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From contradictions to kinship: expansive learning and concept formation in the wild

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Introduction: This article examines the Explorer Program, a culturally grounded credit-recovery pathway co-designed through the Indigenous Learning Lab at a rural high school in the United States. Grounded in Cultural-Historical Activity Theory (CHAT) and Indigenous relational epistemologies, the study investigates how historically produced contradictions in schooling, particularly between punitive disciplinary regimes and Indigenous kinship-based values, generated conditions for collective expansive learning and decolonizing agency between 2019 and 2024. Rather than framing student disengagement as an individual or familial deficit, the study conceptualizes schooling as a historically situated activity system shaped by settler-colonial logics, racialized discipline practices, and disrupted relations of kinship.

Methods: Using a longitudinal formative intervention design, Indigenous youth, educators, community members, and university researchers engaged in iterative cycles of collective analysis, design, and enactment. Processes of double stimulation were central, as participants mobilized Indigenous cosmologies, including the Seven Grandfather teachings, Anishinaabe lifeways, and land-based practices. These resources functioned as mediating cultural artifacts for kin-making, supporting the collective reworking of relationships, responsibilities, and meanings within the schooling activity system. Data sources included participant narratives, observations of Learning Lab sessions, and program records documenting attendance, disciplinary referrals, credit accrual, and graduation outcomes. Analyses traced how contradictions were surfaced, reinterpreted, and resolved through collective design activity.

Results: Through these processes, Indigenous Learning Lab participants reframed student disengagement from a behavioral problem to a form of cultural disconnection produced by schooling structures and disciplinary logics. Kin-making emerged as a central mediational process, enabling participants to rebuild relational ties among students, families, educators, and community members. This reframing catalyzed the emergence of new practices and organizational forms, including Tuesday Check-ins, restorative approaches to discipline, and the Explorer Program itself. Students reported increased senses of belonging, motivation, and purpose; educators observed sustained improvements in engagement and relational trust; and program records showed substantial reductions in absenteeism and disciplinary referrals, with graduation rates approaching 100 percent among participating students.

Discussion: The study advances learning theory by linking CHAT-based expansive learning and concept formation in the wild with kin-making as a mediational and relational process. It demonstrates how Indigenous communities reclaim epistemic authorship in educational design by transforming schooling activity systems in ecologically valid, culturally sustaining, and adaptive ways. More broadly, the study contributes to the learning sciences by illustrating how Indigenous-led research–practice partnerships can support equity-oriented systems change and generate inclusive educational futures grounded in relational responsibility, sovereignty, and collective agency.

KEYWORDS

concept formation in the wild, expansive learning, indigenous epistemologies, kin-making, research–practice partnerships

Introduction

Education in the United States is haunted by settler colonial histories and futures yet to be built. Indigenous youth continue to bear the burden of racialized inequities in discipline¹ and special education, facing exclusion and systemic disregard for Indigenous cosmologies. From the missionary zeal of nineteenth-century boarding schools to contemporary compliance regimes, schools have long functioned as instruments of assimilation, erasure, and extinction (Blackhawk, 2023; Tuck, 2009). These inequities persist despite decades of reform, which have been framed around individual accountability, inclusion, and evidence-based practice. Reforms too often reproduce systemic injustices by treating culture of minoritized communities as ancient, static, and peripheral rather than as foundational, ever-evolving, and future-oriented (Artiles, 2011; Ladson-Billings, 2006; Lipman, 2011; Mehta and Fine, 2019).

Inequities must be understood within the broader context of the crises facing education globally. Across the world, schools are grappling with intensifying social polarization, injustices, forced migration, climate change, and economic inequality. In the U.S., teachers report historic levels of burnout, while student disengagement has reached alarming levels (Ingersoll et al., 2021). Educational reforms increasingly emphasize compliance, competition, and surveillance over joy, care, and community. There is an urgent need for radical reimagining of education in the face of socio-ecological precarity, as existing systems are deemed inadequate to sustain democratic and just futures (Darling-Hammond and Rothman, 2021; UNESCO, 2021). At the same time, the COVID-19 pandemic and other global crises exposed and deepened structural inequities, especially for Indigenous, racially minoritized, disabled, and economically oppressed communities (National Center for Education Statistics [NCES], 2022).

As Haraway (2016) insists, our task as educators, community partners, researchers, and those working within learning systems is not to seek technical fixes but to *stay with the trouble* for crafting practices of kin-making that cultivate care and obligation

amid ecological and social precarity in the face of global socio-ecological crises. Recently, a collective of scholars in the natural sciences argued that survival emerges through fragile yet generative entanglements with human and more-than-human kin (Tsing et al., 2017). This lens resonates deeply with Indigenous educational sovereignty, where kinship is not merely a metaphor but the organizing principle of learning with the land, water, ancestors, and community (Kimmerer, 2013).

Within the fields of education and learning sciences, there has been a growing recognition that these crises cannot be addressed solely through technocratic change models. Scholars emphasize the need for innovative theories and methods that consider cultural mediation, power, and social, historical, and spatial context in the design of learning environments. Penuel et al. (2022, 2025) argued that research-practice partnerships (RPPs) must move beyond instrumental goals of improvement to become infrastructures for equity-oriented, community-driven design. Learning scientists offered various models of RPPs, such as social design experiments that create contexts in which marginalized communities can collectively imagine and enact new futures of learning (Gutiérrez and Jurow, 2016). Engeström and Sannino (2010) emphasized expansive learning, the collective creation of new objects and systems in response to contradictions within an activity system, emerges through contradictions, collective agency, and cycles of generative redesign rather than the replication of set models.

Indigenous and decolonial scholars have pushed the learning sciences to reckon with their complicity in settler colonialism and to center epistemologies, sovereignties, and relational responsibilities often erased in dominant paradigms (Bang et al., 2012; Tuck and Yang, 2012). This work advances the idea that systemic transformation cannot be reduced to equity “fixes” but must engage with questions of sovereignty, land, and justice. Taken together, these developments underscore the pressing need for RPPs that integrate *concept formation in the wild* (Engeström, 2024) and *kin-making* (Haraway, 2016) as frameworks for educational transformation.

It is within this context that we conducted a formative intervention study—the Indigenous Learning Lab (ILL) as an RPP model. ILL examined how contradictions in settler-colonial schooling catalyze expansive learning and decolonizing agency when Indigenous communities mobilize cultural

¹ The term *discipline* refers to behavioral and regulatory school practices—including norms, policies, and responses to student behavior—rather than academic subject areas.

tools to re-mediate the purposes of education and reclaim epistemic authorship. Through the co-design of the Explorer Program as a community-driven educational innovation, we trace how concept formation in the wild unfolded through cycles of contradiction, collective redesign, and stabilization, generating culturally grounded infrastructures aligned with sovereignty, cultural continuity, and ecological responsibility. Kin-making is not ancillary to this work. It is the relational foundation through which educational transformation becomes possible under ongoing conditions of settler colonialism. Accordingly, we studied *how ILL mobilized historically accumulated contradictions in schooling to generate expansive learning, concept formation in the wild, and decolonizing agency*.

Theoretical framework

This study draws on key concepts from Cultural-Historical Activity Theory (CHAT) to examine learning and transformation as collective, historically situated processes. From a CHAT perspective, learning unfolds through participants' engagement with contradictions—historically accumulated tensions within and between activity systems that simultaneously constrain practice and generate possibilities for change (Engeström and Sannino, 2010). Through expansive learning, communities analyze these contradictions, envision alternatives, and reorganize activity over time (Engeström, 2024). This process is mediated through double stimulation, in which participants mobilize artifacts, concepts, and shared meanings as tools for acting on contradictions (Sannino, 2015). Over sustained collective activity, such mediation gives rise to concept formation in the wild, understood as the emergent development of shared orientations and purposes grounded in practice rather than imposed from outside (Engeström, 2024).

