information/decision-making perspective argues that diversity enhances cognitive resources and creativity [4], whereas social identity theory emphasises risks of fragmentation through in group dynamics [5]. Yet both perspectives often treat diversity as an input and performance as an outcome, neglecting the relational processes that mediate between them. Trust and psychological safety have been identified as enabling conditions [6] but trust alone does not explain how epistemic divergence becomes integrative innovation.

Within design education, globally networked collaborative learning has been discussed as an approach for fostering intercultural collaboration and distributed co-creation [7]. However, previous studies have primarily focused on communication and coordination challenges, leaving the reconciliation process through which divergent cultural framings become integrated outcomes relatively underexplored.

Relational reconciliation provides a process-oriented lens by conceptualising difference as a dialogical resource rather than a problem to suppress [8]. In design contexts, reconciliation unfolds through iterative reinterpretation of problem definitions and solution criteria, aligning with theories of knowledge co-production [9]. Boundary object theory further specifies material mediation: artifacts flexible across social worlds enable shared reference without full consensus [10]. Cultural brokerage complements this process, as liminal individuals translate meanings across contexts [11]. Finally, intergenerational capital highlights how age and experience structure authority gradients during convergence [12].

Integrating these perspectives, this study conceptualises multicultural societal design collaboration as a multilayered reconciliation process structured by cognitive, relational, material, and structural dynamics. The proposed Multilayered Reconciliation Model integrates these dimensions to explain how multicultural teams move from divergence toward integrative convergence.

3 CONCEPTUAL FRAMEWORK AND METHOD

3.1 Conceptual framework: the Multilayered Reconciliation Model

This study proposes the Multilayered Reconciliation Model to explain how multicultural teams transform culturally grounded divergence into integrative design outcomes. The model rests on three assumptions: cultural difference appears primarily as variation in problem framing rather than direct conflict; integration emerges through relationally mediated synthesis rather than compromise; and convergence is influenced not only by cultural dynamics but also by generational and experiential capital.

3.2 Research design

This study adopts a qualitative case study methodology to examine the processual dynamics of multicultural co-creation within a bounded educational setting. Case studies are appropriate for investigating complex, context-dependent phenomena. Global PBL environments exemplify such conditions. Rather than aiming for statistical generalisation, the study pursues analytical generalisation by refining theoretical propositions through in-depth empirical analysis. The case involves a six-month Global PBL programme (Figure 1).

Japanese and Estonian university students collaboratively designed interventions addressing social loneliness. The programme included six workshops: online collaboration through Miro and Discord, a four-day intensive face-to-face workshop, and a final presentation and reflection phase. Teams defined loneliness in both contexts, conducted research, generated concepts, and developed prototypes.

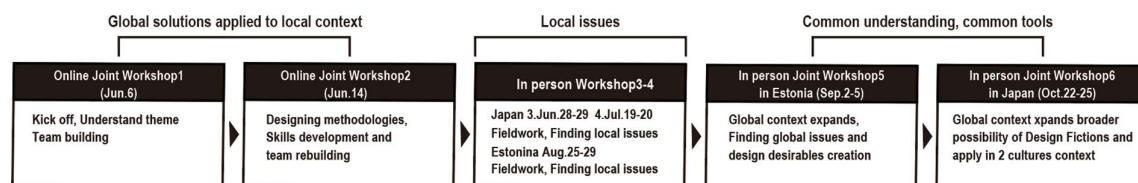


Figure 1. Global PBL programme

3.3 Data collection

Data for this study were collected from two primary sources: semi-structured interviews and a post-programme survey administered at the end of the Global PBL programme. The interviews explored participants' experiences with cross-cultural teamwork, perceived challenges, communication processes, and reflections on collaboration. All interviews were recorded and transcribed verbatim. Observational data (Figure 2) from the various workshops conducted during the programme were also collected and analysed.

