



Agroecological education for food sovereignty: Insights from formal and non-formal spheres in Brazil and Spain

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ABSTRACT

In a context of re-definition of what is Agroecology, we reflect on the characteristics of an agroecological education for food sovereignty (AEFS). To do this, we analyse four courses self-claiming to have a food sovereignty focus in the formal and non-formal spheres in Brazil and Spain by answering three questions: “from where” (motivations and actors promoting it), “who” (teachers, students), and “how” (pedagogies). We describe the commonalities and differences among them and show that in developing AEFS, the most important question is the from where. However, important differences may exist between the formal and non-formal spheres, mostly in the who and the how. AEFS in the classroom is based on *diálogo de saberes*, participatory methodologies and dynamics with a rotational focus (*alternancia*) on learning from the dialectic between theory and practice and reflection and action. Furthermore, the emotional and organizational spaces are as important as the “official” content of the course. We conclude that despite existing barriers to follow some of pedagogical tools in the formal sphere, it is possible to develop AEFS with a focus on transformative education.

1. Introduction

Agroecology has been defined as the “the science of applying ecological concepts and principles to the design and management of sustainable food systems” (Glieman, 2007). Agroecology has been coined as a science, a practice and a movement (Wezel et al., 2009) in order to explain the interdependencies of knowledge, politics and practice fundamental to a holistic ecological approach to food systems (Francis, 2003). However, this definition is often misunderstood as a science (the knowledge of agri-food systems from farm to food, including social and natural sciences), practice (the management of agri-food systems) or social movement (the politics of agri-food systems) and thus, actors mobilize to defend their political positions around agroecology (Loconto and Foulleux, 2019). As a result, agroecology has different meanings for different actors depending on the emphasis given to the different functions of agriculture and its transformative potential resulting in different “agroecologies” (Méndez et al., 2013). Thus, under the framework of agroecology, several narratives currently coexist in a process of redefining what is agroecology (Giraldo and Rosset 2018;

Rivera-Ferre, 2018): agroecology that transforms or conforms the food system (Levidow et al., 2014), reformist and radical agroecology (Holt-Giménez and Altieri 2013), strong and weak agroecology (López-i-Gelats et al., 2016). Reformist agroecology tends to focus mostly on the technical dimension of agroecology while transformative agroecology is grounded in transdisciplinarity, participation, and transformative action (Mendez et al., 2013; Sevilla and Woodgate, 2013) contributing to food sovereignty. Here, food sovereignty and agroecology promote the radicalisation of democracy throughout the food system and the bottom-up establishment of local or community institutions aiming to the emancipation of marginalized actors (Constance et al., 2014; Calle-Collado et al., 2011).

Because agroecology is in itself a proposal with different meanings for different actors, it is not clear what would be the main characteristics of an agroecological education for food sovereignty (AEFS) in different contexts. From the standpoint of an educational model, particularly within universities, the process of redefining agroecology is paralleled by disputes about different educational philosophies and practices. Each of these philosophies are characterized by a distinctive understanding of

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educational and training processes, some more political while other agroecological training has a more technical emphasis which does not question the current organization of the food system. Here, education and production are technically oriented towards replacing chemical inputs or integrated production, or is based on organic certification systems according to commodity-based logic with state support (for critique, see Sevilla-Guzmán 2005 and Martínez-Torres and Rosset 2014). In this line, we may find educational practices which reproduce patterns of what Freire (1997) calls a “banking model” (Avalos, 2019), as opposed to an “emancipatory model” (Meek and Tarlau 2016). The banking model assumes developmental perspectives and food production strategies oriented towards conventional economies such as “green markets” in globalised agri-food systems (Ploeg 2009). As such, agroecological practices rather than transform they further entrench the corporate environmental food regime (Friedmann 2005). For example, proposals such as ecological intensification and climate smart agriculture recognise in agroecology a set of efficient and intensive practices for the management of natural resources, but are disconnected from its social context, exporting a view centred on practices and technologies, without acknowledging or valuing the people possessing the knowledge related to these practices (Rosset et al., 2011; Pimbert 2015; Lampkin et al., 2015). This view reinforces the “waste of experience”, characteristic of the colonising nature inherent in modernity (Sousa Santos, 2009): the practices and the voices of those who produce food, hardly matter when it comes to rebuilding food systems. As such, the educational practices used in agronomic fields, especially in the university, are not disconnected from these “modernising” dynamics. As Víctor Toledo (2005) states, *“the researchers trained in the academic classrooms of modern science were taught to understand the techniques, to inventory the species used, and to discover the production, energy and supply systems through which humans appropriate nature. We were rarely taught to recognise the existence of experience, of certain wisdom, in the minds of the millions of men and women who work day after day with nature precisely using these techniques, these species and these systems, and in modes that we can qualify together as pre-industrial”*.

Given the challenges that food systems face globally, agroecological education is growing. In the non-formal sphere there is a well rooted number of agroecology programs which cover various educational fields (e.g., McCune et al., 2014; La Via Campesina, 2017; McCune and Sánchez, 2019; Meek et al., 2019; Anderson et al., 2019a). In the formal sector there are also numerous agroecology programs. Christophe and Bell (2018) stated that in the last 20 years over a hundred colleges and universities around the world have begun agroecological educational programs, particularly in Europe (e.g. Lund et al., 2014; Migliorini et al., 2018; Wezel et al., 2018; López-García et al., 2019) and Latin America (e.g. Jacob, 2016; León-Sicard et al., 2017; Sarandon and Marasas, 2017; Intriago et al., 2017), while in North America there is more tradition for sustainable food systems (SFS) programs (Valley et al., 2020; Ebel et al., 2020). However, in the formal context, these programs tend to dilute the transformative potential. They rarely make explicit their focus on political aspects, such as equity (Valley et al., 2020) or food sovereignty, even if implicitly they have such focus. For this reason, most academic work of definition of critical food systems education, including AEFS, relies on non-formal education schemes to understand the principles guiding such education options. Yet, it is in the formal sector, within a neoliberal context, where most of the dispute around agroecology is being pursued (Classens et al., 2020). Christophe and Bell (2018) summarised the state of agroecological education, but did not discuss what are the characteristics of an agroecological education for a transformative agroecology in line of what we call AEFS. Considering the fuzzy context in which different agroecological education programs perform, this article aims to contribute to the ongoing discussions about critical adult education in food systems (Anderson et al., 2019a) and underline which are the main characteristics of an AEFS. We achieve this objective through the analysis of four case studies, i.e., four educational programmes in Agroecology in informal (farmer action school) and

formal (university) settings in Brazil and Spain. Based on the results, we discuss some of the barriers found to developing an AEFS in the formal context.

2. Theoretical frameworks and background

The socio-environmental roots of agroecology require that this academic and practical field goes beyond a set of techniques, or even an academic and research arena that tends to expand the agronomic basis of productive systems with the inclusion of certain commercial, cultural or ecosystemic considerations (Sevilla-Guzmán 2005, 2006). The emancipatory education model in which AEFS is inserted is based on a strong critique of current development paradigm and more in line with a post-development perspective (Demaria and Kothari, 2017), adding a social and political content to the curricula. In this way, it seeks to transform situations and institutions by “uncovering” the necessary knowledge for a (social) agroecological transition and by promoting dynamics of social cooperation within economies tied to the territories (Sevilla Guzmán 2006; González and Toledo 2014). AEFS relies on critical food systems education (CFSE) and popular education to advance food sovereignty (Meek and Tarlau, 2016).