Building on this foundation, we integrate CHAT with two complementary theoretical strands—kin-making and decolonizing agency—to make sense of how change unfolded within RPP. While CHAT provides a robust account of collective learning and transformation, kin-making extends this lens by foregrounding the relational dimensions of educational change. Kin-making emphasizes practices of care, reciprocity, and obligation that bind people, land, and more-than-human relations into shared futures, positioning transformation as inherently relational and ethical (Haraway, 2016). Decolonizing agency further extends CHAT by centering how Indigenous communities confront settler-colonial conditions while reclaiming authorship, authority, and responsibility in the design of educational alternatives (Bal and Bird Bear, 2023).

Together, these three strands enable us to theorize transformation not only as a reorganization of activity but as a relational and political process rooted in place, history, and collective responsibility. We hypothesize that expansive learning becomes transformative when communities mobilize historically rooted contradictions through kin-making practices that anchor collective action toward just, relational, and future-oriented forms of schooling. In the sections that follow, we elaborate on each theoretical strand in greater depth.

Cultural-historical activity theory

CHAT conceptualizes learning as collective, mediated, and historically situated (Cole, 1996; Lémonie, 2025; Spinuzzi, 2025). Building on this foundation, Engeström (2024) advanced the notion of concept formation in the wild, emphasizing that new functional concepts are not born in controlled laboratory settings but in everyday contradictions. Unlike abstract instruction, concept formation in the wild unfolds in contested social contexts, where participants mobilize cultural artifacts (signs and tools) to re-mediate their objects, systems, and practices (see also Hyrkkö and Kajamaa, 2025; Scahill and Bligh, 2025; Sensevy and Le Hénaff, 2025; Vänninen and Querol, 2025; Wei and Sannino, 2025).

There are key dimensions in this conceptualization (Engeström, 2024; Engeström et al., 2005): Historically accumulating systemic contradictions are generative forces. Manifestations of systemic inconsistencies, such as the clash between punitive school discipline and Indigenous kinship values, serve not as deficits but as drivers of expansive learning. Through double stimulation, local stakeholders use and invent cultural artifacts to reframe contradictions and envision new ways of acting. Those systemic innovations often begin as fragile prototypes, condense into *germ cells* that crystallize the essence of transformation, and stabilize as system concepts embedded in durable routines, artifacts, and institutional arrangements. Finally, concepts endure when anchored in routines and material structures yet remain open to new contradictions and future reconfiguration. ILL exemplifies wild concept formation as participants reframed disciplinary practices and the normative assumptions about student behavior that sustained them in systemic innovations, such as the Explorer Program, a system concept institutionalized in curriculum, credit structures, and land-based practices.

Kin-making as a forward anchor

Haraway (2016) introduces *kin-making* as a practice of cultivating relational ties across species, generations, and contexts that resist logics of domination. Far from a metaphor, kin-making is a material and ethical commitment to “*make kin, not babies*,” expanding family and community beyond biological descent into webs of care, reciprocity, and obligation. As such, kin-making is both a mode of survival and a politics of futurity in damaged worlds, requiring collective responsibility to sustain living otherwise.

Recent developments in CHAT offer a complementary lens for understanding how such forward-oriented relational work unfolds. Drawing on Vygotsky's principle of double stimulation, Sannino (2022) conceptualized transformative agency as warping, emphasizing how collectives accomplish change amidst uncertainty through *anchoring forward*. In contrast to backward anchoring, forward anchoring is a process of stepping into the unknown by throwing kedge anchors that momentarily hook into new possibilities, enabling movement through turbulent conditions. These warping anchors are provisional and generative, allowing collectives to pull themselves toward emergent futures while remaining responsive to contradictions that surface along the way (Sannino, 2022).

Kin-making can be conceptualized as an art of collaborative survival (Tsing et al., 2017): Fragile but generative infrastructures of relations forged under precarious conditions. For Indigenous communities, this resonates with long-standing epistemologies of relationality, in which land, water, animals, ancestors, and human and more-than-human future generations are understood and honored as kin. These relational practices foreground reciprocity, interdependence, and responsibility, providing a foundation for envisioning education as the weaving of living systems of care and stewardship (Kopenawa and Albert, 2013). In the present study, kin-making was used as a forward anchor to link CHAT's attention to contradictions with Indigenous epistemologies of relationality, reciprocity, and responsibility. Kin-making illuminates how expansive learning is not only cognitive and productive but also relational and ecological. The creation of new education systems depends on reweaving kinship across human and more-than-human communities, pasts, and futures.

Concept formation for decolonizing agency in Indian country

By bringing concept formation in the wild into dialogue with kin-making, decolonizing agency highlights how systemic change necessitates analytical attention to how new concepts emerge through contradictions, double stimulation, and expansive cycles, as well as a political commitment to centering sovereignty, historical consciousness, and epistemic justice as conditions for transformative agency (Bal and Bird Bear, 2023; Sannino et al., 2016). Transformative agency is defined as the capacity of participants in activity systems to break away from existing scripts and take volitional action to reshape their collective activity (Sannino, 2022). Transformative agency emerges through the recognition and activation of contradictions as resources for expansive learning (Sannino et al., 2016).

Building on this foundation, decolonizing agency specified how transformative agency operates in settler colonial and racialized contexts. Decolonizing agency underscores the collective capacity of historically marginalized communities to expose the sociohistorical roots of inequities and domination, move beyond epistemic ignorance imposed by colonial logics, and reclaim sovereignty and authorship in shaping educational futures (Bal and Bird Bear, 2023; Mawene et al., 2025). The Explorer Program embodies this synthesis. It is simultaneously a system concept in Engeström's (2024) sense—stabilized through artifacts, routines, and structures—and an enactment of decolonizing agency, where Indigenous communities claimed authorship of educational futures. In this sense, kin-making becomes a crucial dimension of decolonizing agency: It expands the terrain of transformative action beyond resisting oppressive structures to regenerating the relational infrastructures that make Indigenous sovereignty, survivance, and futurity possible. By cultivating obligations with human and more-than-human relations, kin-making materializes decolonizing agency as a practice of remaking worlds.

Guided by this theoretical framework, the study addresses how collective learning processes unfolded over time in ILL and how participants mobilized kin-making practices to respond to historically rooted contradictions in schooling. We examine these

questions through a longitudinal, design-oriented analysis of ILL's formative intervention work.

Present study

This article analyzes ILL, a community-led formative intervention study, and the Explorer Program, a culturally grounded, credit-recovery pathway, at a rural high school serving an Anishinaabe/Ojibwe tribal nation in northern Wisconsin in the U.S., as a living site of concept formation in the wild (Engeström, 2020) and kin-making (Haraway, 2016; Tsing et al., 2017). ILL, a 5-year partnership emerged in this context as both a response to settler colonial histories and a praxis for designing futures of education grounded in justice and sovereignty at New Hope High, a rural public school serving 11 townships and the local tribal nation.

New Hope High School has long been experiencing racial disparities between native and non-native students. In the 2019–2020 Academic Year, the school served 710 students. Indigenous students made up approximately 20% of the student body. Still, they were subject to disproportionately high disciplinary actions, receiving 100% of expulsions and 64.3% of in-school suspensions (Wisconsin Department of Public Instruction, 2019). This article analyzes ILL as a living site of concept formation in the wild (Engeström, 2020) and kin-making (Haraway, 2016; Tsing et al., 2017). Through these two interwoven processes, the New Hope school community generated new forms of activity by transforming contradictions into relational practices of care, responsibility, and futurity.