The post-programme survey consisted of Likert scale items and open-ended questions designed to assess teamwork satisfaction, perceived cultural and generational challenges, and reflections on communication and collaborative processes. Although the wider programme included students from multiple cultural backgrounds, the present study includes only the survey and interview data from five Estonian students (E_A–E_E) and six Japanese students (J_A–J_F). Responses from other international participants were excluded to maintain analytical coherence and allow direct comparison between the two focal cultural groups.

All participants gave informed consent. Participation was voluntary, and identifiers were anonymised using coded labels to protect confidentiality while preserving analytical relevance.



Figure 2. Global PBL observational data: discussions, pitches, and whiteboards

3.4 Data analysis procedure

A thematic analysis was conducted in three iterative stages to examine the longitudinal dynamics of multicultural collaboration. First, open coding was applied to qualitative materials—including interview transcripts and open-ended survey responses—to identify expressions of cultural framing, perceived misunderstandings, negotiation strategies, mediation practices, and moments of convergence. Second, axial coding organised these codes according to the divergence–negotiation–convergence process described in the conceptual framework, enabling systematic comparison of meaning shifts across phases. Third, selective coding identified core reconciliation mechanisms, such as boundary object mediation, cultural brokerage, and trust formation, that accounted for movement from divergence toward integrative outcomes. Coding categories were refined iteratively to ensure alignment with the Multilayered Reconciliation Model.

The survey included 12 items divided into four domains: (1) participant background (Q1), (2) cross cultural and teamwork evaluations (Q2–Q3), (3) perceived difficulty related to cultural and generational differences (Q4–Q7), and (4) qualitative reflections on cultural, generational, and linguistic challenges (Q8–Q12).

For analytical purposes, survey items were grouped according to the process phases:

- **Divergence** (Q4, Q6)
- **Negotiation/Translations** (Q5, Q8, Q10, Q11)
- **Convergence** (Q2, Q3)
- **Generational comparison** (Q4 vs. Q6; Q5 vs Q7)

Descriptive statistics were used to examine patterns of perceived difficulty and satisfaction. Correlation analysis explored relationships between cross cultural functioning and convergence related outcomes. Quantitative patterns were interpreted alongside qualitative narratives to validate the identified process phases and underlying reconciliation mechanisms.

Credibility was enhanced through triangulation of interviews, surveys, and observational data. Member reflections were incorporated to support interpretive accuracy, and reflexive memoing documented researcher positionality. Analytical decisions were systematically recorded throughout the process.

4 RESULTS

4.1 Divergence: cultural and generational framing

The initial phase of collaboration was characterised by divergence in how loneliness was conceptualised. Survey responses to Q4 indicated moderate difficulty in identifying common loneliness issues across cultural backgrounds, suggesting early awareness of interpretive gaps. Interestingly, responses to Q6 showed comparable or slightly higher perceived difficulty in identifying issues across age and experience levels, indicating that divergence was not exclusively cultural but also generational. Qualitative evidence suggests that divergence manifested primarily in problem framing rather than interpersonal conflict. Japanese participants tended to situate loneliness within collective belonging and social withdrawal. One participant explained, “In Japan, loneliness is often hidden. People feel pressure to belong, and when they cannot, they isolate themselves.” (J_A). Another noted, “It is connected to social expectations and being part of a group. If you step outside, you feel alone.” (J_C).

By contrast, Estonian participants framed loneliness more as an individual, emotional disconnection. As one student described, “In Estonia, people are independent, but that independence can create emotional distance.” (E_B). Another reflected, “Loneliness is not about failing to belong, but about not feeling understood.” (E_C). These narratives reveal divergent relational logics: one centred on collective integration and obligation, the other on personal emotional recognition. Importantly, these differences were not reported as conflictual. Rather, they coexisted as parallel interpretive orientations that expanded the epistemic scope of the project. Generational divergence also emerged during this stage. Participants with more design education demonstrated urgency toward structuring and narrowing the problem, while less experienced members explored meanings more openly. As one participant stated, “Some of us wanted to move to solution mapping quickly, but others kept questioning what loneliness really meant.” (E_B). The divergence phase thus broadened conceptual space before convergence pressures intensified.

