Global Environmental Change 94 (2025) 103042

Contents lists available at ScienceDirect

Global Environmental Change

journal homepage: www.elsevier.com/locate/gloenvcha

Uncovering decolonial pedagogies for learning agroecological transitions: comparative analysis of South America cases

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ARTICLE INFO

Keywords:
Endogenous social learning
Decolonial practices
Co-creation of knowledge
Locally-led agriculture initiatives

ABSTRACT

Agroecological transitions represent strategic pathways for transforming agricultural systems to meet urgent global sustainability goals. These transitions encompass fundamental changes in social-ecological relationships, knowledge systems, and power dynamics within food systems. However, the mechanisms facilitating such transitions remain insufficiently understood, particularly regarding the diversity and efficacy of pedagogical models employed in existing agroecological initiatives. This knowledge gap is especially pronounced within Global South contexts, especially Latin America, where decolonial approaches hold particular relevance and tradition within effective agroecology initiatives. Using a decolonial lens, this study explores the pedagogical models used in community-led agroecological initiatives in Brazil, Colombia, and Peru. Drawing on semi-structured interviews and workshops (n 140), alongside participant observations, we applied a qualitative archetypes analysis to examine three community-led agroecology initiatives. We identified three distinct but interconnected contextual narratives: a. Living Pedagogies; b. Resistance Pedagogies; and c. Hybrid Pedagogies. Despite these different contextual narratives, they share clear patterns, which allowed us to identify one major archetype – the South pedagogies archetype. The decolonial pedagogy found can be fundamental to accelerate agroecological transitions. Traditional communities in Colombia and Peru have preserved and evolved their agroecology knowledge systems through generations of collective learning, offering profound insights into sustainable food production that transcend the limitations of Western scientific methodologies. In parallel, decolonial pedagogies in the Brazilian case were essential to promote urban agroecological transition that started during the 2000s. These findings inform agroecological transition development based on learning processes that value multiple ways of being.

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https://doi.org/10.1016/j.gloenvcha.2025.103042
Received 23 December 2024; Received in revised form 28 May 2025; Accepted 8 July 2025
Available online 15 July 2025

1. Introduction

> "If we are truly committed to the work of decolonizing, we must listen to the silences, that which is not written, and pay attention to the internal dynamics of communities and how we label their experiences." (Rodriguez, 2018, p. 33)

Agroecology is gaining a lot of momentum in debates over sustainable food systems with the proposition to address systemic limitations of global industrial agriculture while advancing social-ecological justice[1] (Pope et al., 2024; Wezel et al., 2009, Gliessman, 2015; Sarandón and Flores, 2014). In this context agroecology is broadly defined not only as a science or set of agricultural practices, but also as a way of life and a form of resistance rooted in localized knowledge systems, historical memory, and sociopolitical struggles (Rosset & Altieri, 2017; Giraldo and Rosset, 2018a; Giraldo and Rosset, 2018b). Therefore, agroecological transitions encompass fundamental transformations in social-ecological relationships, knowledge systems, power dynamics, and institutions within food systems (Anderson et al., 2019a; Anderson et al., 2019b, Feola et al., 2021). However, the mechanisms facilitating such transitions remain insufficiently understood and theorized (McKay, et al 2024), particularly regarding the diversity and efficacy of pedagogical models employed in existing agroecology initiatives (Anderson et al., 2019b; Francis et al., 2013).

Within Latin American contexts, agroecological pedagogies, fundamentally grounded in Freirean critical pedagogy[2] (Freire, 2000), have emerged as critiques of traditional agricultural education methodologies as well as of linear and hierarchical knowledge transfer models. These kinds of decolonial pedagogies constitute theoretical and practical frameworks that interrogate and deconstruct colonial mechanisms inherent in contemporary knowledge production and educational practices (Mignolo, 2011). Their approaches fundamentally challenge established epistemological hierarchies while seeking to legitimize knowledge systems historically marginalized by colonial and neocolonial educational paradigms (Quijano, 2000; Maldonado-Torres, 2007). By explicitly creating epistemological spaces for marginalized knowledge systems, experiences, and ways of being, these pedagogies foster critical consciousness (Freire, 1970) and advance social-ecological justice (Zavala, 2013; Tuck & Yang, 2012, Pope et al., 2024). This is of particular significance within Latin American agricultural contexts, where numerous community-led agroecological initiatives have emerged as vital sites of pedagogical innovation and resistance (Rosset & Martínez-Torres, 2012).

Decolonial pedagogies propose to transcend technical enhancement of agroecological practices and focus on the social and cultural dimensions of sustainable agriculture (Gliessman, 2016; Altieri & Toledo, 2011). They explicitly acknowledge the epistemological value of diverse local knowledge systems as fundamental components in developing contextually appropriate agroecological interventions (Pimbert, 2018). Consequently, Latin American agroecological pedagogies emphasize experiential learning methodologies, horizontal knowledge exchange processes, and the systematic integration of Indigenous and peasant knowledge with Western/North scientific knowledge (Méndez et al., 2013). Examples of decolonial pedagogical practices include incorporating Indigenous knowledge and languages into rural school curricula, engaging in community-based learning projects and ways of thinking, and fostering critical dialogues about race, power, and identity (Zavala, 2013; Gaztambide-Fernández, 2012). Another example of a decolonial pedagogy is *Chicana* feminist pedagogies. These refer to culturally specific ways of organizing teaching and learning in informal sites, such as the home, that embraces Chicanás ways of knowing; it extends beyond formal schooling (Delgado Bernal, 2001). These pedagogies interrogate the dominance of Western/North epistemologies, seeking to recognize and embrace Indigenous, non-Western, and marginalized knowledge systems (Mignolo, 2011; Santos, 2014).

Moreover, the development of agroecology pedagogies in Latin America is often closely tied to social movements and grassroots organizations that advocate for food sovereignty and equitable rural development (Martínez-Torres and Rosset, 2014). Notable examples include the peasant-to-peasant (*campesino a campesino*) movement in Latin America and the Landless Workers' Movement (MST) in Brazil; both of these have established their own educational programs and centers (McCune et al., 2014). These pedagogies not only focus on technical agricultural skills but also address broader historical issues of land rights, rural livelihoods, and biodiversity conservation, which together reflect the multidimensional nature of agroecology in the Latin American context as both a science and a social movement (Fernandez et al., 2013).

By examining the diverse learning approaches utilized by community-led agroecology initiatives in different geographical and cultural contexts of South America, this study aims to gain a nuanced understanding of the strengths, limitations, and contextual factors shaping the decolonial pedagogical models of agroecology. Drawing on the pedagogical experiences of agroecological initiatives in Brazil, Colombia, and Peru, this study aims to discern both commonalities and distinctions in agroecological learning and community-led agriculture across South America. To do so, we empirically identify archetypes and narratives of decolonial pedagogies relevant for the agroecological transition in South America. In this paper, we define archetypes as recurring patterns that help analyze similar phenomena across different contexts (Eisenack et al., 2019) and narratives as the stories or collective accounts that reflects the experiences, values, and identity of a specific community (Rappaport, 1995). Ultimately, we seek to deepen our understanding of the learning processes through pedagogical models emerging from existing empirical, and potentially invisible, cases among the neglected and marginalized communities of South America.

2. Methodology

To unravel the narratives and archetypes of decolonial pedagogies underpinning agroecology learning in different cases in Brazil, Colombia, and Peru, we used qualitative archetype analysis (Eisenack et al., 2019). This method allows for identification of recurring patterns of pedagogical dynamics across diverse cases while maintaining sensitivity to contextual nuances (Oberlack et al., 2019).

This section presents the case descriptions (2.1); the methodological approach of qualitative archetype analysis (2.2); and the data collection and analysis details (2.3). As the intersections of oppressions and decolonial responses can only be fully understood by situated analyses, especially when dealing with ways of life other than westernized ones, this study selected cases, categories of analysis, and research methods based on selected criteria: (i) the focus on the local realities, motivations and the community views; and (ii) their operational principles/patterns of decolonial pedagogies potentially revealed as archetypes.

2.1. Comparative cases: The three cases described

This study identifies and compares the pedagogies employed in community-led agroecology initiatives in Brazil, Colombia, and Peru (Fig. 1). In these countries, autonomous agroecology initiatives emerge

[1] According to Pope (2021), socio-ecological justice integrates environmental sustainability with social equity, recognizing that ecological degradation and social inequalities are interconnected issues that must be addressed simultaneously. It emphasizes that environmental challenges disproportionately affect marginalized communities while acknowledging their rights to participate in decision-making about resource use and management.

[2] Paulo Freire's critical pedagogy emphasizes education as a liberating force through dialogic learning and consciousness-raising ("conscientização"), where learners actively engage in understanding and transforming their reality rather than passively receiving information (Freire, 1970). This approach combines critical reflection with action ("praxis") to foster social transformation.