CFSE framework, based on grassroots movements pedagogies, builds on four pillars: agroecology, food sovereignty, food justice and critical pedagogy. In that form, CFSE supports a vision that *“advances radical agroecological education programs that train students to be political subjects capable of creating a socially and environmentally equitable food system”* (Meek et al., 2019). Through critical pedagogy, CFSE aims at exposing, challenging, and transforming existing systems of power in ways determined by those most marginalized by those systems (Classens et al., 2020). Thus, education for emancipation essentially consists of a process of revealing the socially constructed reality and developing collective paths toward social emancipation from a variety of situations and identities. In this regard, Caldart (2003), drawing on the experience of the “Movimento dos Trabalhadores Rurais Sem Terra” (MST, Landless Rural Workers Movement), establishes five basic objectives for its Field Education programmes: promotion of food sovereignty, land reform, democratization of land use, establishment of a new technology and power paradigm, and establishment of a productive logic based on cooperation. La Via Campesina (LVC) extends its lessons from creating various “Agroecology Institutes in Latin America” (IALA in its Spanish acronym). In these centres, education starts from philosophical principles such as: *Education based on, and for, social transformation; Education based on, and for, diversity; Education based on, and for, work and cooperation; Education based on, and for, rebellion*. According to LVC, these principles should be tied to the logical bases for a popular education and a radical agroecology, such as the dialogical relationship between action-reflection-action, the dialogue between ways of knowing from a diversity of perspectives and participatory-action-research (PAR). The objective is the critical and emancipatory construction of Food Sovereignty. As Calle-Collado et al. (2013) expressed, proposals on AEFS need to be forged directly from training experiences with a strong sense of methodological innovation based on critical pedagogies and a political agroecology analysis of food systems that integrates the critiques of the power relations existing in agrifood systems. This analysis must address the critique of how knowledge is produced and which model of education allows for a real transformation of food systems. In AEFS it is also very relevant to consider from where emancipatory actions will emerge. Foucault (1971), like Freire, argues that it is from below, from the “invisible” individuals of our society, where it is possible for a counter-power to emerge: knowledge is only possible at “the margins”, it can only occur “where power relations are suspended”. Inspired by Gramsci, Freire (1996) will rescue the popular sense of the subaltern classes as a means and as an end to build other ways of understanding reality and building alternatives within the framework of the class struggle and the dialectical perspective between the oppressed and the oppressors. In practice, that means that in building AEFS we need to

consider not only the *how* (the curricula and associated pedagogical methodologies), but also *from where* those programs are built and *who* participate.

3. Methodology

In order to identify common principles of AEFS in different contexts as well as limiting factors to it, we use as case studies four courses in Brazil and Spain that self-claimed to aiming to contribute to food sovereignty through agroecological education, both in formal and non-formal settings. To perform the analysis authors had three in-person meetings and two online to decide which courses would be analysed and develop the analysis criteria. We initially considered eight courses with a broad selection criterion (agroecology courses). Finally, we agreed to analyse only those having an explicit focus on food sovereignty (AEFS) in which at least one of the co-authors had had active participation as lecturer and had contributed to developing the education program. We ended up selecting four courses: two in the formal context and two in the non-formal context. To analyse the courses in a systematic way and to facilitate later comparisons and extraction of common trends among the courses, we agreed to build our analytical framework through guiding questions. In our initial literature review we observed that most research in critical food systems education and AEFS paid attention to the “how”, that is, what’s the formal curricula content and the methodologies used. But as the theoretical section highlights, in analysing AEFS it is equally important to explore the *who* and particularly, *from where*. Thus, our guiding questions were: *from where* (how did the programs start and by whom), *who* (who participates both as lecturers and students) and *how* (what is the pedagogic vision and which tools are used). We also reflected on the barriers and limitations found to develop the courses in the different contexts (Table 1). Tasks were also assigned: Every author was in charge of describing one course. After the first writing, we shared the texts in order to homogenise the content, avoid inconsistencies, and fill the things that were missing in some courses. Later discussions were focused on the questions raised (from where, who, how).

For the selection of the case studies we also consider the specificities of agroecological education in Brazil and Spain, that make them

particularly relevant in the AEFS discussions. Inspired by Freire’s work, Brazil has a long history of popular education, which is central in agroecological training to create horizontal, problem-posing educational processes committed to systemic social change led by the historically oppressed people (McCune et al., 2014). In this context, the MST training programs have been an inspiration for many of the peasant movement agroecological programs that emerged during the 2000s, as the IALA (McCune et al., 2014). Spain is also a particular case because agroecology in Europe emerged first in that country. In the late 80s, in Andalusia (in the South of Spain) the rural worker’s movement coincided and interacted with the environmentalist movement and a group of social scientists creating the Institute of Sociology and Peasant Studies (González de Molina and Guzmán, 2017). Its particular cultural context and historical and close connections with Latin America, makes Spain a privileged actor in this context.

4. The context of agroecological education in Brazil and Spain

Before describing the four agroecological courses analysed in this article, we first illustrate the context of agroecological education in Brazil and Spain.

4.1. Brazilian context

Brazil is probably the country with the highest number of agroecological training programs in the world. Most agroecology courses arose after the creation of the National Technical Assistance and Rural Extension Policy in 2003. These agroecology courses are at high school level, vocational training, undergraduate and graduate levels, and respond to the demand for professionals to work in a family agriculture context (Stamato 2012). The creation of the higher education courses in agroecology occurred after 2008, with the creation and expansion of the Federal Network of Education, Science and Technology and the creation of the Federal Institutes (Gomes, 2014). According to Balla and Massukado (2016), there are currently about 33 courses in agroecology, 27 of which are vocational (82%) and 6 are bachelor degrees (18%), in total offering approximately 1700 places annually. Of the institutions offering these courses, 7 are federal institutions; 9 are public universities and 15

Table 1
Analysis of agroecological education initiatives in the formal and non-formal sphere in Brazil and Spain: the *from where*, the *who* and the *how*.