4.2 Negotiating and translation: mediating differences

The second phase involved active negotiation. Survey responses to Q5 indicated moderate difficulty in creating solutions across cultural backgrounds, and Q10 responses revealed that English communication posed additional challenges. Language limitations shaped collaborative interaction. An Estonian participant observed, “Sometimes we simplified ideas too much because explaining complex emotions in English was difficult.” (E_A). A Japanese participant similarly reflected, “I felt I could not express subtle cultural meaning. I worried that my explanation sounded too simple.” (J_D). However, linguistic constraints simultaneously catalysed reliance on visual and material artifacts. Shared storyboards, sketches, and prototypes functioned as mediating tools. As one participant described, “When we started drawing together on Miro, misunderstandings reduced.” (E_C). Another noted, “The storyboard helped us see that our ideas were not opposite but just focused on different aspects.” (J_B). These artifacts externalised implicit assumptions and shifted discussion from abstract debate to collaborative modification. Through iterative co-editing, culturally embedded meanings became visible and negotiable.

Within this negotiation phase, certain individuals emerged as cultural brokers. These participants translated not only language but also interpretive nuance. One respondent remarked, “She helped explain what ‘social obligation’ means in Japan in a way we could understand.” (E_B). Another commented, “He rephrased Estonian perspectives, so we did not misunderstand them as being cold.” (J_A). Broker roles were not formally assigned but organically assumed, often by individuals with greater international exposure or linguistic fluency. Yet brokerage entailed emotional labour. As one participant admitted, “I sometimes felt responsible for keeping the conversation smooth.” (E_A). This suggests that brokerage functioned as relational infrastructure, stabilising trust but unevenly distributed. Generational dynamics intensified during solution development. Comparison of Q5 and Q7 indicated that age-related differences were perceived as slightly more challenging during convergence stages. Participants reported tensions between experimentation and feasibility: “Senior members were cautious about feasibility, while younger members wanted bold ideas.” (E_D). Another reflected, “There was tension between experimenting and refining.” (J_C). Cultural divergence dominated early framing, whereas generational capital shaped decision thresholds during prioritisation.

4.3 Convergence: hybrid integration

Despite negotiation challenges, overall teamwork satisfaction (Q2) and perceived cross-cultural functioning (Q3) were high. Convergence was experienced positively rather than as forced compromise. Participants repeatedly described final outcomes as hybrid constructs integrating plural logics. One noted, “Our final concept combined community events with private reflection spaces.” (J_B). Another reflected, “It was neither Japanese collectivism nor Estonian individualism, it was something between.” (E_C). Rather than eliminating divergence, teams synthesised it into layered design solutions. For example, one concept combined small in-person gatherings (reflecting collective integration) with personalised digital journaling (reflecting individual introspection). Convergence thus embodied integrative reconciliation rather than assimilation. Face-to-face interaction during the intensive workshop played a decisive role in this transition. Participants emphasised the rapid strengthening of relational trust: “After meeting in person, trust increased quickly.” (J_A). Another stated, “Online we were careful, but in person we could read expressions and build confidence.” (E_B). Enhanced trust enabled more direct and constructive disagreement without escalation. Importantly, convergence did not erase underlying difference. As one participant acknowledged, “We still see loneliness differently, but we created something that respects both views.” (E_C). This suggests integration without homogenisation.

4.4 Cross-phase patterns

Across the six-month period, the collaboration unfolded iteratively rather than linearly. Cultural divergence was most visible in early framing stages, expanding its interpretive range. Generational divergence became more influential during solution prioritisation and convergence. Language functioned both as constraint and catalyst, limiting nuance but encouraging visualisation. Boundary objects and emergent brokers stabilised negotiation and enabled synthesis. Overall, the empirical pattern supports the conceptualisation of multicultural co-creation as a multilayered reconciliation process. Divergence expanded epistemic possibility; negotiation translated and externalised assumptions; convergence integrated plural logics into hybrid outcomes. Trust infrastructure and material mediation functioned as stabilising mechanisms, while generational capital shaped convergence dynamics.