Fig. 1. Case study locations in Peru, Colombia and Brazil Map was generated by the authors and built from Natural Earth (naturalearthdata.com).

out of vulnerable communities, characterized by local contexts and social positions affected by global capitalism and coloniality (Asante, 2006, Quijano, 2000) with intersecting lines of power and resistance. It highlights the intensified intersected subordinations and the alternatives built from their place of marginalization to deal with local socio-environmental problems, indicating how to tackle the interconnected systems of oppression from a bottom-up perspective that includes Traditional Ecological Knowledge in agroecological knowledge systems (Saylor et al., 2017).

The specific cases examined in these countries share key features: resilient approaches and alternative knowledge systems centered on agroecology. The initiatives analyzed demonstrate remarkable responses to challenging circumstances and have developed innovative, locally tailored agricultural practices. All case studies self-identify as practicing agroecology and from the researcher's perspective adhere to 13 principles of agroecology (Wezel et al., 2020), though they vary in intensity and focus depending on their specific contexts.

The focus of the study was on including agroecology initiatives rooted in the logic of the territories, initiated and led by local inhabitants. The selection of these three cases was deliberate, representing diverse manifestations of agroecology across different socio-ecological contexts while sharing the fundamental characteristic of being locally-led initiatives. Each case was selected based on its potential to illuminate distinct aspects of "territorial" agroecology: the Colombian case exemplifies agroecological education in post-conflict rural areas, the Peruvian case demonstrates agrobiodiversity conservation through traditional farming practices, and the Brazilian case illustrates urban agroecology in marginalized communities. This diversity allows for examination of how agroecological principles manifest across varying cultural, environmental, and socio-political settings. More specific information about each case is presented below.

2.1.1. *Case 1: The Bucket Revolution and urban agriculture in Brazil*

The Bucket Revolution Project (BRP) is a community initiative originating in the socioeconomically marginalized Comunidade Chico Mendes, a *favela* and a black territory in the periphery of Florianópolis, a city in southern Brazil. This black territory exemplifies the systematic concentration of marginalized populations in urban peripheries characterized by insufficient public services and political repression (Gonzalez, 2020). The community, primarily composed of rural–urban migrants seeking improved socioeconomic conditions, has grappled with persistent waste management challenges due to insufficient collection by the local government, resulting in the proliferation of disease vectors. A critical juncture occurred in 2008 when two residents succumbed to Leptospirosis, catalyzing a heightened awareness of the organic waste crisis (Abreu, 2013). The case is a strong example of the complex "socio-environmental problems faced by favelas in Brazil, as the convergence of poverty, poor household infrastructure, social discrimination, and lack of public services led to inadequate waste management, resulting in environmental problems and diseases" (Guimarães Reynaldo et al, 2023, p. 2142).

In a community meeting together with several organizations, an initiative to deal with Leptospirosis was then suggested by the health unit of Monte Cristo. The meeting brought together representatives of nurseries, schools, associations, and Cepagro (Center of studying and promoting collective agriculture), an environmental NGO that already conducted educational actions and composting of organic waste in the community. The BRP then emerged from a collaborative process with Cepagro to conduct a composting method based on an Indian technique studied by the Federal University of Santa Catarina (UFSC) and adapted to the local climate conditions (called the UFSC method). In 2016, the partnership with Cepagro came to an end and the BRP achieved certification as an NGO, embarking on a more autonomous journey. The project demonstrated rapid community engagement, engaging 95 households within its initial six months and expanding to encompass 150 families by 2021. The BRP's operational framework centers on the distribution of receptacles to residences for organic waste separation, followed by centralized composting at the local educational institution (Abreu, 2013).

This project serves a dual purpose: it ameliorates public health and environmental conditions while simultaneously generating nutrient-rich compost for local horticultural applications, thereby addressing soil fertility deficits. Urban composting enhances soil health and promotes local food production, potentially improving food sovereignty and dietary diversity (Tornaghi, 2017). The resulting nutrient-rich compost is used in community and household gardens (Mougeot, 2015), supporting diverse vegetable and herb cultivation for both consumption and medicinal purposes (Altieri and Nicholls, 2018). These gardens grow various locally-adapted crops, including root vegetables, leafy greens, legumes, and herbs, contributing to dietary diversification and agrobiodiversity – a fundamental aspect of agroecological systems (Gliessman, 2015). In 2019, the project was awarded as "*Outstanding Practices in Agroecology 2019" by the* World Future Council (WFC).

The project's genesis lies in addressing a complex socio-environmental challenge, with the primary objectives of mitigating rodent populations alongside enhancing waste management practices and urban agriculture knowledge systems. The composting process is facilitated by a volunteer cohort comprising local students and community members. The resultant compost is subsequently allocated to community gardens or commercialized to external communities, fostering a circular economy model. Each month 5.6 tonnes of organic waste are recycled (Abreu, 2013, Bonatti et al 2022, Guimarães Reynaldo et al., 2023).

2.1.2. *Case 2: Agroecology peasants schools in Colombia*

Agroecology Peasant Schools (ECAs) have emerged as a local

initiative to support local communities, defend territories, promote sustainable farming practices, and provide alternatives to illegal crops (Chavez-Miguel et al., 2022). In the Coffee Axis, ECAs formed during periods of armed conflict to protect farmers' communities. In this context, Valle del Cauca saw the creation of the country's oldest ECA, addressing agroindustrial toxicity and violence.

The Coffee Axis, Valle del Cauca, and Cauca are three Colombian regions facing significant land use, armed conflict, and agriculture challenges. In the Coffee Axis, traditional agroforestry systems are being replaced by monoculture coffee plantations, while forestry and mining activities threaten local resources. Valle del Cauca is dominated by extensive sugarcane monocultures and forestry plantations, causing environmental and health concerns. Cauca, heavily affected by armed conflict, struggles with illegal activities such as mining, logging, and illicit crop cultivation (Chavez-Miguel et al., 2022).

ECAs aim to promote profitable alternatives that enable farmers to transform illegal productive systems into agroecological ones, while securing their livelihoods. It is worth mentioning that the profitability of the illegal crops can act as a disincentive to switch to legal ones produced under agroecological processes. ECAs across all work to establish Peasant Reserves (Zonas de Reserva Campesina, ZRC) and gain legal recognition for them, such as the Indigenous Reserves recognized by the Colombian State. ECAs enable small groups of farmers to meeting a given pilot farm or, in an itinerant manner, in the different farms of the members of the group, to develop a training process simultaneously with the development of their agriculture activities. Farmers incorporate learning elements such as the analysis of the productive tasks to be carried out and the exchange of knowledge related to the best way of their execution; the study of some relevant environmental and technical issues or of context; and the analysis of the reality of the community and work proposals aimed at facing it (Acevedo-Osorio, 2013).

ECAs, in summary, play a crucial role in understanding and addressing the complex issues of land use conflict, post-war legacies, and the emergence of sustainable agriculture in the current context of 'post-conflict' by offering support and education to local communities facing various environmental and socio-economic pressures.

2.1.3. Case 3: traditional ecological knowledge in Peru

The Peruvian Andes represent one of the world's most significant centers of potato genetic diversity and traditional agricultural knowledge (Brush et al., 2015). Indigenous and peasant communities in these highlands have developed sophisticated agroecological systems that persist despite modernization pressures and environmental challenges (De Haan et al., 2010). The physical challenges of the region, including high altitudes – ranging from 2500 to 4000 m above sea level – alongside harsh climate conditions and steep terrain, are significant. Native potatoes are the primary staple food in these communities. This resilient tuber, well adapted to the Andean climate, has co-evolved with the people who cultivate it.

The Peruvian Andes alone are home to an estimated 4000 varieties of native potatoes including landraces (native) and conventional/improved varieties (Tobin et al., 2016). This form of agriculture is deeply rooted in traditional ecological knowledge, involving everything from the selection and storage of seeds to planting techniques and the use and consumption of the various varieties produced. Additionally, it relies on family labor and cooperative efforts within the community. Traditional methods include the use of manual tools, the construction of terraces for planting, and the practice of crop mixing. Although some farmers consider themselves agroecological, they report using minimal amounts of agrochemicals on their farms.

Specifically, the case study from Peru is situated within what Giraldo (2025) defines as "historical agroecologies". This concept highlights Indigenous and peasant communities whose agricultural practices are not recent adaptations to agroecological principles, but rather expressions of long-standing biocultural systems that have endured through centuries of colonial, capitalist, and extractivist pressures. These communities engage in infra-political tactics, rooted in traditional ecological knowledge, communal governance structures, and relational ontologies, that enable the preservation of agrobiodiversity. The Peruvian case involves Indigenous actors who self-identify as agroecologists and custodians of agrobiodiversity. In this sense, the Peruvian case not only fits into current agroecology principals (Wezel, 2018), but recognizes its historical agroecologies as legitimate and foundational expressions of agroecology.

2.2. Analytical framework

Via an archetype analysis, this study focuses on the identification and representation of recurring patterns (Moallemi et al., 2022), here agroecology pedagogies patterns, while avoiding the pitfalls of overgeneralization and ideography. A key characteristic of archetypes is their non-universal and non-exclusive nature. This flexibility allows for a more nuanced understanding of complex systems, such as the one explored here: learning systems of agroecological initiatives. Consequently, identified archetypes may manifest across various analyzed contexts and countries (Václavík et al., 2016).