From where	Promotors	Non-formal			Formal	
		MST (B)	MSc Agroecology (ES)	FSv & Emergent Agroecology (ES)	Peasant’s action school (ES)	
		MST, students’ movement	Researchers with a PAR approach	Researchers with a PAR approach	FSv networks and farmer’s union	
	Problem to solve	Support to MST workers and settled families	Lack of critical education in formal institutions	Lack of critical education in formal institutions	Lack of food sovereignty training in agrarian unions	
Who	Lectures	MST rural workers	Radical & reformist scholars	Radical scholars	Radical scholars, peasants	
	Students	university activists, settled rural workers	Critical & activists university students	Young students	Young peasants members of agrarian unions	
How	Vision of Development	Post-development, decolonial	Post-development	Post-development	Post-development	
	Curricula content	Social, technical, humanism political	Social, technical, political	Social, political	Political	
	Scientific & knowledge approach	Diálogo de Saberes: farmer-technical-social	Transdisciplinarity, PAR, Complex Science	PAR	Diálogo de Saberes: farmer-technical-social	
	Transfer of knowledge	Co-generation, empowerment	Knowledge exchange	Accompaniment, empowerment	Co-generation, empowerment	
	Teaching goals	political, technical	Political, technical	Political, accompaniment	Political	
	Pedagogy (inside the classroom)	Diálogo de saberes	Master class, some dialogue & group classes	collective on-line tools (forum, wiki), decentralized group work	Pedagogical trio, group work	
	Pedagogy (outside the classroom)	Organisational processes, mystic, cultural	Hidden CV, students assembly	N/A	Organisational processes, mystic	
	Alternancia	YES	NO	YES	YES	
	Emotional space	YES	Hidden CV, student’s self-organised space	NO	YES	
Organization space	YES	NO	YES	YES		

ES: Spain; B: Brazil, FSv: food sovereignty; N/A: not applicable; PAR: participatory action research; MST: Landless Rural Movement; UFRRJ: Federal Rural University of Río de Janeiro.

are private colleges or universities. *Stricto sensu* there are 9 graduate programmes: 1 doctorate, 6 academic masters and 2 professional masters (Gomes 2014).

Regarding non-formal education, the most important experience is the MST schools. The MST was born in 1984, as a movement of landless workers that nowadays is a member of LVC. The focus of their struggle is rooted in agrarian reform, culture, combating sexual violence, democratization of communication, public health, ethnic diversity, political systems and national and popular sovereignty. Concern for education has always played a central role in the movement. Popular education is one of the pillars of the MST since it was born and the pedagogical approach has remained open to various methods and referents such as Paulo Freire, José Martí and Antón Makarenko. The objective of the pedagogical approach has been to respond to the needs of the MST settlements in a contextualized manner (Harnecker, 2002). MST's education can follow two directions: non-formal within the MST settlements (*asentamientos*) and formal courses in more than 60 technical and higher education institutions through partnership with formal education institutions (Roseno, 2014). In both cases the intention is to form political subjects that can build their own story, based on the principle of *“alternancia”* to favour the study and transformation of the reality where students live. The scope of the MST's own pedagogical proposal, in line with its demands for agrarian reform, peasant rights and agroecology, has been relevant both qualitatively and quantitatively, as well as its contributions in the construction of a pedagogy for a critical and participatory rural education (Harnecker, 2002).

Another initiative that speaks to the principles and concepts in agroecology is the Field Education Degree. The courses in this degree provide opportunities to work in a grounded way within the territories due to their pedagogical action methodology, which result from the struggles and construction of social movements. They are offered in universities with the participation of rural social movements. Gomes (2014) described about 65° courses in “Field Education and Pedagogy of the Land”. According to Souza (2015), these courses already construct a problematizing, reflective and transformative education focused on agroecology, sustained on the principle of work, in its ontological sense, and on a research perspective which prompts curiosity and understanding of the world, the relationships established between people and nature over the territories as an educational principle.

4.2. Spanish context

In Spain, within the formal education there are different training spaces around agroecology: (i) university master's degrees; (ii) university specialisation courses; (iii) professorships without formal instruction which, however, generate training on agroecology and food sovereignty; and (iv) non-university vocational training in agroecology throughout the territory (see CENEAM 2018). In the non-formal education domain, agroecology training spaces are offered by NGOs and farmers' unions, sometimes with joint contents designed by both actors, and others independently.

The official postgraduate training options are concentrated in three master's degrees linked to the concept of organic farming and two more that include the word *agroecology* in their titles. Master's degrees in organic farming are presented as specialised training in technical issues with a broad view of organic farming but with emphasis on the eco-productive dimension at the farm-scale. Of these three master's degrees, the oldest (starting in 1999) arises from the organic sector association movement (Vida Sana) and is coordinated with the University of Barcelona (UB) and the Spanish Society of Organic Agriculture (SEAE in Spanish): it tries to give a professional response to the needs concerning technical assistance, certification and marketing within the organic sector. The MSc in “Organic Agriculture” of the Universidad Autónoma de Madrid (starting in 2016) is also focused on research linked to the eco-productive dimension at the farm-level. The MSc in “Organic agriculture, livestock and forestry” offered by Universidad Internacional de

Andalucía (UNIA) and Pablo de Olavide University (UPO), created in 2011, is based on an agroecological perspective, but focused on technical training oriented to problem solving on the farm.

Concerning the MSc in “Agroecology, Rural Development and Agrotourism”, at the Miguel Hernández University of Elche, created in 2009, is oriented towards generalist approaches related to rural development and agrotourism, on the basis of sustainable development positions only slightly geared toward agrarian production. The MSc “Agroecology: an approach for rural sustainability” developed by the XXX (University of XXX) addresses the three dimensions of agroecology and works on dialectics between ecological-productive and political-social issues, and a more orthodox view of science and approaches to “science with people”.

The university specialisation courses emerge from a sector of activist agroecological research which is closely integrated with national social movements for agroecology and food sovereignty. Courses in food sovereignty and agroecology in UNIA, the Hegea Institute for International Cooperation and Development Studies, and the diploma in local agroecological dynamisation in Universitat Autònoma de Barcelona are noteworthy. In these courses, there is a broad view of agroecology, from perspectives that are critical of the current development model and with emphasis on local and global socio-political processes. These courses are oriented toward PAR training for agroecological transition processes at different scales. They lack training in the eco-productive dimension.

Non-formal education initiatives arise from the militant research and activism sector, particularly linked to NGOs along with part of the peasant movement. Examples include courses by the farmers' union EHNE, “Ecologistas en Acción” and the Centre of Rural Studies and International Agriculture (CERAI).¹ Finally, another non-formal autonomous training space is the Peasant Action School generated by the “peasantist” movement (i.e., those actors from the farmer's unionism and activist and militant research supporting the construction of a political subject to defend food sovereignty based on agroecology and peasant agriculture). This school aims at training young leaders in farmers' unions as a way to promote and strengthen agroecological discourse, practice and critique of globalised food systems within their local and national structures.

5. Agroecological education for food sovereignty in Brazil and Spain

5.1. Non-formal sphere

5.1.1. MST training experience of the production, cooperation and environmental sector (Brazil)

From where: The training experience of the production, cooperation and environmental sector of the MST started in 1997. Among the work objectives set out by the production, cooperation and environment sector of MST together with the national leadership of the MST, priority is given to the need to influence the political-ideological and technical training of the movement's social base. Also, priority is given to the constitution of new organisational experiences in the settlements, as well as encouraging cooperation in the production phase of inputs related to agroecological values and approaches (Ortíz, 2015). Members of the MST, who where part of the MST training cooperation and environment section, enrolled at the Agronomy bachelor of the Federal Rural University of Rio de Janeiro. These students brought together other

¹ See <https://www.ecologistasenaccion.org/>, <https://cerai.org/>.

students linked to the Federation of Brazilian Agricultural Students movement (FEAB).² Their purpose was to train a group of activist students on the topics of agrarian reform and agroecology so that they support the MST by facilitating trainings in the encampments and settlements of the state of Rio de Janeiro as part of the training, cooperation and environment section of the organization. - As a result, they created a training course on agroecology for the settlements (Table 1).