Indigenous and non-Indigenous educators, students, families, tribal and school leaders, and researchers from a local university formed a coalition to create a *laboratory in the wild*. This inclusive systemic design space allowed contradictions to be surfaced, cultural tools to be mobilized, and new concepts of schooling to be collectively forged. ILL contributes to current debates in the learning sciences and education research about how RPPs can serve as infrastructures for community-led transformation (Bang and Vossoughi, 2016; Gutiérrez and Jurow, 2016; Penuel et al., 2025; Sannino et al., 2016).

In particular, the Explorer Program, the most significant stabilized outcome of the ILL, responded to both local crises of Indigenous student exclusion and broader global calls for reimagining education. Conceived by an American Indian mentor and workshopped by the ILL members, the Explorer program offered a credit-recovery pathway that integrated academic learning with Anishinaabe practices, including wild ricing, maple sugaring, balsam harvesting, hunting, and community service projects. Its design demonstrates how community-driven infrastructures can embody kinship, sovereignty, and cultural sustainability, while answering the call to create new infrastructures that foster collective agency and systemic transformation.

By tracing the emergence of Explorer through Engeström's (2024) framework of concept formation in the wild, this study highlights how contradictions in schooling catalyzed expansive learning. In doing so, it demonstrates how the Indigenous and non-Indigenous community members of New Hope High School moved beyond compliance-driven reform to author ecologically

TABLE 1 Summary of indigenous learning lab participants, 2019–2024.

Year	Time period	No. of participants	Indigenous/tribal (n, %)	Non-tribal (n, %)	Gender (M/F)	Primary roles represented
1	2019–2020	9	4 (44%)	5 (56%)	4/5	Principal, Assistant Principal, SPED Director, Teachers, AI Ed Mentor, Tribal educators Students
2	2020–2021	12	6 (50%)	6 (50%)	5/7	Admin, Teachers, Tribal educators, Community liaison Students
3	2021–2022	11	5 (45%)	6 (55%)	5/6	Admin, Teachers, AI Ed Mentor, Tribal Director of Education Students
4	2022–2023	12	6 (50%)	6 (50%)	6/6	Admin, Teachers, Indian Ed Mentor, Tribal leaders, Students
5	2023–2024	11	5 (45%)	6 (55%)	5/6	Admin, Teachers, Tribal Director, Students
Total	2019–2024	40	18 (45%)	22 (55%)	25/27	Cross-system team, including school and tribal members

valid educational innovations rooted in sovereignty, kinship, and sustainability. At stake is not only the future of Indigenous education but the future of education itself: Whether education can expand to grapple with histories of capitalism, colonization, and racism, and the resulting alternative futures.

Research question

This study asks:

How did the Indigenous Learning Lab and the co-design of the Explorer Program mobilize systemic contradictions to generate expansive learning for concept formation in the wild and decolonizing agency in schooling?

- a) *How were contradictions between punitive school discipline and Indigenous kinship values surfaced and reframed through cultural artifacts?*

How did these reframing materialize prototypes, stabilize as systemic innovations, and project alternative educational futures?

Materials and methods

ILL was co-initiated in 2017 by university researchers, tribal education leaders, and the principal of New Hope High School. The ILL followed the formative-intervention methodology (Engeström et al., 2014; Sannino et al., 2016), emphasizing iterative cycles of collective analysis, envisioning, design, and enactment. Unlike externally imposed reforms, formative interventions create conditions in which participants surface systemic contradictions and mobilize social, historical, and spatial resources to design alternative futures. This article focuses on the Explorer Program, the ILL's most significant stabilized innovation, and analyzes

its trajectory using Engeström's (2024) framework of concept formation in the wild.

Context for the partnership

ILL was a 5-year-long RPP involving Indigenous youth, families, educators, community leaders, and university-based researchers, whose roles and forms of participation evolved over time. Participation ranged from 9 to 12 members annually, with 40 individuals contributing to the collaboration. Membership consistently included the principal and assistant principal, teachers, the school's American Indian Education Mentor, district specialists (e.g., a social worker and a psychologist), the Anishinaabe Nation's Director of Education, and university researchers. Indigenous representation remained between 40 and 50% annually, with a balanced gender distribution (see Table 1).

All authors except two were active members of the Indigenous Learning Lab. The first two authors are university-based researchers who were also active members of ILL as facilitators and researchers. The first author is an immigrant scholar of color. The second author is an Oneida scholar. Their roles included planning ILL sessions with the third and fourth authors -the vice-principal and the American Indian Mentor of the school -facilitating ILL sessions, participating in collective sense-making, and supporting co-design activities alongside educators, students, and community members. This dual positioning reflects what Wentworth (2025) described as the joint work of RPPs, in which researchers are not external observers but relationally embedded participants whose roles shape both methods and findings. The last two authors are scholars who developed the formative intervention methodology and the key concepts utilized in this study. They have also served as advisory board members in the ILL project. They have been knowledgeable about the ILL project from the beginning.

The composition evolved as ILL's focus shifted from diagnosing systemic inequities to the sustained implementation of the Explorer Program. Explorer was delivered during the school day, embedded

within students' official schedules rather than offered as an extracurricular program. This structure was intentionally chosen to affirm Indigenous knowledge as core—not supplemental—to academic learning and to ensure that Explorer credits apply directly toward graduation. During the early years (2019–2021), members collaborated to analyze disciplinary and special education data, identifying racialized contradictions within the school system. From 2021 onward, the ILL met biweekly to co-design, refine, and expand the culturally grounded Explorer Program. The team overseeing the implementation included school and tribal leaders, educators, students, and researchers working to stabilize and scale relational, land-based, and restorative learning practices. This multi-year, cross-system collaboration embodied the principle of expansive learning through shared analysis, co-design, and collective leadership across institutional and cultural boundaries.

Data sources

Data generation was multimodal and longitudinal. Over the course of 5 years, 280 primary data sources were gathered with informed consent, in accordance with the university's IRB protocol. The data comprise transcripts from 98 meetings, 36 semi-structured interviews, five focus groups, and 57 field notes, documenting classroom and community activities (e.g., lesson plans, tribal council reports, and project outputs). Additional artifacts such as lesson plans, attendance and discipline reports, and program documents were collected to triangulate findings and trace changes in practice and system outcomes.

Analytic approach

Analysis was guided by the perspective of concept formation in the wild (Engeström, 2024), with attention to the following stages: (1) *Contradictions and germ cells*: Identifying systemic tensions (e.g., punitive discipline versus kinship-based care) and the small but generative concepts that crystallized from them; (2) *Double stimulation*: Tracing how participants used Anishinaabe practices, the Seven Grandfather teachings, and community stories and genealogies as second stimuli to reframe problems; (3) *Expansive movement*: Following the modeling and testing of innovations; (4) *Stabilization*: Examining how concepts materialized in durable structures like the Explorer Program, integrating cultural practices into curriculum, schedules, and credit recovery pathways; (5) *Projection of futures*: Analyzing how ILL extended its impact beyond the high school, including tribal council engagement, elementary school outreach, and district-level changes.

Core ILL members ($n = 9\text{--}12$ annually) actively participated in multiple analytic phases, including problem identification, collective interpretation, refinement of analytic claims, and validation of findings. While the research team conducted formal coding, analytic sense-making, and validation were collaborative and iterative across the partnership.

Qualitative materials were coded using a hybrid deductive–inductive approach. Deductive codes reflected key CHAT constructs (contradictions, double stimulation, germ-cell modeling, expansive movement, stabilization), kin-making

practices (relational obligations, reciprocity, more-than-human relations), and elements of decolonizing agency (epistemic reclamation, historical consciousness, collective design rights). The hybrid deductive–inductive analytic approach is consistent with qualitative traditions commonly used in formative interventions and other RPP models, where theory-driven constructs are held in productive tension with emergent meanings from practice to support iterative sense-making and design (Engeström and Sannino, 2010; Miles et al., 2014; Penuel et al., 2015). Wentworth (2025) documented that RPP studies frequently draw on flexible analytic approaches to accommodate the iterative, relational, and evolving nature of joint work, particularly in long-term partnerships.