5 DISCUSSIONS

This study examined how multicultural student teams transformed culturally grounded divergence into integrative design outcomes while addressing the socially embedded issue of loneliness. The findings suggest that cultural difference should not be conceptualised primarily as a source of interpersonal conflict, but as epistemic activation. During the divergence phase, Japanese and Estonian participants articulated distinct relational framings of loneliness—one emphasising belonging and social obligation, the other highlighting autonomy and emotional recognition. These differences expanded the interpretive space of the design problem rather than generating antagonism. Culture functioned as a situationally activated framing repertoire that shaped problem definition without rigidly determining collaborative trajectories.

The movement from divergence to convergence required structured mediation. Boundary objects, such as storyboards, visual maps, and rapid prototypes, played a critical role in externalising tacit assumptions. By shifting interaction from abstract linguistic negotiation to shared artifact modification, teams were able to reframe differences as complementary rather than oppositional. Language constraints, particularly operating in English as a second language, reduced expressive nuance but simultaneously encouraged visual communication. This paradoxical dynamic suggests that linguistic limitation can catalyse artifact-centred collaboration, strengthening material mediation within multicultural design processes.

The emergence of cultural brokers further stabilised negotiation. These individuals translated interpretive meanings and facilitated mutual recognition across cultural contexts. However, brokerage labour was unevenly distributed and occasionally experienced as emotionally demanding. This indicates that reconciliation is not purely cognitive but relationally sustained, requiring attention to invisible mediation work within teams. Integrative outcomes depended not only on tools but also on relational infrastructure.

Convergence did not occur through compromise or reduction to a lowest common denominator. Instead, hybrid solutions emerged that embedded plural cultural logics within shared design systems. Teams combined collective-oriented interventions with individualised reflective elements, demonstrating that

integrative synthesis can preserve differences while producing coherent outcomes. Trust was strengthened through face-to-face interaction and proved essential in enabling constructive disagreement and deeper integration. Convergence should therefore be theorised as hybridisation facilitated by relational trust, rather than mere agreement.

A notable contribution concerns the role of generational and experiential capital. Survey patterns indicated that age and experience differences posed greater challenges during solution development than cultural differences. Cultural divergence expanded problem framing, while generational gradients shaped convergence thresholds, particularly in prioritisation and feasibility evaluation. This suggests that multicultural collaboration operates across multiple axes of diversity simultaneously. Cultural plurality activates epistemic range, whereas generational capital structures decision-making dynamics. Together, these findings support the Multilayered Reconciliation Model, which conceptualises multicultural societal design collaboration as a recursive alignment of cognitive framing, relational trust, material mediation, and structural capital. Innovation emerges when these layers interact constructively. Rather than managing diversity as risk, educators and facilitators should design conditions that enable integrative reconciliation.

This study therefore reframes multicultural collaboration not primarily as communication management, but as a reconciliation process supported through relational trust, material mediation, and hybrid integration.

6 CONCLUSIONS

This research demonstrates that multicultural societal design collaboration progresses not from difference to sameness, but from divergence to reconciliation. Cultural framings activate plural epistemic perspectives that expand interpretive space. Through artifact-mediated negotiation, emergent brokerage, and trust-building conditions, these perspectives are integrated into hybrid design outcomes. Generational and experiential differences further shape convergence thresholds, underscoring the multilayered character of collaborative diversity.

The Multilayered Reconciliation Model reframes multicultural collaboration from conflict management to reconciliation design. Rather than minimising difference, effective co-creation structurally supports its integration. In addressing socially embedded issues such as loneliness—where ethical nuance and cultural sensitivity are paramount innovation emerges not from compromise but from creative reconciliation.

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