The archetype analysis follows three key steps (Sietz et al., 2019): (i) identification of attribute configurations; (ii) development of an analytical framework explaining the relationships between attributes; and (iii) compilation of representative cases where these relationships hold. To implement the first two steps, this study developed an analytical framework illustrating the examined attributes and their interrelationships (Fig. 2 and Table 1).

The analytical framework considers multiple factors based on alternative learning structures, that investigate who participates in the learning process, as well as which kind of sources of knowledge and spaces are used, among others, as presented in Fig. 2 and Table 1. Therefore, to identify and characterize pedagogical archetypes, this study developed a comprehensive analytical framework comprising seven categories/attributes: (i) context/driver of learning, (ii) content and sequencing, (iii) methods and processes, (iv) sources of knowledge, (v) knowledge channels and learning spaces, (vi) participants, and (vii) central narratives and relational learning outcomes.

These categories (Fig. 2 and Table 1) were derived from the elements of seminal studies by Freire (2000), Juárez Collazo & Hindrix (2023), and Bonatti et al. (2024), then cross-checked with a review of literature on pedagogical model components, with particular emphasis on decolonial pedagogies and critical pedagogy principles from Mignolo (2011) and Santos (2007). Our theoretical approach draws on both Freirean critical pedagogy and decolonial theory in a complementary framework that recognizes their distinct yet interconnected contributions to understanding learning in agroecological contexts. Critical pedagogy, as developed by Freire (1970), provides the foundation for analyzing how communities develop critical consciousness (conscientização) through dialogue-based, problem-posing education that enables learners to identify and challenge oppressive structures within dominant agricultural systems. Decolonial pedagogical approaches, informed by scholars such as Mignolo (2011) and Quijano (2000), extend this analysis by specifically addressing the coloniality of knowledge, being, and power, emphasizing the need to center Indigenous and local epistemologies that have been systematically marginalized by colonial matrices of knowledge production. In agroecological settings, these frameworks work synergistically: critical pedagogy illuminates how communities engage in transformative learning processes that challenge industrial agricultural paradigms and develop food sovereignty consciousness, while decolonial theory reveals how these same communities assert epistemic resistance by reclaiming and revitalizing ancestral agricultural knowledge systems.

Our resulting framework (its categories) directly corresponds to some core principles of agroecology knowledge co-creation, encompassing: a. context-driven learning that emerges from territorial specificities (Wezel et al., 2016); participatory methods that privilege

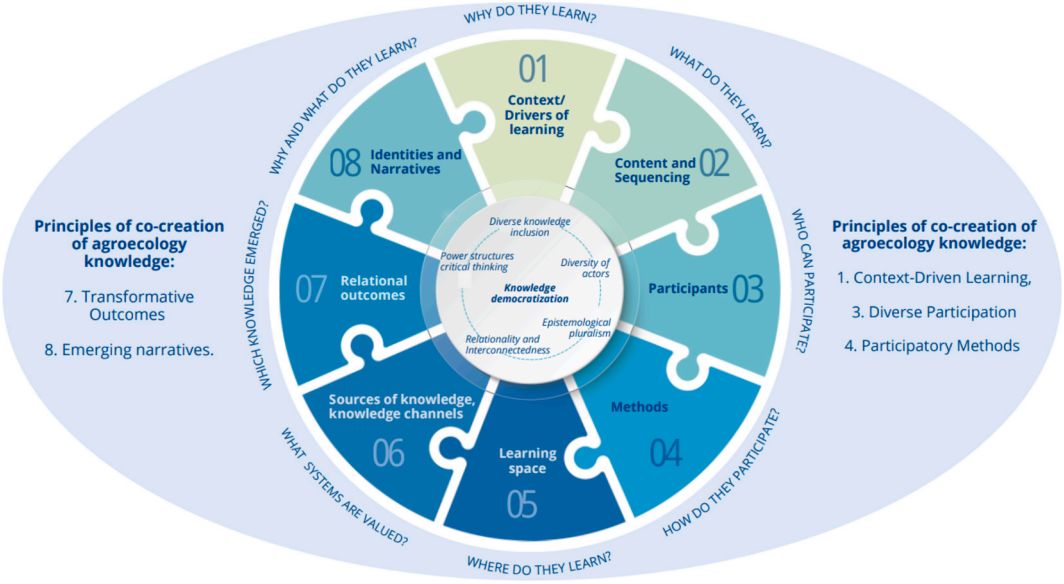

Fig. 2. Framework for the integration of decolonial principles and Corresponding Analytical Indicators of decolonial pedagogies.

horizontal knowledge exchange (Rosset et al. (2011); knowledge democratization that validates diverse epistemologies; inclusive participation across multiple stakeholder groups; transformative outcomes that build both technical capacity and critical consciousness; and emergent narratives that reflect community-generated understandings of agroecological practice (Rivera-Ferre, 2018).

This multifaceted approach allows for a nuanced clustering of attributes as well as pedagogy pattern recognition across the three cases studied. It also facilitated a deeper understanding of the potential unique pedagogical characteristics employed in each context. By systematically applying these categories, the study was able to discern subtle distinctions and commonalities among the learning approaches, thereby illuminating the complex interplay between learning methodologies and their sociocultural contexts.

The categories of analysis (Table 1) are classified into open, closed, and semi-open levels in accordance with qualitative research methods (Miles & Huberman, 1994; Saldana, 2016). These levels primarily vary in terms of flexibility, theoretical alignment, and use of pre-designed answers. Open categories provided flexibility to identify novel themes, being the most challenging with our extensive datasets (Braun & Clarke, 2006). Closed categories provide a clear structure, facilitating efficient coding, but may overlook themes outside the predetermined answers (Saldana, 2016). Semi-open categories balance structure and openness, combining the advantages of both, with potential consistency challenges (Miles & Huberman, 1994).

2.3. Data collection and analysis

Data collection for this study was based on semi-structured interviews (Brinkmann and Kvale, 2015), participant observation (DeWalt and DeWalt, 2011), and focus groups (Krueger and Casey, 2014) (Table 2). This triangulated approach, combining individual perspectives, observational data, and collective insights, aims to enhance the validity and reliability of the research findings (Creswell & Plano Clark, 2017).

The semi-structured interviews, lasting an average of about 60 min, were conducted with the key informants in the participants' mother tongue (Spanish or Portuguese), audio-recorded, and transcribed verbatim with participants' informed consent (Kvale & Brinkmann, 2009). This interview format allowed for consistency while also maintaining flexibility to explore emerging themes (Galletta, 2013). The questions were divided into main subsections connected with the categories of the framework (Fig. 2; Table 1) and general information of the initiative, such as the community problems and their context. The interview guide consisted of open-ended questions designed to elicit in-depth responses.

Participant observation was utilized to gain in-depth insights into daily practices and social dynamics within the initiatives (DeWalt & DeWalt, 2011). Participant observation was carried out by two researchers over approximately two months in each case. Here, researchers assumed the role of participant-observer, systematically documenting social interactions, community dynamics and behavioral patterns, and significant events through field notes. Following standardized protocols for ethnographic documentation (Patton, 2015), field notes were written both during and after observations, including descriptive observations and reflections.

Focus groups facilitated collective knowledge generation and served as a platform for collective discussions to enhance the credibility of the research findings (Lincoln & Guba, 1985). These were conducted using different mediation techniques to adapt to the cultural settings of each case. These sessions, lasting approximately 90 min, were facilitated using a pre-developed discussion guide aligned with the research objectives. Sessions were audio-recorded, and transcribed verbatim with participants' informed consent.

Some slight methodological adaptations, in terms of method sequences and additional data collections, were necessary to adapt to the specific context of each case while maintaining a consistent overall methodological framework (Smith et al., 2022; Johnson and Lee, 2021). In Brazil, we first conducted a focus group discussion with 10 women from the community to investigate collective community issues. Second, 15 semi-structured interviews were conducted, including 6 women from the community and 9 individuals from external institutions (4 women and 5 men). Third, participant observation was carried out during community and institutional meetings. The total sample size for the Brazil case was 25 participants (20 women and 5 men).

The Colombia case involved research conducted across seven schools. In this case, we first conducted semi-structured, but also included unstructured exploratory, interviews (n 30) (Galletta, 2013), six focus group discussions to investigate community and agriculture issues in conflict settings (n 65) (Morgan, 1997), and participant observation (DeWalt and DeWalt, 2011). The total sample size for the Colombia case was 95 participants (45 women and 50 men) who were engaged in regional agroecology networks and schools.

In Peru, data collection methods included semi-structured interviews

Table 1
Conceptual Matrix: Description of analytical categories and indicators related to Fig. 1.

