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Review

Social Learning and Paulo Freire Concepts for Understanding Food Security Cases in Brazil

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Abstract: Food insecurity is a wicked, complex, and critical problem. Although evidence supporting a wide range of assertions regarding the outcomes of social learning is still being investigated, its potential to improve food security challenges is growing. Nonetheless, more work is needed to understand when and how social learning-oriented approaches are effective in food security situations. We address this gap by investigating how elements of social learning and Freire's key concepts are exemplified in existing real-world experiences of food security in rural communities. The case studies in Brazil, Community Seed Banks in Paraíba State, in the northeast and Biodiversity Kit in Guaraciaba, Santa Catarina State, in the south, are examples of small farmers facing and overcoming their limit-situation of food insecurity through celebrating, planting, and saving traditional seeds (landraces). A mixed-methods approach was applied based on semi-structured interviews and a literature review. The key findings show that local initiatives based on the interconnections of social learning and Freire's concepts have improved food security in two cases. The practice of landrace rescue as a food security strategy is strengthened through a culture of closeness and solidarity, through values that are celebrated in the festivities, community meetings, and other exchanges of experiences. Applications of our conceptual framework in operational interventions show clear potential for generating the necessary changes for a more sustainable world, specifically in food security and sovereignty projects, as described in the cases studies.



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1. Introduction

Food insecurity is a wicked, complex, and critical problem. Although the specific definition can vary, food security is widely defined as the access to enough food to supply the energy needed for all family members to live healthy, active, and productive lives [1]. It comprises four interconnected aspects—food availability, food access, food utilization, and food stability. Despite gains in global agricultural productivity, the lack of food security persists in many regions of the world [2]. In Latin America and the Caribbean, hunger increased to 47.7 million people in 2019, after five years of a continuous rise [3]. Although Brazil left the FAO hunger map in 2014, there is a serious risk it will return due to a combination of factors, including recession, unemployment, corruption, cutbacks in social programs, freezing of social investments, poverty, concentration of wealth, and concentration of land [4].

Ending hunger requires much more than just increasing incomes and productivity, it also requires addressing the daily impoverishment mechanisms that are reflected in the systematic marginalization of smallholders from an array of strategic areas, including knowledge generation. While the debate over the technologies to increase food productivity

itself is important, it remains necessary to critically focus on the fundamental technology generation processes behind them, understanding how farmers, especially smallholders, can be better embraced in the development process.

This context leads to the following general questions: How to frame solutions for food insecurity that help vulnerable communities to understand and use/replicate them for their own sustainable development? To what extent can people living below the poverty line be empowered to have a say in framing the problem, in defining the research questions, in choosing methodologies, in evaluating results, and in controlling how solutions are applied, thus determining the overall shape of those technologies that supposedly benefit them?

According to the Declaration of Nyéléni [5], “Food Sovereignty is the Right of peoples, communities, and countries to define their own agricultural, labour, fishing, food, and land policies, which are ecologically, socially, economically and culturally appropriate to their unique circumstances. It includes the true right to food and to produce food, which means that all people have the right to safe, nutritious and culturally appropriate food and to food producing resources and the ability to sustain themselves and their societies.”

Social learning’s potential to improve food security and sovereignty is growing. Yet, as stated by Van Epp et al. [6], evidence supporting the wide range of assertions regarding the outcomes of social learning processes is insufficient. More work is needed to understand when and how a social learning-oriented approach is effective in food security situations. We address this gap by investigating how elements of social learning can be exemplified in existing real-world experiences of food security in rural communities. In doing so, we aim to contribute to the further academic debate regarding the understanding of how elements of social learning can be exemplified in existing real-world experiences of food security in rural communities. As stated before, understanding how social learning processes can help empower farmers in having a say in the framing of the food security problem, in defining the research questions, in choosing methodologies, in evaluating results, and in controlling how solutions are applied, thus determining the overall shape of technologies that supposedly benefit them, is critical.

We address these issues, combining the Brazilian educator Paulo Freire’s lens over two case studies of community-based research and celebration of traditional seeds in the south and northeast of Brazil. On one hand, Paulo Freire challenges inequalities and limiting conditions faced by populations living in poverty [7–9]. For him, a critical social change toward a sustainable world is not driven by educators or technicians, limited within their fields of action, but rather from broad *conscientization* integrating a wide range of social actors. It requires a macro-educational vision that involves not only dialogue but perceiving oppression, conflict organization, as well as overcoming the naive and limited approach on education and pedagogy [10].