Who: The professors were activist students from agronomy, forest engineering, animal husbandry and veterinary sciences, and formed part of both the student's movement as well as the MST. Some had research or extension grants, though not connected with that particular experience, which was not institutionally recognised, a fact which limited the time available to take action in this course. The team members shared principles and values that helped to forge bonds.

The students were the rural workers, men and women, typically between 20 and 50 years old, who lived in the occupied land, some of whom had fought for over seven years to gain access to the land. The level of formal education varied, there were individuals who did not know how to read or write, as well as people with high school degrees. With the course, they sought to reach a greater understanding of the processes experienced during their life of struggle and also to discover new forms of working the land which involved greater autonomy, better health, food sovereignty and quality of life both for themselves and for others. One particular aspect concerning Rio de Janeiro is that the farmers come from different regions of Brazil and bring with them seeds and agricultural knowledge from their own places of origin, which are not always suitable for the new biome. With the course, it was possible to work on those particular aspects with the families.

How: The pedagogical contents and dynamics were developed based on the reflections arising from both the MST and the student movement, which at the time was connected to the Brazilian Federation of Agronomy Students, the academic centre and the permanent working group on agroecology. The organic agriculture group also took part in this process. In this context, the debates that linked these groups together, which met to learn about agroecology and social movements, gained strength and different topics were developed to be discussed on the agroecology course in the settlements. This course had a holistic focus and dealt both with the reflection on socio-political and economic aspects, oriented principally toward questions concerning agrarian reform, as well as the need for a new technical/productive paradigm, centralising agroecology as the core principle. In general, the course had a clear critique of development and colonial thinking. The meetings thus focused on the exchange of knowledge between students and farmers. Members from the education sector who supported the pedagogic development of the course also participated.

The pedagogical dynamic of the course was focused on the *diálogo de saberes* among participants, collective knowledge building, valorization of local and traditional knowledge and of the reality experienced by the participants. The training sessions started with a presentation of the day's topic, followed by debates in working groups and subsequent socialisation concerning the topic. Later, hands-on exercises were carried out concerning the topic addressed or practical exercises in the cultivated plots. In the subsequent class, learning from the results obtained with the agroecological practices that had been implemented were shared.

The courses were conducted and developed in the communities themselves. Group spaces were created where the theoretical part was conducted, as well as the organisational meetings of the different areas.

² FEAB brings together Agronomy university students from all around Brazil. Since the 90s is part of LVC. Its objective is to promote reflections around the professional training and the production of food in Brazil. With other social movements, they promote debates and training actions that problematize the hegemonic industrialised food system that it is still taught in Brazilian universities.

The practical courses took place in the gardens of the settlers. The goal was to train individuals in order to improve their activist practices both in the discourse about the necessity to change the current development paradigm as well as in practices for improving health, guaranteeing the food security and sovereignty, and agroecological production practices. As such, the subjects were: *History of the Struggle for the Land, History of Agriculture, the Green and Agrobusiness Revolution, the Right to the Land, Genetically Modified Crops, Food Security and Sovereignty, Ecological Soil Management, the Agriculture Calendar, the Production of Organic Compost, Ecological Insect Management, Nursery Plant and Seed Production, the Use and Cultivation of Medicinal Plants* and so forth. The courses were generally held on the weekends, in 4–8 h blocks. As the course was informal, there was no need to fulfil a specific workload. The course was conducted based on the communities' needs.

Concerning the organization, the MST has its own organisational structure and the course followed the same. Every person was responsible for at least one activity related to the maintenance and organizational activities of the course, the times, the food, the organization of materials for practical work, cooking, and so on. The tasks were distributed among the participants, always aiming to have both men and women in each and every task. This also shows the importance given in the course to the educational and organisational processes for life in community. During the course, the *mística*³ and spiritual and cultural aspects were also important, through music and poetry.

5.1.2. Peasant's action school (Spain)

From where: The Peasant's Action School (EAC in Spanish acronym) emerged as a project of the Spanish food sovereignty organizations with the objective of reinforcing the movement and responding to a Nyeleni mandate of the international food sovereignty movement (Nyeleni, 2007, <https://viacampesina.org/en/declaration-of-nyeli/>). At the same time, the idea of political training spaces in rural areas addressed to farmers has roots in Spain in the historic processes of the Peasant Schools and Rural Family Schools, as well as from the Paulo Freire Rural Universities' effort to generate a training space for rural areas.

The EAC is consolidated as a space of political expression that emerged from different social and agrarian organizations belonging to the Spanish food sovereignty movement (Gallar-Hernández, 2021); a political consortium that provides resources and takes decisions on this project, made up of two agrarian organizations from LVC (COAG, EHNE, three NGOs (Mundubat, Friends of the Earth Spain, Justicia Alimentaria), the Collectives of Action in Solidarity, the Sociology Institute of Peasant Studies (ISEC in Spanish acronym) and Paulo Freire Rural Universities. From this consortium, a political training program was consolidated whose basic and primary objective is the strengthening of agrarian and peasant organizations for food sovereignty in Spain. This goal comes from the recognition of a generational replacement problem within these organizations and the lack of reflection spaces among their future professional staff. It has a Freirian pedagogic base that includes and strengthens the political union training of these agrarian organizations (Table 1).

Who: The team of lecturers is made up of technical experts or academics deeply involved in the Spanish food sovereignty movement; there are two coordinators that serve as intermediaries with the political

³ *Mística* refers to an spiritual ceremony that represent emotions and actions around food sovereignty. They normally open or close an event. As Daniela Issa (2007) states: The *mística* of the MST "is generally interpreted as love for a cause, solidarity experienced in collectivity, and belief in change. Not only an emotional element, however, it is a praxis of pedagogy and culture developed by the movement to construct its collective identity and preserve its cultural roots against the homogenization of globalization. Art and symbolism are used in practices that not only educate but empower by example and reflect the collective memory of the Landless. The movement incorporates these practices into its struggles, keeping the inspiration alive without institutionalizing the *mística*."

consortium and 7 lecturers (4 women and 3 men) that prepare materials and exercises for each of the formal themes and accompany the students in the development of the Peasant Action Plan (explained in the how).

Students are selected by local unions and generally meet three conditions: 1) they are young (usually under 30 years of age); 2) they are farmers; and 3) they form part of, or are close to, a local farmer's union. A fourth criteria was gender parity, but the local unions claim they were unable to find more than 3–5 women per course. In the time of the four completed courses some 15–18 youth have been trained, and over half of the alumni had taken on positions of responsibility within their local unions (Table 1).