SHORT DESCRIPTION AND GUIDING QUESTIONS	INDICATORS
Decolonial principles - *Cultural context and meaningful universe (*Freire, 2000*)* - *Recognize and embrace marginalized knowledge systems (*Mignolo, 2011*)* - *Power structure critique (Santos, 2014)* - *Epistemological pluralism (*Escobar, 2012*)*	
3. Category: Context/Drivers of learning (open)	
The context or driver that trigger the learning process. This driver usually comes from a crisis or disturbance as suggested by Folke et al. (2003). Agroecological learning emerges from specific territorial challenges, aligning with what Wezel et al. (2016) describe as "territorially-based agroecological transitions". Guiding questions: What context or event triggers the learning process? What are the drivers of learning?	As an open category, there were no predefined indicators. Instead, the focus was on identifying recurrent sentences, words, and central topics that emerged organically from the local descriptions through an inductive approach.
4. Category: Content and sequencing (semi open)	
Content: The subject matter to be taught. Sequencing: The order in which content and activities are presented (Shulman, 1986; Gagné et al. 2005). In agroecology context it can be linked with what Altieri and Toledo (2011) describe as contextually-responsive knowledge development. Guiding questions: What was learned about in the agroecological practices? How was the content organized? Has the content defined from the beginning? In which order it was presented/used?	Indicators: a. Structured and sequential: Follow a predetermined order and framework. b. Unstructured and adaptive: Developed and organized flexibly based on specific needs and contexts.
5. Category: Participants (closed)	
Learner characteristic: Participants backgrounds (Tomlinson, C. 2014, Alves,et al., 2022) Key questions: Who participated? Is the focus of the collaboration on community members or on formal institution representatives?	Indicators a. Community Members: farmers, and/or individuals belonging to a community defined by i) People sharing a common living area (neighborhood, town, city), with varying levels of participation in local activities; ii) Cultural Identity: Groups in specific regions sharing cultural backgrounds, languages, traditions, or ethnicities, often with common heritage (James et al., 2012); iii) Support Networks: Communities functioning as social support systems (e.g., some Favelas/Slums), where members offer mutual emotional, practical, or social assistance. b. Education Institutional Representatives, acting on behalf of established organizations of education, including: university and schools. c. Individuals acting on behalf of established organizations in society, including: Government officials, Corporate spokespersons, Non-profit organization leaders, and delegates from other entities with recognized authority. These representatives advocate for their institutions' interests, implement policies, and perform specific societal functions (James et al., 2012). d. Multiples (the process involved a, b and c)
6. Category: Methods and mediation processes development (semi-open)	
Teaching methods: Strategies and techniques for delivering the content. Mediation Process Development: Defined as the extent to which a pre-established (or not) methodology guides the learning process (Joyce et al 2015). It could be reflecting what Rosset et al. (2011) term "horizontal methodologies" in farmer-to-farmer agroecology networks. Key questions: Was there a methodology planned/organized from the beginning of the process? Was the process spontaneous, evolving through organic interactions among participants over time? Who was it decided/selected? 3. Process Initiation: Who started it? (Professional, external agent, or community members) 4. Facilitation Leadership: Who led the process? (Professional, external agent, or community members) 5. Methodology Timing: Was it defined at the outset or developed along the way? 6. Methodology Flexibility: Did it undergo changes or adaptations during the process?	Indicators: a. Experiential learning (learning by doing) b. Structured methods c. Hybrid approach (includes a. and b. varying based on process stage sometimes).
7. Category: Learning space (closed)	
Spaces or physical infrastructures used to learn, and to exchange knowledge. In some contexts, learning spaces can promote different ways of learning and therefore foster specific pedagogical typologies. Key questions: Where do they learn? In which physical space do the actors share and build knowledge? What are the most used spaces for learning activities? Do the learning spaces influence the learning process?	Indicators a. Household: domestic setting organized to be a learning environment. This needs supportive space and resources at home to use during community meetings. b. Communitarian spaces: these are shared learning spaces within the community, often semi-formal (e.g., NGO programs, church study groups, cultural centers). They offer supplementary education or skill-building. c. School: formal education settings recognized by the state or educational authorities. Schools are central to structured learning and typically the main closed learning environment. d. external/other spaces: structured learning environments outside the main community or formal public school system. May be specialized, temporary, or privately run.
6. Category: Sources of knowledge, knowledge channels (closed category)	
Sources: Materials and tools used to support teaching and learning (Fraser, 2012). Knowledge flow: channel and direction of knowledge. Key questions: Which sources of knowledge are used? Are they material or non-material/oral? From where does the knowledge flow? Which material did they use? Are there books, and or guidelines? Other sources?	Indicators Channels: a. Multiples, b. extensionist to farmer, farmer to extensionist, c. farmer-to-farmer/neighbor to neighbor, d. multiples Sources: a. books/material, b. oral c. virtual
7. Category: Central narratives (open category)	
Narrative: story or collective account that reflects the experiences, values, and identity of a specific community. It serves as a framework for understanding a participant's past, present, and future aspirations (Rappaport, 1995). These are dynamic constructs that evolve over time, influenced by changing circumstances and power dynamics (Hammack, 2008) "Central narratives" relates to what Rivera-Ferre (2018) describes as the "cultural dimension" of	As an open category, there were no predefined indicators. Instead, the focus was on identifying recurrent sentences, words, and central topics that emerged organically from the local descriptions.

(*continued on next page*)

Table 1 (*continued*)

agroecology. Key-questions: What are the current sentences, or words, related to a specific learning topics? Are there central topics when participants describe the community, problems and learning process? How they related to agroecology?	
8. **Category/attribute: Relational learning outcome (semi-open category)**	
Relational learning outcomes are resources generated through social network and collaborative exchanges that cannot be produced by individual entities alone. It emerges from collective action and shared learning experiences.	Indicators: a. Enhanced critical thinking: Evidenced by questioning power structures, living conditions, and roles in natural resource management. This involves self-reflection, problem-solving, and considering alternative realities (Cundil and Rodela, 2012; Craps and Maurel, 2003; Young, 1995). b. Increased environmental knowledge: Manifested through new skills, behaviors, products, and relationships.

(n 10) conducted on guardians' farms (chacras), participant observations carried out during farm visits and peasants' fairs, as well as focus groups. The sample size for the Peru case was 10 participants (6 men and 4 women), all farmers from the Association of Native Potato Guardians of Peru.

Considering the difference sizes of the cases, purposive sampling was used to select farms and interviewees based on their involvement and experience with the agroecological initiatives under investigation (Patton, 2015). As this study utilized a case-based methodological approach, each agroecological initiative constituted a distinct unit of analysis. The Colombian case encompassed multiple schools within a regional agroecology network, effectively comprising several sub-cases within the same initiative, while the Peruvian case focused on farmers practicing agroecology within a single geographic region. This methodological decision resulted in different sample sizes between Colombia (n = 95) and Peru (n = 10), which represents a limitation regarding statistical comparability. However, the research prioritized contextual understanding of each initiative rather than direct cross-national statistical comparisons.

The sampling designs aim to engage deeply with the respective communities and generate a profound understanding of their dynamics, agriculture methods and learning process, social networks, and motivations (Wilson, 2023; Tongco, 2007). In Brazil, local gatekeepers facilitated interactions at the slum (Favela Chico Mendez). In Colombia, local gatekeepers assisted in accessing regional agroecology networks and schools in the conflict zones of Coffee Axis. In Peru, interactions were facilitated by different local gatekeepers, including the International Potato Center (CIP), Grupo Yanapai, and the Association of Native Potato Guardians of Peru (AGUAPAN).

The data analysis followed a two-phase approach combining content analysis and network analysis. In Phase 1, content analysis was conducted using the categories and indicators as guiding codes through NVivo and MaxQDA software platforms. The analysis was performed by an interdisciplinary team comprising agronomists, geographers, social scientists, biologists, and pedagogues, who analyzed the collected data according to the established categories (Tab. 1).

The team evaluated both the presence and intensity of factors in the data, using a standardized scale where 3 indicated strong presence, 2 medium presence, 1 low presence, and 0 indicated absence. The intensity (3 = strong, 2 = medium, 1 = low, 0 = non) has been calculated by the recurrence of the topic in the narratives in a peer-review process of the codes. Additionally, they examined relationships between factors and identified potential attribute clusters. Regional variations in software usage were observed: Peru utilized NVivo software (Bazeley and Jackson, 2013) with data synthesis in Microsoft Excel spreadsheets (Meyer and Avery, 2009), while Colombia and Brazil employed MaxQDA for qualitative data analysis (Garcia et al., 2023; Rädiker and Kuckartz, 2020).

To ensure analytical rigor, peer training sessions were conducted to calibrate understanding of analytical categories and variables across the research team. The coding process was carried out by a minimum of two independent researchers working in parallel, with regular exchanges to discuss and compare findings for validation. When discrepancies arose, they were resolved through reference to operational definitions and, when necessary, consultation with additional reviewers. This systematic approach ensured consistency and reliability in the data analysis process.

3. Results

The three cases of agroecology initiatives share common characteristics and patterns, particularly in their community-centered structures and dynamics. These are centered on community members/farmers, emphasizing experiential learning with content tailored to specific needs, and relying on oral communication channels, such as neighbor-to-neighbor and farmer-to-farmer oral channels. These communications happen in communitarian spaces, resulting in an enhancement of environmental knowledge and other related outcomes.