In descriptive studies, data analysis is used for understanding a phenomenon. In this 5-year-long formative intervention study, data analyses were used to facilitate the intervention. Throughout the project, members of the research team independently reviewed data segments to generate provisional codes grounded in participants' language and actions (e.g., reframing disengagement). These provisional codes were discussed in weekly meetings with the research team and monthly agenda meetings with the ILL liaisons, the American Indian Mentor, and the vice principal—now the principal of the school—refined through constant comparison and consolidated into shared inductive codes that evolved as new data were incorporated. For example, during the design phase in 2019 and 2020, the research team analyzed ILL sessions after each meeting using both deductive (e.g., the cycle of expansive and non-expansive learning actions, Engeström, 2018) and inductive coding (e.g., resistance, transformative agency, Sannino, 2020). Then, the emerging assertions were shared with the second and third authors at the agenda meetings for collective analyses to determine the agenda of the next meeting. The data analyses were used to design and facilitate other activities (e.g., follow-up interviews, artifact analysis, and the school assemblies with the school staff and students during the summer. For example, disciplinary referral data, meeting transcripts, and student focus groups were triangulated to examine disengagement. While administrative data initially supported deficit-based interpretations, Indigenous educators and students consistently framed disengagement as relational rupture. Through collective analytic sessions, these data sources were brought into dialogue, leading to a reframing of disengagement as a form of cultural disconnection. This reframing directly informed the design of Tuesday Check-ins and land-based learning, illustrating how collaborative analysis shaped emerging concepts and practices.

In this article, the analysis foregrounded kin-making (Haraway, 2016) and decolonizing agency (Bal and Bird Bear, 2023). This means privileging Indigenous voices and tracing how they exposed colonial logics, reclaimed ontological, epistemic, and axiological authorship, and enacted kin-making for sovereign and transformative educational futures. In writing the present article, the first author analyzed the data corpus and shared the preliminary codes with other authors. To trace concept formation over time, we organized and coded the data chronologically. This involved aligning coded excerpts with key moments in the intervention (e.g., disciplinary incidents, collective analyses, design decisions) to examine how problem framings, mediating artifacts,

and concepts shifted across phases. We used analytic memos written throughout the analytic processes conducted during the intervention study and its aftermath. Memos served to document emerging interpretations, link empirical observations to CHAT constructs, surface analytic tensions, and inform subsequent rounds of coding and theorizing. We then constructed temporal matrices to trace how contradictions surfaced, which mediating artifacts were mobilized, how prototypes and germ cells emerged, and how system concepts stabilized, allowing us to map concept formation in the wild across 5 years. For example, early matrices documented how student disengagement was predominantly framed as an individual behavioral issue. In contrast, later matrices showed a shift toward collective interpretations of disengagement as cultural disconnection produced by schooling practices. The matrices enabled comparison across time and supported identification of expansive learning trajectories.

Triangulation occurred by comparing patterns across data types, stakeholders, and settings, and by using member checking to confirm analytic claims, strengthen interpretive validity, and ensure alignment with community epistemologies. Member checking was conducted as an ongoing, dialogic process rather than a single validation step. Preliminary interpretations, analytic memos, and emerging claims were collaboratively shared, questioned, and refined. Participant feedback directly informed understanding of contradictions, identification of mediating artifacts, and articulation of kin-making as a mediational process, thereby strengthening interpretive validity and alignment with community epistemologies.

Results

The findings trace how ILL functioned as a site of concept formation in the wild through the emergence of the Explorer Program. Across the episodes presented below, contradictions in school discipline and family-school-community relationships became catalysts for expansive learning, prompting participants to draw on cultural tools, kin-making practices, and tribal knowledge to model and stabilize new forms of schooling. Data analysis revealed a sequence of interconnected transformations that unfolded through cycles of contradiction, double stimulation, and stabilization.

Below, we present how participants identified contradictions, used double stimulation to reframe problems, developed fragile prototypes and germ cells, and consolidated these into the durable system concept of Explorer. Together, the findings illustrate how expansive learning and kin-making are intertwined to generate decolonizing agency and institutional transformation.

Germ cell: contradiction between punitive discipline and kinship

The germ cell is “the genetic basis of the development of which all other, just as particular, phenomena of the given concrete system may be understood in their necessity” (Il’enkov, 1977, p. 335). The germ cell of transformation in ILL emerged from the contradiction between punitive discipline and the tribal community’s insistence

on kinship-based education. At New Hope High, Indigenous youth comprised approximately one-fifth of the student body, yet they accounted for more than half of the disciplinary referrals and all expulsions. As one Indigenous student explained: “*It just felt uncomfortable being here*” (Focus Group, 2023).

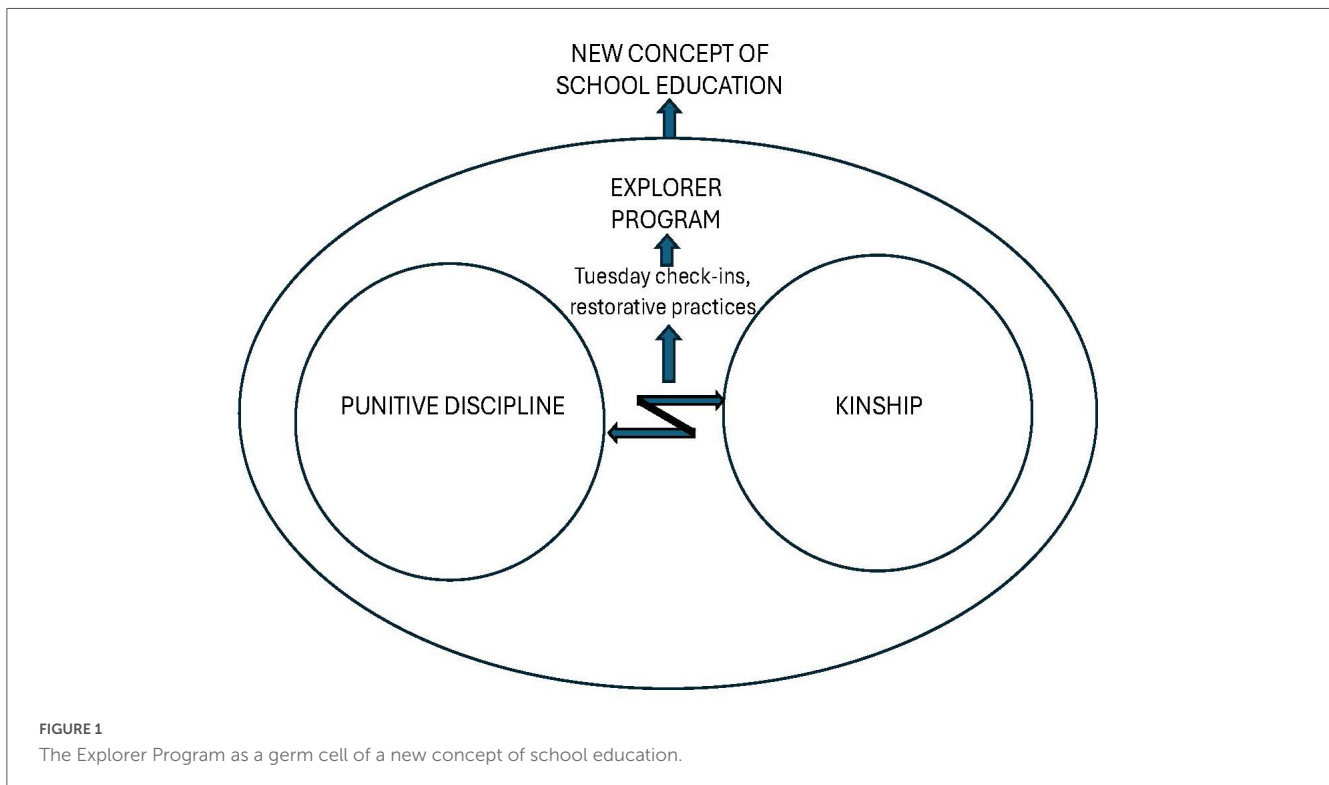
Administrators initially framed the issue in terms of achievement and compliance. They described pressure to meet state metrics—standardized testing and graduation—and reported focusing on achievement data and compliance systems: “*The State of Wisconsin, whether we like it or not, judges schools based on our ACT results. . . that’s their number one academic metric.*” (ILL meeting#1, 2019). Indigenous parents and elders, however, reframed inequities through historical trauma, pointing to legacies of boarding schools, racialized policing, and anti-Indian treaty rights protests in the region. Indigenous members’ reframing positioned schooling as a site where kinship had been systematically severed and where healing required re-establishing relationships across generations, land, and community. They linked the behavior concerns to intergenerational harms from boarding schools and the negative history of New Hope building itself, emphasizing that students carry that history into school each day:

Jeremiah (American Indian Mentor): Education has been put on Native Americans from day one in a way that it’s been thrown down our throats in some fashion through the Indian boarding schools. That’s some of the cultural side and the historical and the trauma that we still face today with some of our elders bringing that up. And how do we get this to a selling point that it’s not all about discipline, it’s about communication, it’s about the bigger picture, is having our tribal kids interact on a regular basis, that we’re all the same (Year 1 ILL session #10, 2019).

Indigenous members’ framing of the object shifted the focus from technical gaps to historical systemic injustice, crystallizing the germ cell that contradictions were not pathologies to be fixed but drivers of expansive learning (Engeström, 2024). This shift echoes Haraway’s (2016) call to *make kin not babies* in troubled conditions, emphasizing that transformation in education must begin with the restoration of kinship bonds fractured by settler colonialism. The germ cell can be graphically represented using Figure 1. In Figure 1, the Tuesday Check-ins and restorative practices represent the first actions toward resolving the contradiction.

The Explorer Program represents a stabilized critical practice that opens the way to a new, full-fledged, concrete concept of school education that transcends the initial contradiction (Engeström, 2020). This contradiction-turned-driver of expansive learning exemplifies concept formation in the wild: It emerged not in a laboratory or policy space, but in community dialogue saturated with the historical memory of boarding schools and kin-based obligations. The germ cell thus condensed both the epistemic and affective dimensions of decolonial learning, expanding hegemonic conceptions of who and what may constitute kin. These tensions set in motion a process of collective reframing, as community members turned to their own cultural resources to imagine alternatives.

Analytically, this episode illustrates the first moment of concept formation in the wild: A historically accumulated contradiction surfaced and was collectively reframed as the germ cell for expansive learning. Administrators’ reliance on compliance metrics and achievement framings confronted families’ and elders’ insistence that the problem was relational and historical, not



technical. Such a reframing anchored the expansive cycle by transforming “discipline” from an individual behavior issue into a systemic contradiction rooted in disrupted kinship. The move toward restorative check-ins and land-based practices represented the earliest actions toward resolving this contradiction and exemplified kin-making as a forward anchor. In this sense, the germ cell did not simply diagnose inequity; it enacted decolonizing agency by reclaiming epistemic authority over what counts as harm, care, and educational possibility.

Double stimulation: reframing through cultural tools

Members of ILL mobilized cultural practices as a second stimulus to reframe the concept of schooling. School data and discipline charts (first stimuli) were countered with the Seven Grandfather Teachings, Anishinaabe prayers, and community narratives (second stimuli; Sannino, 2015). The American Indian Mentor captured this shift, emphasizing that expectations were being raised differently, rooted in Indigenous identity:

Jeremiah: [W]hen doing the T-bird, I can hear my dad say, “Well, we were here first. . . we had our own traditions, we had our own teachings, we had all this. We didn’t need the structure that we have now. But today’s society is the only way we can survive, to interact and to teach each other about culture, the cultural ways from traditional cultures to [the tribal] culture of who we are here today (Year 1 ILL session#10, 2019).

Students echoed this reframing and described adapting home ways of speaking and joking into classroom spaces, making the program feel familiar and culturally grounded. Cultural practices such as wild ricing, maple sugaring, hunting, and Ojibwe language

lessons became more than curricular add-ons. They were acts of kin-making that reconnected students with the land, their ancestors, and the community. These practices fostered new relational obligations, enabling students to view themselves not as isolated individuals but as part of a living web of human and more-than-human kin (Haraway, 2016). In this way, double stimulation unfolded not only through tools and artifacts but also through kin-making practices that reframed disengagement as a disconnection from kinship relations.

The data illustrated the second moment of concept formation in the wild: Double stimulation enabled participants to re-mediate the meaning of schooling by replacing deficit framings with Anishinaabe cultural tools. The discipline charts and achievement metrics served as the first stimuli, anchoring schooling in compliance and individual behavior. At the same time, the Seven Grandfather Teachings, prayers, stories, humor, and land-based practices served as a second stimulus, redirecting collective action toward relational responsibility. This reframing demonstrates how expansive learning unfolded through the activation of social-historical-spatial resources, shifting the object of activity from controlling students to repairing kinship relations ruptured by settler schooling. In this sense, double stimulation did more than introduce new tools. It enacted decolonizing agency by legitimizing Indigenous epistemologies as authoritative grounds for redesigning schooling itself.

Expansive movements: Tuesday check-ins and restorative practices

Before the formal creation of Explorer, smaller innovations emerged from cycles of expansive learning and experimentation.

Weekly Tuesday Check-ins provided Indigenous students with a structured, relational space to share their struggles and receive support: “*We dedicated. . . Tuesday check in. . . so we could connect with some of these kids.*” (Jeremiah, Interview, 2024). Teachers reported shifts in how they approached students. They noted that suspension was not an adequate response and began asking what they could do differently, leading to relational practices on program days. Restorative alternatives to suspension were also introduced, grounded in dialogue and accountability rather than exclusion. These practices modeled an expansive movement (Engeström, 1987, 2016). Contradictions translated into functional new practices. The relational innovations served as the scaffolding for Explorer, a more comprehensive program.

The data showed the third expansive movement of concept formation in the wild, where participants collectively translated the germ-cell contradiction into new, functional practices. Tuesday Check-ins and restorative alternatives to suspension represent early prototypes that emerged as educators and mentors experimented with culturally grounded ways of relating to students. These efforts show how the community moved from recognizing contradictions to actively redesigning the object of activity. Through cycles of reflection and action, educators began appropriating Indigenous relational practices (e.g., restorative dialogue) as mediating means for transforming school–student–community interactions. In this way, expansive movement was inseparable from kin-making, as these innovations reestablished reciprocal obligations and honored students’ connections to family, land, and community. The emergence of these relational routines thus marks a key transition from isolated interventions to the collective formation of decolonizing agency, laying the groundwork for the more comprehensive system concept that would crystallize as the Explorer Program.

Stabilization: the explorer program

The most significant stabilization of concept formation was the Explorer Program, a self-contained, credit-recovery pathway co-designed by the Native American Mentor, students, families, and educators. Explorer integrated academic coursework with Anishinaabe practices, including wild ricing, balsam harvesting, wreath-making, and community service projects (see Figures 2, 3). These were not framed as extracurricular activities but as kin-making practices such as repairing students’ relationships with place, seasons, and community. As Jeremiah explained, “*our culture. . . was by learning by seeing, and by doing. We didn’t have books. . .*” (Interview, 2022). In CHAT terms, the Explorer Program stabilized the concept formation (Engeström, 2024). In kin-making terms, it became an infrastructure for reweaving relations of care across land, water, and generations (Tsing et al., 2017).