How: The pedagogical dynamic of the course is based on what is called the “pedagogical trio” and the exploration of the “Peasant Action Plan”. The pedagogical trio is composed by one student, one union representative and one lecturer (acting as individual tutor or facilitator). This figure avoids the isolated relation of the pupil and the lecturer to go further from a Freirian educational perspective of conscientization and, in this particular case, is directed to involve and reply to the needs of the union organization itself. Thus, the union representative chooses a student to attend the EAC and defines the task the student will look at during the training process to strengthen the organization, and at the same time the tutor is present to facilitate and provide tools for this process. This process materializes in the Peasant Action Plan: the task that the organization assigns to the student, for example, the revitalization of the youth sector of the organization, the revitalization of the women's sector, the revitalization of generational replacement of executive positions, etc.

The program is made of four in-person classes over the weekend where attendees work with the training modules, visit local activities, get to know local union organizations and one of the organizations that belongs to the EAC consortium, meet two local social union leaders and explore the Peasant Action Plan. The contents to explore in the EAC are defined as: *Food in the sociopolitical context, Tools and methodologies in popular education, the Peasant proposal, Exploration of agrarian history and its social movements, the Peasant feminist proposal, Actors and social dynamics in rural areas*. These are pedagogical contents aimed for the discussion on productive models and their relation to food sovereignty and also to the creation of new political cultures that are more participatory and horizontal within the organizations (Gallar-Hernández, 2021).

During the in-person meetings, work is participatory and the student is placed at the centre of discussions. At the same time, tutors try to facilitate and accompany the processes requested by the local union outside of these meetings. The tutor meetings are given along with on-site visits and through Skype and telephone calls both with the student and with the contact for the local union. This process of in-person meetings with more formal contents along with implementation periods of the Peasant Action Plan in the area create an *alternacia* that tries to reinforce the political application of the contents to FSv in each organization and territory.

During the meetings, debates and tensions arise around topics based on their daily-life experience and thus, each meeting and the consolidation of the students group involves an emotional effort managed through participatory dynamics and in informal spaces as part of the structure of the program: dinners where each participant brings food from their area or produced by themselves; open discussion about a topic linked to the contents of the EAC; facilitation student's exchange of experiences in informal spaces outside the program; shared trips taken by tutors and students (the “travelling classroom”), etc.

During the in-person meetings, students have to assume responsibility in the organization through different roles: logistic, *mística*, methodology, feminism. In this way, students cover all the roles in each meeting and each student fills each role during the four meetings that take place during the EAC course.

5.2. Formal sphere

5.2.1. MSc agroecology: an approach for rural sustainability (Spain)

From where: The MSc in Agroecology was initiated in 1996 within the Agronomy faculty and under the umbrella of the Sociology Institute of Peasant Studies (ISEC) in the University of XXXX. It was the result of the personal commitment of the professor Eduardo Sevilla Guzmán. ISEC had its origin back in the 70s, after an international academic meeting around Peasant Studies in which different researchers (Shanin, Galeski, Redfield, Martínez Alier, Worsley, among others) participated in order to find new pathways for a new rural sociology (Galeski, 1978). As part of the context facilitating the creation of ISEC, in XXXX there was a political and intellectual support to the Andalusian union of rural workers “Sindicato de Obreros del Campo (SOC)”. At the same time a connection process with the Latin American peasantry occurred, especially with CLOC, one seed of La Vía Campesina. The MSc in Agroecology collected the effort to integrate a political and sociological dimension within an Agronomy school, but also to accompany processes of productive autonomy and to find alternative marketing forms and spaces. Thus, the MSc had an integral vision of agroecology covering all three of its dimensions (techno-productive, socio-político-cultural, socio-economic), including the role of peasants in the management of natural resources as a political subject and in general how to favour rural endogenous development through participatory methodologies and facilitation of *diálogo de saberes*. The focus of the MSc was Chayanov's work (Chayanov, 1986) and a marxist heterodox perspective in dialogue with peasant and indigenous knowledge. Such focus has been maintained throughout the time, expanding to a food system approach and the territory, but maintaining an interdisciplinary profile, giving importance to new scientific thoughts, and using participatory methodologies oriented to transform local societies (Table 1).

Who: The group of lecturers is composed mainly of scholars with specialisation in different disciplines. Lecturers also have different levels of involvement and articulation with social movements or local and global agroecological processes. Some are more oriented to research from “outside” of the processes and social movements, while others are implicated in PAR inside local agroecological processes.

The students' profile has changed over the years. Initially students came primarily from Latin America and had a lot of practical experience in extension, research or teaching (with a technical focus but oriented towards agroecological transitions from a community or political perspective). There were also members of social movements, especially from Brazil. In the last 6 years, this profile has changed. Half of the students are Spanish or European, and in all cases, they are much younger (less than 30 years old). In terms of their discipline background, most of them have an agronomic, forest or environmental profile, although sociology, biology and anthropology are also frequent. They all search for an interdisciplinary formation to complement their background. Most of the students have some involvement in Agroecology and social movements (Table 1).

How: The objectives and content of the course are oriented towards a holistic vision of agroecology in which there exist a dialogue among social and natural sciences, conventional and complex sciences, public policies and social movements, and a critic to capitalist development. The program has a strong focus on theoretical and technical knowledges, but sometimes far away from the every-day life which lacks a political and situated vision of the challenges of agroecological transition for food sovereignty. The subjects cover the three dimension of agroecology: techno-productive (*Ecological bases of agroecology, Agronomic bases of agroecology, Agroecological methods II; Design and evaluation of sustainable systems; Sociocultural and ecological biodiversity; Agroecological transition, Sustainable management of Mediterranean agro-ecosystems*); socio-economic (*Ecological economics, Sustainable agri-food systems, Sustainable rural development, Agroecological rural extension*) and political and cultural (*Social basis of agroecology, Agroecological methods I, Political ecology, Public policies, Gender and agroecology, Political agroecology*).

Local and global debates are picked up through the lecturers' experiences and conversations with students.

The pedagogical dynamics include unidirectional master classes and participatory classes based on dialogue and group-work. According to the course evaluation, students most value classes with dialogue, with practical examples, with group-work, and that consider the knowledge of students. This is not always fulfilled. Furthermore, the MSc offers visits to projects and territories linked to the subjects' content, covering both technical and social issues, although not always in an integrated manner. During the course, there are a few invited guests coming from food sovereignty organizations, mainly represented by those professors participating in social movements or food sovereignty groups at the local, national or international level.

The course has no practicum, but the students are invited to prepare the final master thesis (TFM) by mutual agreement with agroecological projects or in territories where existing demands were already detected.

Outside the formal content, there are different strategies to promote participation. The spatial structure in the classroom is circle-shape; a general student assembly is created at the beginning of the course to favour autonomous self-organization (to coordinate and propose activities within the group, to contact agroecological producers for food provisioning, to contact producers to propose autonomous field visits, and to represent the group in front of other institutional actors within the university). The consolidation of a students' self-managed space is an essential part of the course promoted by the professors and at the same time is a challenge in terms of emotional management of the group, given the intensity of the 13 weeks of the in-person part of the course (morning and afternoon classes) in a closed space full of exchanges, vital experiences, etc. In this space, there is a growing adoption of a feminist and care perspective in which they analyse and share the transformation of patriarchal attitudes. This space, which is part of the educational environment, is known by the lecturers involved as the "hidden curricula".