Each of the three cases does not represent a different pedagogical model, but rather demonstrates a singular pedagogical archetype operating across diverse contextual narratives. The results revealed essential common pedagogical elements and some recurring patterns that enable the characterization of one unified pedagogical model (the archetype), despite its implementation in varying socio-ecological and cultural contexts (contextual narrative). As shown in Tables 3 and 4, there are nuances among the cases and they differ in some characteristics, particularly their narratives and contexts (Tables 2 and 3).

Regarding "Methods" (Tables 3 and 4), Peru and Brazil exhibit similar methodologies, predominantly employing informal, peer-to-peer knowledge channel mechanisms and eventual workshops facilitated by both internal and external actors, but mostly internal. In contrast,

Table 2
Summary of data collection methods and sample size.

COUNTRY	METHODS	SAMPLE SIZE	GENDER DISTRIBUTION	PARTICIPANTS
Brazil	• Focus group discussion (1) • Semi-structured interviews (15) • Participant observation	25	20 women, 5 men	• 10 women from the community (focus group) • 6 women from the community (interviews) • 9 individuals from external institutions (4 women, 5 men)
Colombia	• Semi-structured and unstructured exploratory interviews (30) • Focus group discussions (6) • Participant observation	95	45 women, 50 men	Participants engaged in regional agroecology networks and schools across seven schools
Peru	• Semi-structured interviews (10) • Participant observation • Focus groups (1)	10	4 women, 6 men	All farmers from the Association of Native Potato Guardians of Peru

Table 3
Distribution and intensity of indicators revealing shared patterns (in blue) across the cases. *Intensity values: 3 = strong presence, 2 = medium presence, 1 = low presence, 0 = none.

CATEGORY	INDICATOR	INTENSITY*		
		PERU	COLOMBIA	BRAZIL
Content and sequence	Structured content and sequential	0	3	1
	Unstructured/ according to needs	**3**	**3**	**3**
Participants	Community members/ Farmers	**3**	**3**	**3**
	Extensionists	2	1	0
	Formal educational representants	0	2	1
	Non-Educational institutions representants	1	1	1
Methods	Experiential learning (learning by doing)	**3**	**3**	**3**
	Structured methods	1	2	1
	Hybrid approach (varying based on process stage).	1	2	1
Learning spaces	Household	3	1	2
	Communitarian spaces	**3**	**3**	**3**
	School	0	1	1
Sources of knowledge, Knowledge channels	Material (books, etc.)	1	2	1
	Oral, face-to-face	**3**	**3**	**2**
	Virtual	0	2	1
	Extensionist-to-farmer, farmer-to-extensionist	1	0	0
	Farmer-to-farmer/ neighbor-to-neighbor	**3**	**3**	**3**
	Multiples kinds of flow	2	1	3
Relational outcomes	Enhanced critical thinking	2	3	3
	Increased environmental knowledge	**3**	**3**	**3**
	Other outcomes	**3**	**3**	**3**

Colombia implemented a more diversified approach, integrating both formal and informal educational strategies. This hybridization in Colombia suggests a more institutionalized approach to agroecological education compared to its counterparts.

For "Learning Spaces and Materials" (Tables 3 and 4), while all three countries utilized communitarian centers and spaces, the specific structures varied significantly. Peru and Brazil emphasized community-wide spaces, with Peru incorporating culturally significant local structures such as the "Centro de Interpretación de la papa nativa." Colombia, however, demonstrated a more complex infrastructure, leveraging a network of formal educational institutions, including schools, alongside community spaces. This multi-tiered approach in Colombia indicates a different degree of integration with formal education systems.

This study also revealed that "Learning spaces" (Tables 3 and 4) associated with entertainment and arts consistently serve as effective platforms for knowledge exchange on agroecological practices and identity development. In all cases studied, events such as festivals, fairs, theater performances, and graffiti exhibitions facilitated informal learning about sustainable agriculture. These venues not only provided opportunities for sharing agroecological knowledge but also strengthened participants' cultural and agricultural identities.

In the analysis of "Knowledge Sources," the epistemological foundations of agroecological learning differed across the countries according to the collected data. Peru predominantly relies on oral traditions and local ecological knowledge, which emerged from belief systems of local communities due the sacred and intrinsic values of nature. In contrast, Colombia and Brazil exhibited a more heterogeneous knowledge base, incorporating community knowledge, academic input, and NGO collaborations (Tables 3 and 4).

Considering the "Participants" category, while farmers/community members constituted the primary participant group across all countries, Colombia displayed a more diverse demographic. In some schools, the inclusion of university students from the local territory and commercially engaged farmers in Colombia indicates a broader stakeholder involvement, potentially facilitating knowledge exchange between academic and practical domains (Tables 3 and 4).

Regarding "Relational Outcomes and Narratives," all countries reported strengthened community support, improved development of identity, and enhanced environmental knowledge. Peru focused on biodiversity preservation and the revival of traditional agricultural practices. Colombia uniquely emphasized the restoration of farming identity and agroecology practices. Brazil developed a more critical consciousness towards governmental policies and historical oppression, suggesting a more politicized approach to agroecological education. While a narrative of persistence and historical struggle was common across all three countries, nuanced differences emerged. Brazil's emphasis on narratives of exclusion and the ongoing fight against marginalization suggests a more confrontational stance compared to the persistence-focused narratives in Peru (Tables 3 and 4).

3.1. *Archetype and its contextual narratives*

This study proposes a major archetype that encompasses these shared characteristics, while identifying distinct contextual narratives that capture the nuanced differences among the cases (Fig. 3). In this context, general findings reveal the main archetype is named the South pedagogies archetype. The designation "South pedagogies archetype" transcends the mere geographical local of the cases, instead representing an epistemological positionality aligned with Santos' (2014) conceptualization of "Epistemologies of the South." The choice of the term acknowledges knowledge systems that have emerged from contexts of resistance and social struggle, reflecting what Escobar (2016) terms "other ways of knowing and being." North and South are then understood as metaphorical concepts representing power relations rather than geographical locations (Mohanty, 2003). The further analysis of the diverse attributes of each case suggests three distinct pedagogical contextual narratives:

a. Living Pedagogies, emerging in a context of rural isolation, prioritizing experiential learning, oral channels of communication mainly based on day-to-day rationalities, and traditional and Indigenous knowledge;

b. Resistance Pedagogies, emerging in a urban context of exclusion while concentrated on the empowerment and mobilization of community members against oppressive structures based on critical thinking; and

c. Hybrid Pedagogies, which integrate agroecology into traditional and non-traditional educational frameworks such as alternative rural schools integrating multiple actors. This last archetype draws upon the principles of critical pedagogy and integrates agroecology into not just educational frameworks but also formal and informal school formats while maintaining aspects of the aforementioned archetypes.

These contextual narratives, while not mutually exclusive, represent predominant approaches observed in each case. Therefore, these contextual narratives are not pure; rather, they interface and overlap in complex ways across the three countries (Fig. 3). The networks presented in Fig. 3 reveal the main patterns associated with the 3 cases.

The three representations in Fig. 3, based on Table 3, illustrate the identified and quantified attribute configurations for each case. This figure serves an illustrative purpose, highlighting the categories that exhibit the highest and lowest intensities across the three cases. These network patterns are important to our subsequent classification of typologies and the identification of core shared elements, which are presented in Fig. 4 and elaborated on in the discussion section. The shared elements among the cases are the core of the South Pedagogy archetype and are based on the intersections found in this analysis.

Table 4
Qualitative summary of results to open, semi-open, and closed categories; including predominant indicators identified.

CATEGORY	PERU CASE	COLOMBIA CASE	BRAZIL CASE
1. Context/ Drivers of learning	Attachment to Values (Loss of native agrobiodiversity, Erosion of traditional practices, Sense of purpose, Food security)	Selfish Elites / Common threats (Forced displacement, Land distribution, Agro-toxic environment, Products certification, Monopoly resistance, Threats to water resources)	Weak Institutional Arrangement (Community health, Organic waste management, Food security, Environmental awareness)
2.Content and sequencing	Agrobiodiversity conservation; peasant and Indigenous identities; knowledge systems	Rural reconstruction after long-lasting conflict (*Buen vivir* as an endogenous development alternative; Indigenous and peasant identities reconstruction of the social fabric and the historical memory lost in times of conflict; Connection rural–urban)	Urban agriculture, composting
3. Participants	Community: mainly Indigenous farmers	Community member: mainly family farms. In one case, university students but people/youth who were from the territory. Farmers who commercialized their products	Mainly community members, urban farmers. Led by women
4. Methods and mediation processes development	Neighbors-to-neighbors, informal, workshops with external and internal actors	Multiple: Farmer-to-farmer, Farmer-to-students. Formal and informal: Workshops, knowledge interchange events	Neighbors-to-neighbors, informal, workshops with external and internal actors
5. Learning space	Households and communal farming areas; (Pachamamaq Samaynin- *Centro de Interpretación de la Papa Nativa= Center of interpretacion of native potatos*). Peasants Markets /Fairs promoted by the municipalities as a formal structure for the exchange and commercialization of agrobiodiversity.	Schools (linked and non-linked to formal educational systems offered by the State. Universities Community centers Open spaces Agroecological Markets	Communitarian center and overall community space
6. Sources of knowledge and knowledge channels	Oral material mostly.	Multiples Multiples and non-hierarchical, community, university students and NGOs. Self-generated content (Based on the needs: "ahora necesitamos bio pesticidas")	Multiples and non-hierarchical, community, university students and NGOs
7. Relational learning outcomes	Communitarian support, Yinni (Oral material mostly), Environmental knowledge, Seeds (rescue biodiversity and practices potatoes and otros quinoa), Cultural Identity	Know how local, Minga Oral material mostly. Identity. *"Volver a ser orgulloso de ser campesino" (back to be proud of being a paysant).* Environmental knowledge. Critical thinking approach	Identity (black lives matter, feminism, *nós por nós*), critical approach to government and oppression. Environmental knowledge – mention of circular economy, food sovereignty; respect for the environment; waste cycle; community empowerment.
8. Central narratives	Recurrent words: persistence: "persistencia en lo que hacemos" (we persist in what we do"), history of campesinos, importance of their knowledge	Recurrent words: resistance, history of campesinos, "conocimiento local para los locales" (local knowledge to the locals), organization, association.	Recurrent words: resistance, exclusion, fight against oppression, resistance