Students contrasted Explorer with mainstream classrooms: “*because it was [a] better place to be. . . someone to talk to, someone close to home.*” (Explorer Program Debrief, 2022). Projects in Explorer integrated ecological knowledge with entrepreneurship. One student explained: “*We gotta make a marketing plan. . . making like a flyer. . . website. . . [target] families. . . Tribal Council.*” (Explorer Program Debrief, 2022). Others framed activities through sovereignty: “*What is a ceded territory. . . taking advantage of [the]*

resources. . . we can go harvest wild rice. . . in our ceded territory.” (Explorer Program Debrief, 2022)

Educators confirmed the program’s impact. Principal Bart noted that students who had previously been truant began arriving early for field projects, reflecting increased engagement. Staff described a strong commitment to attend program days (Interview, 7/8/2025). Quantitative outcomes were equally striking. Absenteeism dropped from 27 to 8%, disciplinary referrals declined sharply, and graduation rates for Explorer students approached 100% (The Explorer Program Data Report, 2023).

The fourth movement marks the stabilization phase of concept formation in the wild, when earlier prototypes coalesced into a durable system concept that reorganized the school’s activity structure. Explorer institutionalized the relational and land-based practices trialed in earlier expansive movements by embedding them into curriculum, credit structures, and daily routines. As a stabilized concept, Explorer demonstrates that contradictions were not only resolved locally but reconfigured into new institutional arrangements capable of sustaining collective agency. The program’s reliance on cultural practices such as spear fishing and wild ricing illustrates how kin-making served as the infrastructure through which stabilization occurred: relations with land, elders, peers, and service became the organizing principle of teaching and learning. This relational grounding enabled students to engage differently with school, as evidenced by dramatic improvements in attendance, engagement, and academic persistence. Through the stabilization, the school did not simply adopt a new program; it reoriented its object of activity toward relational and land-based forms of education.

Destabilization and projection of futures

Engeström (2024) suggested that the final moment of concept formation in the wild emerges when a stabilized concept encounters new contradictions. Despite stabilization, contradictions persisted. Resource constraints, staff turnover, and political pushback threatened sustainability. For instance, in 2024–2025, the Explorer Program experienced significant staff turnover: One teacher left after only a few months, and another was on extended medical leave, forcing schedule reductions and requiring the remaining staff to reorganize instruction and student support mid-year. The loss of continuity disrupted relationships with students and increased reliance on temporary staff, revealing the system’s fragility. As one teacher reflected, “*When one person leaves, it feels like the whole structure shifts. These relationships are what keep the kids coming; you can’t just plug in a sub and expect it to work*” (Implementation Meeting #4, 2024).

At the same time, district budget shortfalls linked to the end of two federal grants constrained hiring and expansion, despite growing community demand for the program. A district administrator described the tension succinctly: “*We’re always building with one hand while holding the wall up with the other. The grants end, the funding drops, and we have to keep explaining why this work matters*” (ILL Implementation Meeting #6, 2024). These tensions reflected the broader contradictions between the locally grounded, relational model of education that ILL cultivated and the fiscal and policy logics governing public schooling.



FIGURE 2

The tools informed by the Anishinaabe geography and cosmology.

Yet participants reframed these challenges as part of a longer continuum of Indigenous educational sovereignty and continued to adapt the program through local leadership and community partnerships. As an Indigenous mentor emphasized, “*We can’t let it stop here. This program is proof our ways work in schools. Even if the funding goes away, the idea’s not going away*” (Year 1 ILL meeting #9, 2020). In this sense, the instability did not signal collapse but rather a process of reorientation—participants imagined and enacted futures grounded in community resilience, cultural continuity, and self-determined education. The struggle for Indigenous education was not only about institutional reform but about restoring kin relations across generations and into the future—a living enactment of what [Tsing et al. \(2017\)](#) described as crafting futures in damaged worlds through collaborative survival. Through these projections, Explorer evolved from a credit-recovery program into a stabilized educational innovation and a launchpad for broader struggles for Indigenous educational sovereignty.

Staff turnover, funding shortfalls, and policy pressures exposed the fragility of the new system concept and revealed the limits

of working within state-controlled infrastructures. Yet rather than collapsing, the community’s response demonstrates how expansive learning continues through reorientation, participants used these challenges as opportunities to reaffirm cultural commitments and extend the program’s object toward longer-term visions of Indigenous sovereignty in education. In a sense, those contradictions reopened the cycle and compelled participants to imagine new forms of coordination and sustainability. In kin-making terms, they activated a deeper sense of relational responsibility that bound students, tribe, educators, and land in ongoing mutual obligation. This forward anchoring reflects decolonizing agency: The capacity to enact educational futures beyond the constraints of the existing institution. Through this process, Explorer shifted from a local program to a generative seed for broader struggles over self-determined, land-based, and community-governed education.

In summary, the Explorer Program illustrated concept formation in the wild ([Engeström, 2024](#)). Contradictions generated a germ cell, double stimulation reframed problem spaces, expansive



FIGURE 3
Jeremiah, a non-indigenous teacher and a student in an Explorer Program activity.

movements produced prototypes, stabilization anchored them in Explorer, and destabilization projected new futures. Most importantly, these processes were inseparable from decolonizing agency, as Indigenous students, families, and elders reclaimed authorship over systemic design and advanced a vision of education grounded in kinship. Across these stages, ILL demonstrated that contradictions need not culminate in closure but can sustain a living cycle of creation, reflection, and renewal—the hallmark of concept formation in the wild.

Limitations

Several limitations should be noted. First, the analysis focuses on ILL, a single project case in northern Wisconsin, and within that 5-year study, notably the Explorer Program. Although the richness of this case provides insights into how contradictions can catalyze expansive and decolonizing learning, the findings cannot be generalized across all Indigenous or non-Indigenous contexts. Instead, they should be understood as generative theoretical generalizations (Engeström, 2015) informing but not prescribing work in other communities.

Second, the Explorer Program's durability remains contingent on relational and organizational conditions (e.g., local leadership,

staffing stability, and fluctuating resources), factors that are not limitations of the study itself but characteristic of long-term, equity-oriented research–practice partnerships. Such partnerships unfold within shifting political, fiscal, and institutional landscapes, making periods of instability an expected part of collaborative transformation rather than evidence of failure. The vulnerabilities that emerged—staff turnover, budget shortfalls, and policy pressures—highlight the broader challenge of sustaining community-driven infrastructures of equity within state-governed school systems. Rather than undermining the work, these dynamics illuminate the structural conditions under which RPPs operate and underscore the importance of building adaptive, relational, and culturally sustainable systems capable of weathering ongoing contestation.

Third, as a formative intervention, the study was deeply entangled with the perspectives, commitments, and positionalities of the researchers and community partners. While this entanglement enabled co-design and shared authorship, it also introduces potential biases in interpretation and representation. We attempted to mitigate these risks through triangulation of data sources (interviews, focus groups, artifact analysis, and school outcome data) and by privileging Indigenous voices throughout the analysis.

Discussion

The analysis of the Explorer Program demonstrates how *concept formation in the wild* can serve as a lens for understanding and enacting systemic transformations in Indigenous and public education. By tracing how new concepts emerged through collective struggles in everyday school life, the analysis reveals the generative power of contradictions, mediating artifacts, and decolonizing agency. In doing so, it extends the learning sciences' focus on design-based interventions toward questions of sovereignty, relationality, and alternative futures. The findings highlight four key insights.