On the other hand, we present two communities generating their own solutions for food insecurity using their landraces as a valuable adaptation strategy. Agroecological processes that surround the traditional seeds (landraces) are collective alternatives for rural development, strengthening not just peasant identity and ecosystem stability, but also food security and sovereignty. Despite the contextual differences between the two cases presented in this study, one in the south and another in northeast Brazil, there are similar strategies that these communities used to create scenarios of adaptation and food security, such as social learning based on the intensification of the relationship between community members and relationship between community members and technicians organized in associations. By analyzing these cases, we bring empirical evidence to the four elements of social learning for food security and adaptation: engagement, iterative learning, capacity development, and challenging institutions [6].

We argue that integrating different areas and sources of knowledge is an important step toward a holistic way to tackle complex problems, such as food insecurity. Relating these two cases will facilitate the understanding of how food security initiatives can be developed in different community contexts through social learning by using elements of

the Pedagogy of the Oppressed such as *conscientization*, *problematization*, *untested feasibility* as proposed by Freire.

2. A Framework Using Freire's Concepts

Those on the front lines directly facing the complex problems of food insecurity, small-holders, and technicians, require deep knowledge about integration and transformative action. Paulo Freire's ideas can provide key principles and methods for community development supporting food security and sovereignty. Freire's ideas are tools for implementing integrative approaches in food security projects.

Development studies often emphasize the typical consultancy models or problem-solving methods in which experts detach themselves from a situation to provide an objective diagnosis leading to a learned prescription. In this frame, food security projects continue to rely upon knowledge transfer and adoption models, even as they try to incorporate incompatible participatory approaches. If a development project does not deeply integrate the points of view of the population and of the stakeholders, it is taking a top-down approach.

Freire is critical of the alienated practice of education, development, and change. According to Freire (1979) [10], it happens when professionals see themselves as the absolute owners of knowledge that must be donated to the ignorant ones. Freire (1979) [10] includes agrarian reform technicians, agronomists, and other professional of good, albeit naïve will, who, in the name of what they call "saving time," try to vertically replace empirical procedures from the people with their specialized techniques. They come from a true need to increase the production. However, they are not aware that their specialized techniques and the approaches of the people are both cultural manifestations. They also do not realize that the currently used approaches cannot be automatically replaced. They do not see the people in their totality; rather, they see the people as empty vessels to be filled with their modern and advanced techniques [10].

In his critical education called *conscientization*, Freire recommends praxis using methods based on dialogue that build a capacity for substantive transformation. Praxis is an ongoing process of action and reflection happening through identification of the *limit-situation* and the collective creating of a solution called *untested feasibility*. According to Freire, an educational or a development process should start with an understanding of the participants' perspectives about their reality. Thus, participants develop a type of diagnosis with a special focus on how they understand their reality at that moment. Therefore, at the beginning of the process, the mental perspective of the participants over their reality is also investigated. They become active in presenting narratives, images, improvisations, characters, and objects that reflect their actual understanding. Through dialogue, participants are encouraged to investigate and establish new perceptions about new ways to see the proposed problems [11].

Freire proposes *problematization*, a succession of participatory problem creation and solving. *Problematization* is an active, collective, and critical approach to a certain reality context. It happens through a set of activities around the participants' reality and its limit-situations. Participants, divided into research groups, take deliberate steps toward understanding and confronting the limit-situation, such as food insecurity. The result is a consciousness that changes as the investigation continues. The evaluation focuses on how this perspective shifts from an alienated one to a more critic and creative one [11].

The *untested feasibility* is a concept that touches the creativity that comes from actively researching to change or overcome a limit-situation. The *untested feasibility* is related to the understanding of history as a possibility, which is a position opposed to the fatalistic view of reality. It is considered a powerful concept to be included in transformative food security strategies directly linked to community views (Figure 1). It is related to the understanding that reality is not ready but is being and, therefore, can be transformed. The development of critical consciousness necessarily implies transforming action; the critical consciousness is complemented in the critical and creative act of the subject that assumes its historical

responsibility. For this reason, critical consciousness not only predisposes itself to change, but acts autonomously in relation to limit-situations; not only believing in the possibility of transformation but assuming the struggle for the construction of the untested feasibility. The risk of assuming the struggle for the untested feasibility is, therefore, a consequence of the creative nature, proper for critical consciousness, and inherently incorporates a methodological perspective, since it makes the act of collective imagination a transforming movement and transformative education process [12].