5.2.2. University expert in food sovereignty and Emerging Agroecology (Spain)

From where: This course arose from the academic network of past ISEC graduates with the objective of strengthening theoretical and practical learning and support the training of activist researchers willing to accompany agroecological and food sovereignty processes in the different locations where the in-person part of the course was developed (branches of the course) (Table 1). Despite it being bureaucratically associated to Spain, five universities organized the course: the National University of Rosario (Argentina); the university center of agroecology – AGRUCO – of the University of San Simón (Bolivia); the State University of Campinas and researchers from the NGO Giramundo (Brazil); the ISEC along with researchers from networks for food sovereignty in Catalunya (Spain); and finally, the Network of Sustainable Agricultural Alternatives (RASA) and the University of Veracruz (Mexico). This course, after two years of planning and design, had three editions: 2011, 2012 and 2014. The course required too much effort and the oppressive and stressful pressures of academia for a course which is not considered as part of the formal time of the implicated lecturers made its continuation complicated.

Who: Lecturers designed and started the course, developed the different materials and documents for the students and were in charge of energising the virtual learning process through the *moodle* on-line tool. Thus, they were activist scholars linked to food sovereignty organizations in Spain, Argentina, Brazil, Bolivia and Mexico.

Students were primarily young university students or middle-aged professionals (between 30 and 40 years old) connected to agricultural production, usually linked to agroecology projects with some previous relationship with the faculty (either in more academic work or as activist researchers outside the university) (Table 1).

How: The objectives of the training were aimed primarily at the application and recognition of the key elements of agroecology and food

sovereignty in a practical project through PAR methodologies designed to recognise and reveal both positive and negative teachings, trying to generate a reflection space within the project itself (the final goal being one of *alternancia* learning and aware-raising research process for the students). The training program was designed to work on the different dimensions of agroecology and its methodological tools in dialogue with the concept of Food Sovereignty (FSv). Thus, the course was structured into five blocks: *Introduction to FSv, Introduction to the Emerging Agroecology, Tools and Methodology of Evaluation for FSv, The Construction of FSv and Realities and Practices of FSv*. The first four blocks were online, combining readings prepared by lecturers, complementary readings from other bibliographic sources (both scientific and social), along with active work in the virtual classroom. Each student has an associated lecturer (tutor) with whom they work along the year to complete a "systemization document": a methodological tool to work with an agroecological project in their territory. This document is organized according to the dimensions of agroecology, including more general attributes (productivity, diversity, resilience, stability, autonomy-independence, reliability and equity) and numerous indicators along with their corresponding research techniques, and the possibility of including a gender dimension and feminist vision (Vara-Sánchez and Gallar-Hernández, 2014).

This systemization document and the involvement of each student in an agroecological project formed part of the pedagogical strategy of *alternancia*, where all the contents in the course should be compared, put into practice and placed in dialogue with the project in which students participated in.⁴ Finally, the last subject was developed on-site in a decentralized way. Students met together in each of the university branches and continued to work on their systemization document, visited experiences in the area and shared learning and advances. All branches were connected at the same time via "live videoconferences" to follow the same content and group work.

The last phase was the Final Course Project: students continued to explore the agroecological dimensions, attributes and indicators included in the systemization document with the guidance of their tutors, focused on creating a document to give back and dialogue with their systemized agroecological project.

Due to its online format, this course lacked a collective emotional space. During the in-person week, however, emotional links coming from the virtual relationships generated on the forums, the sharing of the experience and the difficulties faced during the systemization document emerged. All the same, this course did not achieve the creation of a training space where attitudes and abilities for organization, coordination, and consolidation of self-management processes were developed.

5.2.2.1. Discussion: Identifying common trends and barriers to AEFS. In this article, through the systematic analysis of four case studies (two agroecology courses in the formal sphere and two in the non-formal sphere in Brazil and Spain), we contribute to recent debates on transformative agroecological learning (Anderson et al., 2019a,b; Christophe and Bell, 2018; Man, 2018; McCune and Sánchez, 2019; Meek and Tarlau, 2016; Meek et al., 2019; Rosset, 2015), in other words, AEFS. The four courses were created in response to conventional training and the banking method of education. In the analysis we put the emphasis not only on the *how*, i.e. which actions and methodology, which is often the main focus of discussion, but also on the *who* and *from where*. This latter question ultimately defines the other two, since depending on who promotes a given agroecological course and for what purpose, will define how this course will be developed, who the teachers will be, what the student's profile will look like, and whether or not it has a

⁴ Most of the experiences collected in the Systematization Atlas of the Food Sovereignty Observatory come from the students work <http://www.osala-agroecologia.org/atlas-de-sistematizacion/>.

transformative agroecology focus.

From where: In the non-formal sphere, led by rural workers or peasants' movements, the courses normally respond to an identified need of the movements (Meek et al., 2019). The programmes normally aim at strengthening agricultural organizations, training (young) farmers (and activists) of the food sovereignty movement, and reinforcing their presence as political subjects through *ad hoc* political and technical training. The objective is to have cadres of people capable to engage and support agroecological transitions in their territories and communities (McCunes and Sánchez, 2019). This is confirmed in our cases, where the courses were developed to train farmers to fill a political void (EAC in Spain), or to provide particular technical options combined with political training (MST in Brazil). In the formal sphere, however, it is mostly activist researchers and lecturers, normally after a shared diagnosis with the social movements, who respond to another need: the lack of political, holistic and critical training in formal spheres. Indeed, higher education institutions are home to the Western banking method of education (Avalos, 2019) which is not free from internal resistance of lecturers and researchers in different domains (Critical Pedagogy Working Group et al., 2015). In our cases, the two formal courses emerged from the personal compromise of lecturers with agroecology and food sovereignty and the conviction that universities have a role to play in agroecological transitions through the promotion of critical and political education. In all the cases, lecturers were engaged with agroecology and food sovereignty movements in their territories. However, following Freire, Gramsci and Foucault's ideas that it is from below, the invisible and the margins that the counter-power will emerge, it is necessary to acknowledge the limitations of the formal context to promote a real transformation, which is further confirmed with the limitation in the *who* and the *how*.

Who: Indeed, no matter the sphere, an important issue found in all courses analysed in this paper is that actors are linked to agroecological and food sovereignty networks. This implies that in the training they have a strong critique of current development policies and actions with a clear diagnosis of a problem to solve, in which agroecology provides an opportunity in facing current crises (e.g. ecological, civilization) and plays a key role in the sustainable management of natural resources. There are, however, important differences between the formal and non-formal spheres regarding the students' and teachers' profile, the objectives of the training, and overall, on the pedagogical dynamics. Therefore, it is important to be clear about which role each of these spheres can play in AEFS, all of them being important.