By examining similarities in importance and the co-occurrence of networks' components—evidenced by consistently high-intensity presence across all three cases—we observe that experiential learning emerges as a common feature in terms of pedagogical methods. This is accompanied by a strong presence of unstructured and needs-based content sequencing. All three cases also demonstrate that the learning spaces are primarily communitarian, predominantly involving participation from community members and farmers. Other categories with high intensity include enhanced critical thinking and increased environmental knowledge, both of which are considered relational outcomes of the learning process. However, the networks structures exhibit slight differences among them, mainly due the high integration of their components in the Brazilian and Colombian cases, while the Peru network shows two clusters.

"Living Pedagogies in Peru case": This South pedagogy archetype emerged in a contextual narrative that emphasizes experiential learning and deep community engagement. It is most prominent in the Peruvian case, where informal, community-based, and neighbor-to-neighbor knowledge exchange is prevalent. The pedagogies are characterized by their embeddedness in local contexts, utilizing communitarian centers and culturally significant spaces as primary learning environments (e.g., "casa de Doña Irma" in Peru). Therefore, these initiatives generally take place in non-formal educational spaces, such as households, community gardens, and settlements. The reliance on oral traditions and local ecological ancestral knowledge in Peru exemplifies this approach, fostering a strong connection between learning and lived experience.

> *"When I was a child I ate native potatoes of different flavors, when I grew up I realized that the new varieties that are appearing, the improved ones, no longer have the same flavor. For that reason I have returned to work in the fields, to recover those varieties and that is my motivation, and I hope that in a few years there will still be native potatoes, that they will not disappear, because they are inherited from our grandparents"* (Anonymous, 2021, interview by the authors).
>
> *" To maintain these varieties (of native potatoes), they must be protected from diseases. The seeds must be properly conserved. To plant is not only to think technically, you also have to coordinate with the earth, with the Pachamama (mother earth), with those around us, many wisdoms that have to be shared with the neighbors around us. That is my responsibility with the potato."* (Anonymous, 2021, interview by the authors).

The Living Pedagogies emphasizes experiential learning and community engagement as central ways of acquiring and interchanging agroecological knowledge. In addition, Living Pedagogies emphasize the importance of the exchange of intergenerational knowledge between different participants and communities alongside the creation of horizontal learning networks. These networks facilitate the exchange of experiences, the dissemination of successful agroecological innovations, and the strengthening of bonds of solidarity between farmers.

In essence, Living Pedagogies come from farmers as active subjects in the construction and application of agroecology, building situated

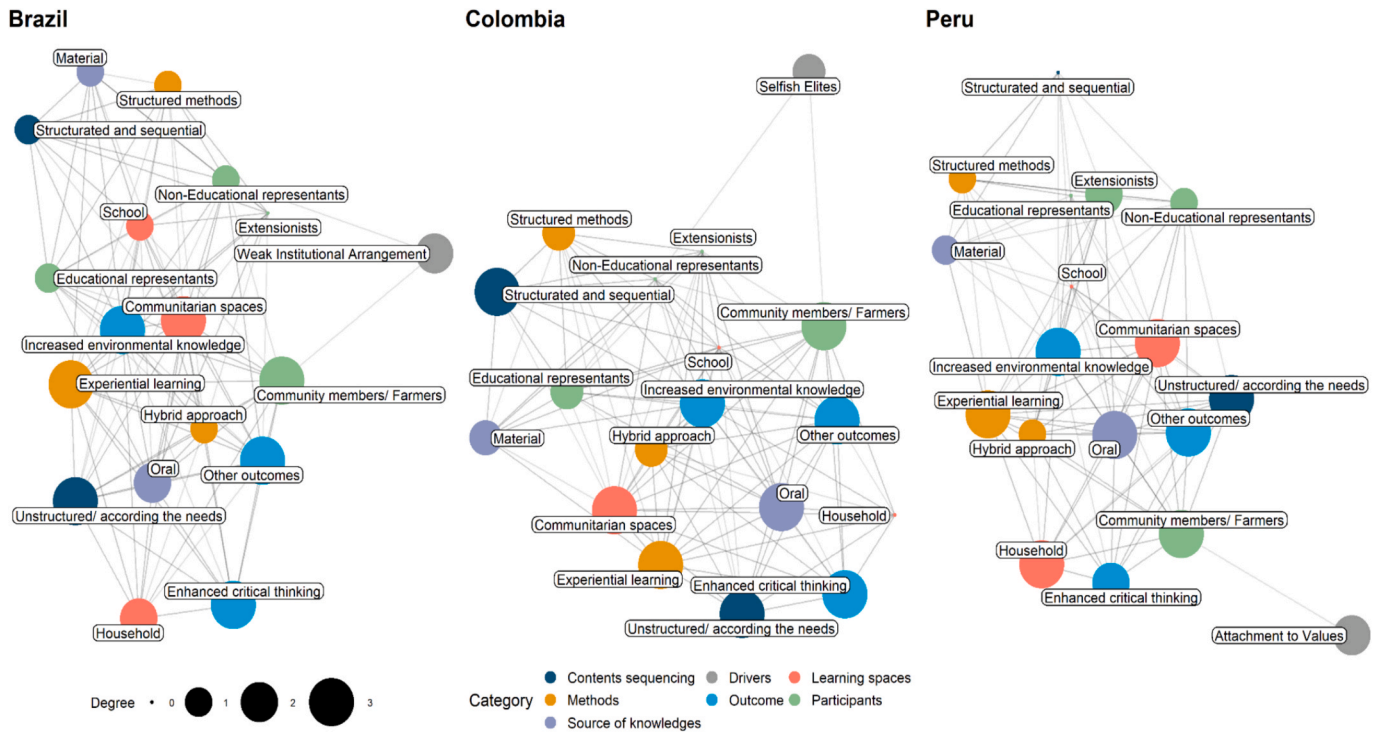

Fig. 3. Comparative Analysis of the 3 cases – plotted using the intensity of each category defined by experts' knowledge, where links suggest relations between the characteristics and their indicators.