Contradictions as catalysts for expansive learning

Consistent with Engeström's (2024) framework, the germ cell of the Explorer program emerged from the contradiction between punitive discipline and kinship-based care. The contradiction was not resolved through technical adjustments to behavior management but rather through reimagining the object of discipline as belonging, care, and Indigenous sovereignty. This underscores that contradictions in settler-colonial schooling are not malfunctions to be patched but deep structural tensions that, when surfaced, generate the conditions for expansive learning. This shift redefined the object of activity from controlling behavior to cultivating relational sovereignty, illustrating the principle that expansive learning is driven by collective reorientation toward a new, more inclusive object (Engeström, 2016; Sannino et al., 2016).

In the learning sciences, this extends earlier traditions of design-based research (Brown, 1992; Cobb et al., 2003) by emphasizing contradictions as central—not obstacles but generative forces. It resonates with Gutiérrez (2008) notion of the “third space” where competing logics collide to create hybrid practices. By foregrounding contradictions as historical and political rather than technical, Explorer pushes the learning sciences to grapple with the structural inequities embedded in education systems. Although DBR has long emphasized the iterative refinement of learning environments, its approach to problems has tended to frame breakdowns as technical challenges requiring improved designs (Gutiérrez and Jurow, 2016). The present study extends DBR by demonstrating that contradictions are not merely obstacles to be engineered away but historically layered tensions that reveal the socio-political foundations of schooling. Within ILL, contradictions between punitive discipline and Indigenous kinship and between standardized accountability metrics and tribal sovereignty were not design failures. They were the generative forces that opened expansive cycles of collective learning (Bal et al., 2021). This reframing pushes DBR beyond its conventional focus on improvement toward an orientation that treats design as the collective re-mediation of activity systems shaped by colonization, race, and power. By centering contradictions as the engine of transformation, the study illustrates how design emerges not from optimizing existing systems but from surfacing and reworking the historical structures that produce harm.

Cultural artifacts as second stimuli

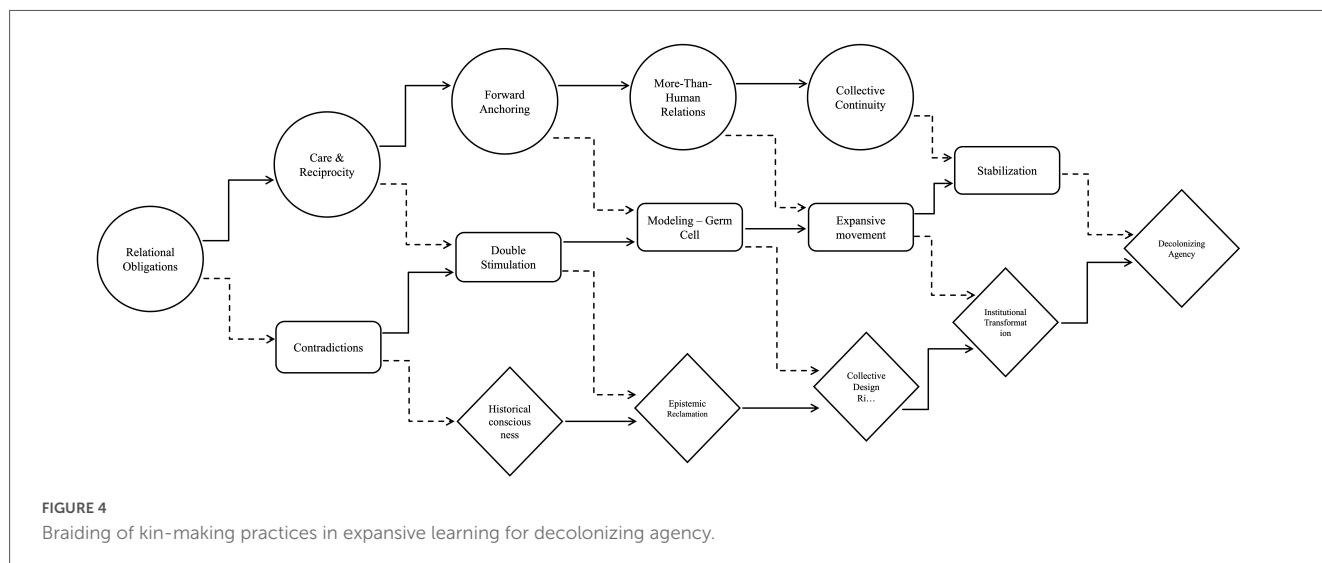
The role of the Seven Grandfather teachings, Anishinaabe practices, and stories exemplifies double stimulation. Rather than relying on abstract pedagogical techniques, cultural practices served as secondary stimuli, enabling participants to reframe problems and envision alternative solutions. The Anishinaabe practices serving as secondary stimuli expand the notion of tool-mediated learning by showing that Indigenous cosmologies are not ancillary but central to the creation of new functional concepts in education. In this sense, double stimulation took on a relational dimension, in which the “second stimulus” was not merely a symbolic artifact but a living relationship with land, ancestors, and community. This approach challenges the mainstream Western interpretations of mediation and reframes learning as ontologically grounded in reciprocity. Moreover, it aligns with Bang and Medin's (2010) work on Indigenous science learning, which demonstrates that cultural practices are not “contextual supports” but forward anchors for knowledge-building and future-making (Sannino, 2022). Similarly, Nasir et al. (2020) argued that equity-oriented learning sciences require recognizing community cultural repertoires as central to participation. Explorer builds on this by showing how artifacts not only mediate learning but also reconstitute the object of schooling itself.

From transformative agency to decolonizing agency

Sannino's (2022) concept of transformative agency describes how participants resist, criticize, and take action to redesign activity systems. ILL extends this by demonstrating decolonizing agency: The collective capacity of Indigenous communities to expose the settler-colonial roots of inequities, reject epistemic ignorance, and reclaim authorship over educational futures. In Explorer, transformative actions, such as land-based projects, were inseparable from decolonizing commitments to sovereignty and intergenerational justice.

Decolonizing agency was constructed through ILL when Indigenous students, families, and elders reframed disproportionality in disciplinary actions not as technical failure but as part of intergenerational trauma rooted in boarding schools, anti-Indian violence, and treaty struggles. It deepened when Anishinaabe practices and the Seven Grandfather teachings were positioned not as “add-ons” but as central organizing principles for redesigning education, culminating in the stabilization of Explorer as an educational innovation. Figure 4 illustrates how kin-making practices intersect with key constructs from CHAT, highlighting how relational commitments functioned as mediating processes that supported expansive learning across activity systems.

The extension to from transformative agency to decolonizing agency aligns with debates in the learning sciences on justice-oriented design research (Bang and Vossoughi, 2016; Philip et al., 2018), which argue that equity necessitates redistributing epistemic authority to historically minoritized communities, who are traditionally excluded from knowledge production, decision-making, and systemic design activities in education research and



practice. Explorer demonstrates how transformative agency can be articulated through decolonizing commitments, challenging the field to integrate analyses of coloniality, sovereignty, and land into its theoretical frameworks. Decolonizing agency foregrounds Indigenous sovereignty not as a metaphor but as a living practice of collective authorship over educational futures.