Regarding the students' profile, non-formal courses tend to attract agroecological farmers/peasants (which at the same time is the public objective of the courses), while the formal sphere attracts more critical students, technicians and activists (*idem*). Thus, the content needs to be adapted to these different types of students. Yet, what is important here is that all of these different profiles in reality reinforce one another and all are needed in the construction of food sovereignty or alternatives to the industrial food system. Regarding the lecturers' profile, in non-formal spheres they include members from radical and critical research, social movements for food sovereignty and peasants. This is a clear differentiation from the formal spaces where lecturers are normally critical academics and activist researchers, and only occasionally, producers or members of the civil society. This is also linked to the requirements the courses need to fulfil in the formal sphere in order to be approved (e.g. number of doctors in the academic team). Formal barriers in the participation of peasants in the courses reduces the transformative potential of AEFS courses in the formal sphere.

How: All courses have a strong critique to current development policies and actions. The biggest difference among them can probably be found in the pedagogical dynamics. Peasant's organizations have developed counterhegemonic pedagogies to confront conventional agricultural education. Some examples of alternative peasant's pedagogies are the *emergent and diverse peasant pedagogy* (Batista, 2014; Rosset, 2015) or the *agroecological peasant pedagogy* (Barbosa and Rosset,

2017). Different pedagogies have different educational practices, different conception of the role of education, different educational objectives, and different views on the role of agriculture and agri-food systems. Rosset (2015) lists seven common elements of political and agroecological formation developed by CLOC-LVC: 1) *diálogo de saberes* and horizontal exchange; 2) holistic integration of the technical, political, humanist and internationalist formation with respect to the Mother Earth and *Buen Vivir*; 3) *Alternancia*; 4) all spaces (classroom, kitchen, garden, community) and time (formal lectures, cleaning, cooking, cultural, etc.) are educational; 5) Self- and collective organization is part of the educational experience; 6) the objective is to form people as facilitators of processes of political and agroecological transformation; 7) agroecology is fundamental for the resistance and construction of food sovereignty and autonomy, for the creation of a different relationship between humans and Nature, it is territorial and requires organizational spaces for the fight and collective transformation of rural reality. Casado Baidés (2018), based on the education notebook of the MST, summarises the pedagogical principles of the MST as: 1) direct relation between theory and practice; 2) methodological combination between education and training; 3) orality as the basis for the production of knowledge; 4) formative contents which are socially useful; 5) education for work, through work; 6) organic link between education and political processes, education and economic processes, education and culture; 7) democratic management of the education process; 8) students' self-organization; 9) creation of pedagogic groups and permanent training of facilitators; 10) research skills and attitude; and 11) combination between individual and collective pedagogical processes. Anderson et al. (2019b) in analysing the European Agroecology Knowledge Exchange Network proposed four main characteristics of transformative agroecology learning: 1) horizontalism; 2) *diálogo de saberes*; 3) combining practical and political knowledge; and 4) building social movement networks.

In the formal sphere these innovations face a great deal of resistance, including the management aspects to lecturers and even students, who are not used to this way of teaching and learning, leading to many pedagogical challenges and conflicts (Stamato, 2012). Another challenge is the link between teaching, research and extension which is perceived as necessary and fundamental to learning about agroecology, the construction of interdisciplinary knowledge through PAR, establishing the relationship between theory and practice, and contributing to strengthening the actions in the territories (Stamato, 2012). This is not a simple action as it requires an effort to create profound changes in the production of academic knowledge, which is based on epistemological foundations contrary to the "*diálogo de saberes*", and practices such as "*alternancia*". Yet, new efforts are growing not only in agroecological education (Francis et al., 2011, 2017; Lund et al., 2014), but also in SFS education (Ebel et al., 2020). (Ebel et al. (2020)) following the work of Valley et al. (2018), proposed eight learning outcomes for SFS education, which have close similarities with the learning goals proposed by Østergaard et al. (2010) for agroecology. From these, systems thinking, critical reflection, diverse ways of knowing, practical skills (based on experiential learning), collective action and advocacy, are particularly relevant for AEFS. Yet, since their proposal aims at being broad enough as to be implemented in different SFS undergraduate programs, they fail to make more explicit the political transformative goal of this type of education, which is one of the characteristics of CFSE and AEFS.

Dialogo de saberes is identified by most authors working on critical pedagogies as a key element in AEFS. Rosset (2015) describes how *diálogo de saberes* among different organizations of LVC is generating a mutual learning process of agroecological and political formation. Based on the practices of LVC, McCune et al. (2014) and Mann (2018) emphasised *diálogo de saberes* as central for education on food sovereignty, in the same way Anderson et al. (2019b) did after analysing the European Agroecology Knowledge Exchange Network. In the educational sphere this means a real transdisciplinary education where both lecturers and students exchange knowledge in a non-hierarchical and

respectful environment. Following Freire's (1996) principles of horizontality and transformative praxis, "learners cannot be considered mere objects, but must be active in the process of learning as discovery [...] which challenges the dominant prepositions of modernism". Furthermore, reinforcing a series of dialogue-action cycles at the local level, also with other actors that promote endogenous development (scale-out) and with other organizations that transcend the subject's own territory (scale up), is essential to build agri-food systems based on food sovereignty. In the formal sphere, *diálogo de saberes* is a major challenge, the question being whether lecturers are prepared to work in this way. Stamato (2012) identified some barriers for the development of an AEFS in the formal sphere arising from its transdisciplinary nature: external barriers, such as the difficulty of hiring teachers with appropriate training in agroecology, and internal barriers such as the resistance from the teachers and the administrative staff to create and implement these kinds of courses. For instance, in the MSc described here, an important limitation is the lack of training of lecturers in alternative pedagogical tools based on *diálogo de saberes*, that is, they can have a critical, political pro-FSV focus, but lack the pedagogical skills to implement critical pedagogical tools. Yet, experiential learning and the recognition of embodied intelligence in students, as described by Østergaard et al. (2010), implies taking seriously the students' lived experience as a point of departure and allows to create more horizontal teaching-learning spaces.

Another key element of AEFS pedagogy is the "*alternancia*". The system of *alternancia* responds to a process of collective accumulation and experimentation of educational experiences which adopted the alternation of educational times and spaces as a form of articulating both schooling and working (Casado Baidés, 2018) and is considered essential to build a different pedagogical logic (das Graças Carvalho and da Silva, 2018). In the non-formal courses analysed, the *alternancia* is very clear and is part of the training objectives. In the formal sphere, a broad definition of rotational strategies allows to introduce "*alternancia*" practices to accompany the learning process with practical experiences and fieldwork, such as experiential learning (Francis et al., 2011) or at least with educational practices outside the classroom closer to emancipatory educational models. One way to facilitate this is the final master thesis. For instance, the two formal courses analysed here make it compulsory to develop work in communities in which students are participating to support agroecological processes. The same approach was proposed by Francis et al. (2011, 2017).