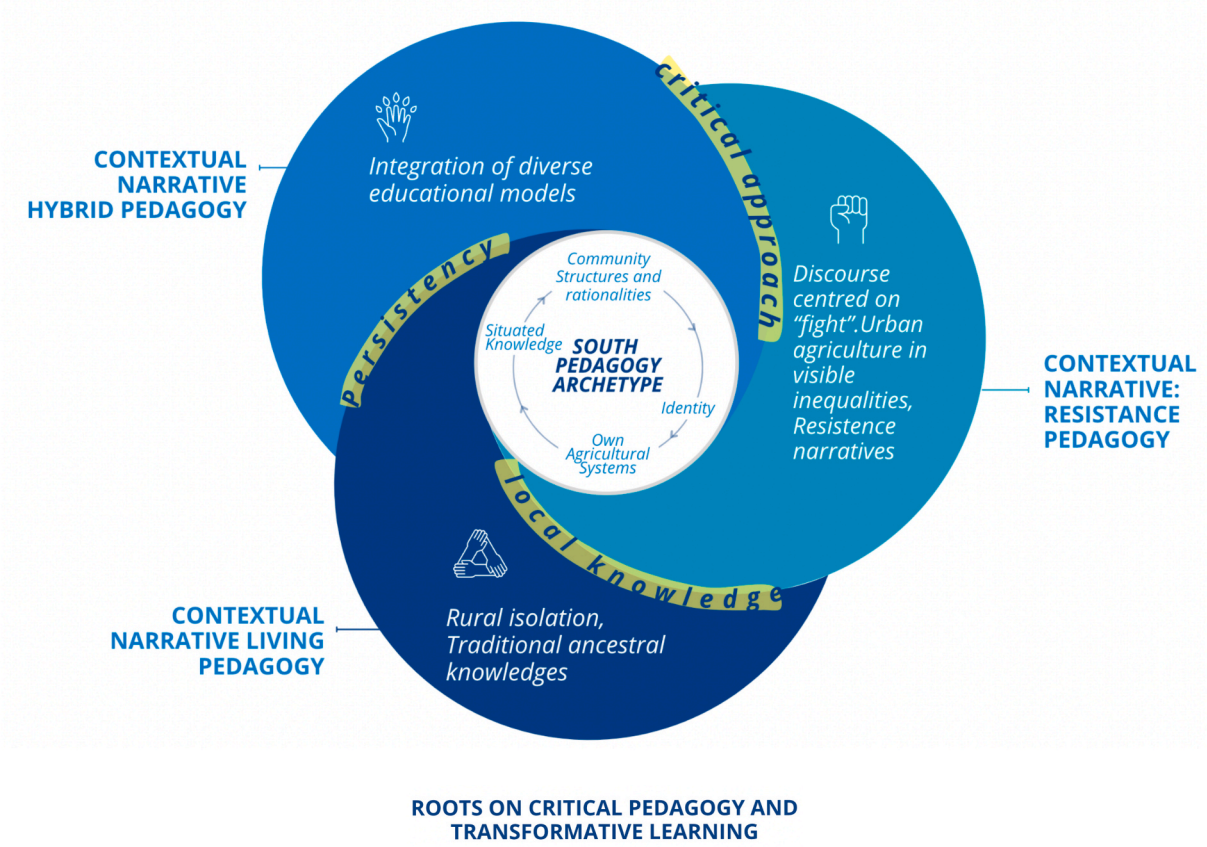

Fig. 4. Core shared elements (nucleus) of South pedagogy archetype and its expanding intersections with different contextual narratives, demonstrating the dynamic relationship between foundational principles and their contextual applications.

knowledge based on their voices, experiences, and centrality in the learning process. It presents an approach to organizational structure and dynamics, leveraging both formal (peasant markets) and informal networks to facilitate interaction and information flow. By placing less emphasis on hierarchical roles for actors, the model promotes a more collaborative and adaptive environment, exemplified by practices such as mingas—a form of free, Andean collective agriculture work system for social purposes (Mayer, 2018). This approach encourages shared responsibilities, collective decision-making, and mutual support, fostering stronger community bonds and agroecological practices.

"Resistance Pedagogies in the case of Brazil": This South pedagogy archetype emerged in a contextual narrative of resistance, empowerment and mobilization of community members. While elements of resistance are present across all three cases, it is particularly salient in the Brazilian case. Here, the educational approach embraces a critical consciousness toward governmental policies and historical oppression. The narratives of exclusion and the ongoing struggle against marginalization in Brazil underscore this pedagogical orientation (Freire, 1970). These pedagogies aim not only to promote agroecological knowledge but also to cultivate a sense of agency and collective action among participants who live in the peripheries. This second archetype identified in this research, Pedagogies of Resistance (Dickmann and Stanqueviski, 2019), which have their roots more closely related to social movements and links to community problems as exemplified by these quotes:

> *"Existing is resisting"* (Anonymous, 2020, interview by authors).
> *[The BRP] "has the advantage to be happening in a territory of resistance", "with the intention to occupy and resist to transform realities inside the community"* (Anonymous, 2020, interview by authors).
> *"(here) it is a territory of resistance because even though the people are full of problems, they are always smiling, always having fun, always reinventing themselves, they are always searching."* (Anonymous, 2020, interview by authors)
> *"In Revolução's learning, we'll always put the focus on community problems so that the people who come to a course can think about it together with us and we'll apply it here in the community to give them feedback so that they understand that: 'Look, I'm valuing the person who came, who thought with us collectively and I'm also applying that idea that could have remained only in theory…… and then this construction is collective…. because we think up a project here, but we'll adapt it to each reality. Now if we go to another community and there it's this and this… we'll have to adapt… and always have models for us to use… decentralise even."* (Anonymous, 2020, interview by authors)

The quotes stress the potential of the community to conduct the important task of taking theories into a practice of resistance, parting from this social technology to articulate, strengthen, collectively transform, and bring improvements to the territory (Guimarães Reynaldo et al, 2023). In this context, agroecology is presented not only as a set of sustainable agricultural practices but also as a political and economic alternative to the absence of public services, the violent presence of the state in the community and the capitalist industrial agricultural model. The learning processes are closely linked to debates on issues such as land concentration, the oppression of the favela as a vulnerabilized black territory, the rights of marginalized peoples, and the protection of community food sovereignty.

Despite the university's involvement in developing composting techniques and the implementation of composting practices on the school grounds, the case study also reveals complex and conflictive relationships with formal educational institutions. The local school director and some teachers interviewed were very critical of the initiative and its presence in the schoolyard and the community. At the same time, the coordinators of the BRP contested the lack of engagement of the school with the community and denounced the gap between the academic and the popular languages.

The methodologies employed in this case include political training workshops, Theater of the Oppressed (Boal, 1985), culture circles, and other participatory approaches that stimulate critical reflection and collective action. The facilitators act as educator-militants, committed to the cause of social transformation and the empowerment of black communities. A crucial aspect of Pedagogies of Resistance is the link between the theory and practice of agroecology and broader social struggles. Agroecological practices are presented as tools of resistance and autonomy in the face of the dominant sociopolitical model. The social mobilization intends to face the subordination of the community while fostering social equity and justice.

"Hybrid Pedagogies in the case of Colombia": Representing the most complex integration of agroecological principles into educational frameworks, the case of Colombia, offers a nuanced approach to agricultural education that merges formal and informal pedagogical strategies. The case of ECAs stands out as an example of this hybrid model, demonstrating the potential for synergistic relationships between diverse educational institutions, social cohesion, and community-based learning environments.

> *"Agroecology is not a technique or technology but a 'propuesta de vida'", meaning a pro-posal of life, "which emphasizes not only on the environmental, but also historical-cultural, biophysical and socioeconomic aspects of peasant lives"* (Anonymous, 2020, during Focus Group Discussion conducted by the authors).
> *"We not only care for the environment but above all for the community and the family. Agroecology starts with the family and is essential for enabling community sovereignty. In isolation, a farmer cannot carry out AE transformation, because AE is a collective process"* (Anonymous, 2020, interview by authors).

The Peasant Schools model leverages an intricate network comprising traditional schools, universities, and community spaces, thereby creating a multifaceted learning ecosystem. Some school models break with traditional models while some follow them by using school structure and books but keeping critical thinking as a key element. By integrating these varied educational contexts, the model facilitates a more holistic understanding of agroecology, encompassing both theoretical foundations and practical applications rooted in local realities.

The context-specific methodologies employed by Escuelas Campesinas de Agroecología (ECAs) facilitate the integration of diverse epistemological frameworks into collective learning systems, subsequently enabling the dissemination of this synthesized knowledge to broader social contexts through established social networks.

4. Discussion

This diversity and complexity of the contextual narratives suggest that agroecological learning and the South pedagogy archetype is not a monolithic practice but rather a context-dependent endeavor that requires not just tailored approaches to effectively address local needs and conditions, but also a close link to specific biocultural contexts (Burke et al., 2022).

Rather than representing country-specific models, the findings reveal an existing archetype and contextual narratives that may exist across various areas in the studied countries and potentially beyond, aligning with the concept of 'situated agroecologies' proposed by Méndez et al. (2013).

The South pedagogy archetype demonstrates multi-layered interactions between people and nature alongside the diverse models of resistance to poverty, inequality, and social exclusion (Fig. 4). In this context, the findings also reveal connections between the three contextual narratives observed and the specific colonial legacies present in each case study, particularly in relation to territories historically linked to the enslavement and subjugation of Black or Indigenous populations. This relationship underscores the enduring impact of colonial practices on contemporary spatial and social dynamics in these regions (Quijano, 2000). It also reflects and connects to Emergent Narratives,

and democratization of knowledge reflecting what Rivera-Ferre (2018) describes as the "cultural dimensions" of agroecology, where local ways of knowing and describing ecological relationships gain legitimacy.

The findings align with, and expand upon, other previously identified decolonial pedagogies, such as the "pedagogies of home" (Delgado Bernal, 2001). As Delgado Bernal notes, these pedagogies extend critical pedagogy discourse by prioritizing cultural knowledge and language, thus bridging home-based learning with broader societal contexts. This approach criticizes the diffusion of 'official knowledge' and dominant ideologies, a theme resonating across our identified archetypes and consistent with the work of Apple (2004) on the politics of knowledge in education. Importantly, again, the contextual narratives are not mutually exclusive but interface with each other (Fig. 4), reflecting the complex nature of agroecological knowledge systems described by Gliessman (2018). They all emphasize actionable knowledge and situated learning, with practical and experiential dimensions being essential (Fig. 4). Agroecological gardens, community nurseries, and experimental areas observed in Brazil and Colombia cases serve as living laboratories where theoretical concepts are applied, tested, and reassessed through action-reflection-action cycles (Nicholls et al., 2016; Campesina, 2017, Buendía et al., 2023).