Stabilization and fragility in the wild

Engeström emphasizes that wild concepts become durable when stabilized in artifacts and routines. Explorer demonstrates this through its integration of Indigenous practices into the curriculum, credit systems, and community partnerships. At the same time, the program illustrates the fragility of wild concepts: Sustained by duct-tape pragmatism, threatened by political pushback, and dependent on a few key individuals. This tension reflects the cyclical nature of expansive learning—stabilization always contains seeds of destabilization that project futures beyond the immediate setting (Cussins, 1992; Engeström et al., 2007). Explorer’s oscillation between stabilization and fragility mirrors the trajectory of “runaway objects” (Engeström, 2016) as collective innovations that exceed their contexts yet remain vulnerable to institutional containment, while the runaway objects are not under any entity’s control. For the learning sciences, this points to a critical insight. Sustainability in equity-focused interventions cannot be understood only as institutionalization (Penuel et al., 2016) but must also grapple with fragility, resistance, and ongoing contestation. Explorer showed that infrastructures for equity are dynamic, requiring continuous struggle, negotiation, and imagination.

Extending the learning sciences toward decolonizing futures

The Explorer Program demonstrated how the learning sciences can move beyond questions of “what works” to examine how

communities generate futures through collective redesign and expansion of the objects within their systems as they build new systems around these expansive objects. Rather than treating contradictions as failures, the Explorer Program illuminates them as generative forces for expansive learning, where new concepts and practices emerge through collective struggle, negotiation, and reimagining. The Explorer Program’s fragility and durability echo Haraway’s (2016) call to stay with the trouble by crafting futures through ongoing practices of kin-making, making common cause with human and more-than-human kin, even in the ruins of colonial schooling. These practices of kinship resonate deeply with Anishinaabe traditions of reciprocity, where education is inseparable from living well with land, water, and community. As Tsing et al. (2017) reminded us, such “arts of living on a damaged planet” require attentiveness to interdependence and survival amidst precarity.

Education research must move beyond institutional frames to analyze and design learning as a form of kin-making in a damaged world, recognizing that systemic innovation is not only about closing achievement gaps or reducing discipline disparities, but about reweaving relations of care across generations, ecologies, and sovereignties. ILL and the Explorer Program exemplify this synthesis, showing how kin-making can ground systemic redesign in education through practices of sovereignty, care, and collective survival. Thus, kin-making clarifies how expansive learning can unfold through decolonizing agency. It shows that durable systemic change is possible when participants enact new forms of relationality, extending accountability, belonging, and care across human and more-than-human communities (Tsing et al., 2017).

Whereas DBR has traditionally emphasized iterative refinement of instructional forms (Brown, 1992; Bang et al., 2012), the Explorer program demonstrates that contradictions, particularly those rooted in settler colonialism, are not obstacles to be minimized but structural tensions that catalyze expansive redesign. Taking contradictions as central shifts the analytical focus from optimizing instructional designs to transforming the underlying objects, motives, and social relations of schooling (Engeström,

2024). By foregrounding contradictions as social, historical, and spatial rather than technical, this study highlights how the learning sciences contend with the legacies of boarding schools, racialized discipline, and systemic dispossession that structure educational activity. This reorientation reframes equity not as remediation but as the collective struggle to dismantle colonial relations and to build new infrastructures grounded in sovereignty and justice.

Conclusion

Explorer exemplifies how systemic contradictions can be leveraged as resources for expansive and decolonizing learning. What began as recognition of disciplinary injustice grew into a program that redefined education through kinship, sovereignty, and cultural practice. Students described feeling seen and valued; teachers observed profound shifts in engagement; and measurable outcomes showed declines in absenteeism and disciplinary referrals alongside graduation rates nearing 100%. More importantly, Anishinaabe families and elders framed Explorer as a sovereignty project, oriented to future generations.

Analyzed through the framework of concept formation in the wild (Engeström, 2024), these transformations showed five interwoven dimensions that extend expansive learning theory toward decolonizing praxis. Contradictions between punitive discipline and kinship catalyzed expansive learning (Engeström, 1987, 2015). Dialogical struggles, animated by Anishinaabe cultural practices and the Seven Grandfather teachings, reframed disengagement as disconnection from kinship rather than individual failure, resonating with work on third spaces and hybrid practices (Gutiérrez, 2008). Longitudinal cycles of innovation, from Tuesday Check-ins to restorative practices, condensed into new forms of practice, illustrating the recursive character of expansive learning (Engeström et al., 2005). Material infrastructures stabilized these innovations into the Explorer Program, embedding Indigenous practices into curriculum, credits, and school routines, echoing research on the role of artifacts and tools in mediated learning (Cole, 1996; Greeno and Engeström, 2006). Finally, future orientation was evident in students' and elders' insistence that Explorer is a sovereignty project for the next seven generations, extending calls in the learning sciences to foreground historicity, futurity, and justice in design (Bang and Vossoughi, 2016; Sannino and Engeström, 2018).

These findings hold implications far beyond Indian Country. Across the world, education systems face crises of inequity, burnout, and climate precarity—symptoms of more profound systemic contradictions. Transformation cannot be engineered through technical fixes alone; it must emerge from intentionally and collectively formed infrastructures that utilize community epistemologies, sovereignties, and interdependence.

Our study may contribute to RPPs in several ways. First, it demonstrates that concept formation in the wild is not only cognitive and institutional but also relational, ecological, and political (Engeström, 2024). Second, ILL built on Sannino's (2015) notion of transformative agency by advancing decolonizing agency and kin-making. Third, the findings highlight the importance of longevity and materiality: Sustainable change emerged not from short-term technical fixes but from infrastructures (e.g.,

credits, schedules, and seasonal practices) that stabilized cultural knowledge into school routines. Finally, it illustrates how research–practice partnerships can become infrastructures for justice when they center sovereignty, relationality, and community epistemologies.

For practitioners, the ILL offers several takeaways. First, systemic transformation requires more than technical fixes. It requires co-design with those most affected by inequities. Second, sustainable change depends on relational infrastructures—embedded mentors, elders, and community partners who carry practices forward beyond the intervention. Explorer demonstrated this most vividly by fusing Indigenous cultural practice with systemic redesign. As Gutiérrez and Jurow (2016) argued, social design experiments open pathways to futures otherwise. Explorer stands as a living case of such an experiment—where contradictions became catalysts, cultural practices became tools for systemic redesign, and fragile but durable infrastructures emerged for learning otherwise.

Transformation emerges from infrastructures intentionally built through long-term community relationships, shared authorship, and reciprocal accountability. The ILL illustrates that forming such infrastructures is often the primary challenge: RPPs must cultivate trust, continuity, and sovereignty-affirming collaboration before systemic redesign becomes possible. The imperative for the learning sciences is not merely to refine existing systems but to join communities in creating new ones. This study shows that expansive learning can emerge from the wild—within communities' epistemologies, sovereignties, and kin relations. Through community-led RPPs, social design experiments, and formative interventions, schooling can evolve into a living system of care, where knowledge is cultivated through reciprocity, healing, and shared responsibility. By centering communities as co-authors of transformation, we can move toward futures that are not only more inclusive and just but also more joyful across generations and in kinship with more-than-human life.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving humans were approved by the University of Wisconsin-Madison Institutional Review Board. The studies were conducted in accordance with the local legislation and institutional requirements. Written informed consent for participation in this study was provided by the participants' legal guardians/next of kin. Written informed consent was obtained from the individual(s), and minor(s)' legal guardian/next of kin, for the publication of any potentially identifiable images or data included in this article.

Author contributions

AB: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. LO: Conceptualization, Data curation, Investigation, Project administration, Resources, Software, Visualization, Writing – review & editing. LM: Data curation, Investigation, Project administration, Resources, Validation, Writing – review & editing. FM: Conceptualization, Data curation, Investigation, Methodology, Resources, Validation, Writing – review & editing. SM: Data curation, Investigation, Methodology, Resources, Validation, Writing – review & editing. YE: Conceptualization, Formal analysis, Validation, Visualization, Writing – review & editing. AS: Conceptualization, Formal analysis, Validation, Visualization, Writing – review & editing.

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Conflict of interest

The author(s) declared that this work was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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