Introducing emotions in the learning process is central in critical and transformative education. Goris et al. (2021) showed how affects and emotions in popular education can deeply change relationships between students, between students and educators, and between humans and nature. Here, the configuration of the educational spaces is also extremely relevant. This refers not only to the physical spaces but also to the process of building an "educational environment". Building an educational environment means that all educational processes are intentional and have educational objectives, referring to what happens both inside and outside the classroom (Casado Baidés, 2018). This requires a good, specific plan of the time and the spaces. According to Caldart (2013), building an educational environment combines objective activities with attitudes, so that each person is responsible for the group, and the group is responsible for each of the individuals, thus, bringing emotions into the learning process. In the non-formal courses described here (MST and EAC) this is very clear. In the formal sphere this is limited and we did not find literature referring to the relevance of this in the formal context. The different learning outcomes and methodologies proposed by (Ebel et al. (2020)) could implicitly allow the creation of this environment, but do not have a focus on emotions which are essential in building the sense of community. Indeed, emotions are rarely brought into the formal classroom (Hook, 1994; Goris et al., 2021). In our analysis we found that the Agroecology MSc has developed a *hidden curricula* through the promotion of the students assembly, while in the expert course the limitation arises from its blended nature where

collective face-to-face spaces are limited. The structure of formal courses makes it very difficult to develop such training as part of the official education process, relegating it to a non-visible space. This is due to the evaluation processes of formal courses, which impose an external "corset" and impedes courses to explicitly organise and officially recognise different educational spaces that, using feminist economics nomenclature, we could call productive and non-productive spaces within the course: That is, one space where the content of the course is shared, studied and evaluated (productive), and another non-official educational space, such as the cultural, organizational, live-experienced and emotional spaces (non-productive). In the non-formal sphere, these different spaces are formally and explicitly visibilised, recognised and all are equally important in the student's learning processes. In the formal sphere, introducing feminist pedagogies may help to overcome this barrier (Peece and Griffing, 2006).

Our work suggests that being formal or informal, in part, determines the approach and teaching methods of the training sessions, but in light of the experiences, this variable does not necessarily limit what we theoretically claim should be AEFS. Rather, it has to do with who the actors promoting the courses are and their relationship to social and political food sovereignty networks, so they may be more radical or reformist and more academic or more linked to social networks. In the event that there is sufficient coordination between academia and political networks, by creating a cluster of critical radical scholars it is possible to launch formal AEFS training programmes that respond to, and provide training to different kinds of students, which can range from more research-oriented to more activist students oriented towards agroecological practice and processes and committed to the supporting of agroecological projects. Thus, in the formal sphere it is possible to develop training of radical critical researchers, students and facilitators for agroecological transition processes, but some key AEFS components cannot be fully developed, limiting the transformational potential of these courses. Table 2 summarises the main characteristics of AEFS.

6. Conclusions

In the context of resignification processes of agroecology, education is another disputed territory. In this article, based on four cases studies (two formal and two non-formal courses self-claiming to work towards food sovereignty), we advance in the discussion about CFSE centred on AEFS. AEFS must be based on building cooperative situations among the actors involved in the agrifood system: producers, educators, consumers, social movements, (local) public institutions, along with initiatives and markets for a social-solidarity economy. AEFS's approach must enable and promote actors that transform territories inspired by a radical democratization of knowledge, teaching, institutions, economies and, in general, power. As we have documented, this is a combination of theoretical (e.g. popular education, political agroecology), practical (ongoing study proposals for Food Sovereignty) and transformative (food networks and movements) approaches.

AEFS education in the classroom is based on *diálogo de saberes*, participatory methodologies and dynamics, with a rotational focus (*alternancia*) on learning from the dialectic between theory and practice and reflection and action. This includes the explicit and strong recognition of emotional and organisational aspects of the group, to unite the group around a shared common political identity on experiential and emotional processes and leaving the organisational and logistical tasks of the course to the students to incorporate practical learning useful for political life in group dynamics and participation within the organisational structures of movements. In this sense, despite we believe AEFS is not possible without an emotional and experiential dimension, this requires of further research. Training spaces of a transformative nature must generate spaces allowing students to interact with their own and other realities, exchange experiences and learn about different views. However, the way to implement these common principles and practices differs between the formal and non-formal sphere, due to both internal

Table 2
Main characteristics of Agroecological Education for Food Sovereignty (AEFS).

<i>From where</i>	<i>Promoters</i>	Food sovereignty networks Food sovereignty and agroecology experts Scholar-activists Farmers organizations
	<i>Problem to solve</i>	Sustainable management of natural resources faced with a civilization crisis Reinforcement of food sovereignty networks
<i>Who</i>	<i>Lecturers</i>	Radical scholars/critical teachers (academic, from social networks, NGOs) Peasants, producers, professionals
	<i>Students</i>	Critical university students; University activists Agroecological producers, Peasants Members of agricultural organizations
<i>How</i>	<i>Vision of development</i>	Critique to Development (e.g. post-development)
	<i>Curricular contents</i>	<i>Social</i> (eg. participation, equity, Feminisms) <i>Environmental</i> (eg. Metabolisms) <i>Political</i> (eg. social movements) <i>Economic</i> (eg. Human needs (<i>oikos-nomia</i>): critical economics; ecological economics)
	<i>Scientific and knowledge approach</i>	Transdisciplinary; Complex Science; Science with People <i>Diálogo de Saberes</i>
	<i>“Transfer” of knowledge</i>	Social empowerment in the territories, accompaniment, facilitation
	<i>Market Overview</i>	Territorial agrifood systems
	<i>Teaching goals</i>	Train critical people capable of accompanying and responding to transformations towards food sovereignty
	<i>Emotional space</i>	Care and cultivation for spaces to express emotions, empathy, new languages
	<i>Organisational space</i>	Educational environment, Training in horizontal political cultures, new leadership, rotating roles, acquisition of group facilitation, community living and organization skills, <i>mística</i> .
	<i>Pedagogy inside the classroom</i>	Participatory methodologies; PAR; <i>diálogo de saberes, alternancia</i> ,
	<i>Pedagogy outside the classroom</i>	Relation to territories and communities; involvement of other knowledges; students participate in logistic and organizational activities of the (educational) community

and external barriers in the formal sphere, which limits its transformative potential in the context of neoliberal academia. Yet, as Jara (2020) warns of the conservative offensive happening in Latin America and the Caribbean, we should not underestimate the difficulties that popular education may also encounter in the current historical moment. What is yet unclear is to what extent those courses self-claiming to contribute to food sovereignty are actually contributing or not to food system transformations in their territories. In the case of non-formal education, given the political roots of emergence of such programs, responding to very concrete needs of social and peasant movements, it is relatively easy to infer they contribute to transformation at least through reinforcement of the movements. In the case of formal programs, despite participants are politically motivated, they emerge to fill a gap in higher education, but not to respond to specific needs of movements. In this way, they contribute to change development paradigms at this level, but it is not possible to assess, unless specific tools are used, to what extent they contribute to food system transformations towards food sovereignty, which goes beyond their learning outcomes. Our analysis suggest that their transformative potential is limited mostly because of constraints in the *who* and *how*, but most importantly, because the *from where*. Whatever the case, our work shows the need to develop evaluation tools to fill such knowledge gap.

Authors statement

Marta G Rivera-Ferre: Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Supervision; Validation; Writing –

original draft; Writing – review & editing. David Gallar: Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Validation; Writing – original draft. Angel Calle-Collado: Conceptualization; Formal analysis; Investigation; Methodology; Validation; Writing – original draft. Vania Pimentel: Conceptualization; Formal analysis; Investigation; Methodology; Validation; Writing – original draft.

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