The South pedagogy archetype identified here is grounded in the principles of popular education and Paulo Freire's critical pedagogy (Freire, 1970; Giroux, 2011). It relates to agroecological education based on the peasant-to-peasant horizontal method (Freire, 1970), which has been disseminated across Mesoamerica and the Caribbean since the 1970s (Holt-Giménez, 2006), and the political-agroecological training schools that have been central to La Via Campesina member organizations since the 1990s (Martínez-Torres & Rosset, 2014). It values horizontal dialogue and collective knowledge construction in Global South contexts, echoing the findings of McCune and Sánchez (2019) in their study of agroecology education in La Via Campesina.

The Pedagogy operating in the contextual narrative of Resistance, inspired by critical pedagogy and popular education traditions, aim to raise awareness and mobilize community members around an agenda of social and political transformation (Dickmann & Stanqueviski, 2019, Freire, 1970; Rosset & Martínez-Torres, 2012). They emphasize critical analysis of power structures, inequalities, and injustices within conventional food systems, as highlighted in the work of Holt-Giménez and Altieri (2013). As the context where it occurs is related to urban marginalization, inequality tends to be more evident. In this sense, it is relevant to highlight the persistent exclusion and major underrepresentation of black people in spheres of power and influence in Brazil, like the educational field, as their access to education was historically denied and continues to be hindered by social practices and structures such as systemic racism, racial division of labor, and marginalization (Guimarães Reynaldo et al, 2023).

In the Hybrid contextual narrative, the Peasant Schools approach aligns with the concept of 'knowledge dialogues' or 'diálogo de saberes' proposed by Leff (2011), Santos (2007), and Martínez-Torres and Rosset (2014), all emphasizing the co-creation of knowledge through the interaction of academic and traditional wisdom in the reflective and participatory process fostering both practical skills and a deep understanding of agroecological principles.

The findings also highlight the limitations of current formal education approaches and underscore the need for more pluriversal learning systems (Escobar, 2012, Santos, 2007) that support endogenous social learning systems (Bonatti et al, 2024). This necessitates the deconstruction of traditional linear models of knowledge generation inherited from positivist academia, which often tends to ignore the complexity and potential of other ways of learning, for instance, one based on the arts (Fals Borda and Mora-Osejo, 2004; Altieri & Toledo, 2011). The findings of the cases showed complex ways of learning based on entertainment and arts. It is related to the effectiveness of arts-based learning spaces in facilitating agroecological knowledge exchange and exemplifies what Freire (1970) terms "cultural synthesis" – where learning occurs through creative dialogue between different forms of knowledge and expression. These findings resonate with Boal's (1985) concept of "aesthetic spaces" as sites of transformation, where artistic expression becomes a medium for both knowledge transmission and identity formation.

The findings have significant implications for policy development and practical implementation, particularly regarding the diverse pedagogical approaches emerging from South American agroecological communities. These pedagogical systems demonstrate the critical value of diverse knowledge frameworks in addressing sustainability challenges (Chanza and de Wit, 2021) and offer innovative solutions to climate change and complex agricultural problems through the integration of local knowledge systems (Whyte, 2013).

These approaches present opportunities for reverse innovation, where Global South practices could inform and enhance Global North implementations (Govindarajan & Ramamurti, 2011), particularly in European contexts where agroecological approaches often prioritize technical advancement through formal institutions (Giraldo and Rosset 2018). The integration of these pedagogical approaches into academic and research institutions could simultaneously strengthen scientific production while benefiting marginalized rural communities (Díaz et al., 2020).

The study underscores the central role of local narratives in developing sustainable food systems (Nyeleni, 2015; Rosset and Altieri, 2017) and offers valuable insights for emerging participatory initiatives such as Living Labs, which seek context-specific agricultural solutions (Schuurman et al., 2016).

Finally, this study acknowledges limitations that warrant consideration. First, the inherent subjectivity in qualitative analysis and diversity of topics involved in each case may have influenced the interpretation of the pedagogical archetypes identified. The decolonial perspective proposed perceives objectivity in a positioned way, considering that the perceptions of all subjects involved in the research process, including the researchers, are influenced by their social place and are never completely absent, but should be acknowledged to bring situated objectivity and, therefore, more academic honesty to the results and the discussion.

Secondly, the dynamic nature of agroecological education means that these models are likely evolving. The different sizes of the cases also present challenges when making comparisons. Future research should broaden the geographical scope and employ diverse methodological approaches to validate and refine this archetype and discover others. It should also question the appearance of this archetype within excluded populations living in Global North countries, thus improving the generalizability and robustness of the findings.

In terms of positionality, the team of authors presents considerable diversity, with the majority originating from the countries under study and some from the specific areas examined. Five authors are descendants of peasants, including one part-time agroecology farmer, bringing lived experience that enriches our understanding of local agricultural systems in Brazil, Colombia and Peru. This connection to the territories and farming heritages provided insights into the socio-ecological dynamics explored in our research, while our collective diversity of backgrounds enables multiple perspectives that strengthen the analytical framework applied to our findings.

5. Conclusion

This study reflects on the strengths, nuances, and contextual factors shaping three distinct learning processes, offering insights into the effectiveness of diverse pedagogical approaches for agroecology that value the epistemologies of the South. The research recognizes that potential agroecological transitions face challenges from entrenched power structures and the historical erasure of knowledge systems, calling for more than technical adjustments—rather a fundamental revaluing of diverse ways of knowing and being is essential. In this context,

this research responds to the pressing need for a deeper understanding of pluriversal knowledge systems, epistemologies of the South, and learning approaches that have emerged organically within the Latin American context, where agroecological movements have deep and strong roots.

The growth of agroecology, also as an academic discipline, presents both opportunities and challenges. While it validates traditional agricultural practices within Western scientific frameworks, it risks perpetuating colonial knowledge hierarchies if not grounded in decolonial perspectives. Decolonial pedagogies are fundamental for accelerating agroecological transitions. As shown in this study, traditional communities in Colombia and Peru have preserved and evolved their agroecology knowledge systems through generations of collective learning, offering profound insights into sustainable food production that transcend the limitations of Western scientific methodologies. In parallel, decolonial pedagogies in the Brazilian case were essential to promote agroecological transition that started recently in the last decades.

The three contextual narratives that emerged from the South pedagogy archetype are intricate and interconnected, defying simplistic categorization. This study shows how the South pedagogy archetype serves as a model of resistance to poverty and social exclusion through agroecology. As research understanding deepens, there is a pressing need to explore Indigenous pedagogies to unveil additional valuable approaches to learning that lead to more inclusive educational models that resonate with diverse learners and address complex global challenges.

By showcasing the rich knowledge systems and alternative learning structures present in these three cases, this research provides valuable insights for policymakers, educators, and practitioners. These findings can inform the co-creation of strategies that nurture agroecological systems and transitions, embrace the growing diversity of agroecology approaches, and navigate the complexities inherent in designing learning processes that value multiple ways of being.

6. Declaration of generative AI in scientific writing

AI-assisted technologies (Deepl.com) were used in the writing process to only improve the readability and language of the manuscript.

CRediT authorship contribution statement

Michelle Bonatti: Writing – original draft, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Renata Guimarães Reynaldo:** Writing – original draft, Investigation, Conceptualization. **Berta Martín-López:** Writing – original draft, Methodology, Data curation. **Sergio Bolivar:** Formal analysis. **María Cordero-Fernández:** Investigation, Data curation, Writing – original draft, Methodology. **Giovanna Chavez Miguel:** Methodology, Investigation, Data curation. **Adriana Martin:** Validation, Investigation. **Janika Hämmerle:** Visualization, Validation, Investigation, Data curation. **Barbara Schröter:** Writing – original draft, Methodology, Investigation. **Carla Erismann:** Writing – original draft, Data curation. **Teresa da Silva Rosa:** Writing – original draft. **Jon Hellin:** Writing – original draft, Conceptualization. **Izabella Schlindwein:** Writing – original draft, Validation. **Álvaro Acevedo Osorio:** Conceptualization. **Leonardo Medina:** Validation, Writing – review & editing, Conceptualization. **Carla Baldivieso:** Writing – original draft. **Luca Eufemia:** Writing – original draft, Conceptualization. **Johanna Jacobi:** Writing – original draft. **Ana Maria Lobo Guerrero:** Writing – original draft. **Stefan Sieber:** Writing – original draft.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

The project “Safeguarding Overlooked Ecosystems: Protect, Manage and Restore Grasslands and Savannahs in Argentina, Colombia and Paraguay” is funded by the International Climate Initiative (IKI) on behalf of the Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV).

The cooperation of the Peru, Brazil and Colombia communities, who openly shared their stories and struggles with us, was crucial for the development of this research.

Part of research is part of the SULCOM project (Socioecological innovations of communities in the Global South). We thank Cepagro (Centro de Estudos e Promoção da Agricultura de Grupo), Comcap (Companhia Melhoramento da Capital) and Rede Compostagem, for their willingness to share and develop knowledge.

Availability of data and material (data transparency)

The collected data and interviews transcription underlying this research are confidential and, thus, not available in open access data sharing platforms.

Consent

All participants have provided appropriate informed consent.

Data availability

The data that has been used is confidential.

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