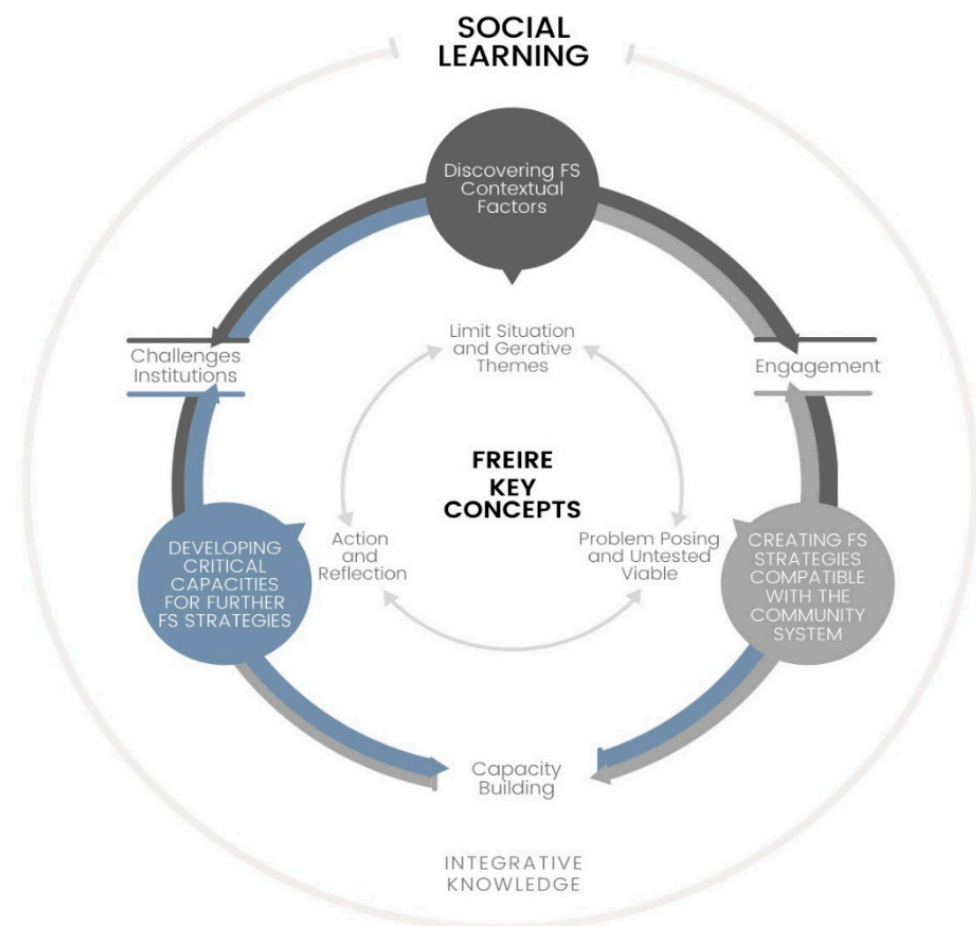


Figure 1. Interlinkages and interfaces of Freire's key concepts, a food security key actions, and social learning dimensions. Source: Own.

As Figure 1 illustrates, there are several correlations among Freire's key concepts, food security key actions, and social learning dimensions. Understanding food security contextual factors enables an environment for understanding local realities, limit-situations, and generative themes. This process triggers the development of FS strategies based on the participants' understandings. While criticizing their own external actions, they understand the system and how to change them. Social learning components (engagement, capacity development, and challenging institutions) interrelate all FS actions, and interactive learning embed the whole process. Furthermore, we see them as triple loop learning [13,14].

3. Methodology

The case studies are in Brazil: Community Seed Banks in Paraíba State, in the northeast (Figure 2A,B), and Biodiversity Kit in Guaraciaba, Santa Catarina State, in the south (Figure 2C,D). Both are examples of small farmers facing and overcoming their limit-situation of food insecurity through celebrating, planting, and saving traditional seeds (landraces). Landraces not only tend to have high levels of genetic variation, but that variation is already tightly coupled with the environmental variation present within a

region [15]. They are defined as a local cultivar or animal breed that has been improved through traditional agricultural methods. In our case, landraces usage is part of a deliberate strategy by smallholders to achieve a state of food sovereignty and independence from commercial sources of hybrid seeds. Doing so allows them to maintain low, but stable, levels of agricultural production and biodiversity despite the growing impact of climate extremes. There are studies showing that the landrace richness and the presence of wild relative species in the Guaraciaba region allowed to characterize it as a “microcenter of diversity” of mays and rice [16,17].

A mixed-methods approach [18] was applied based on semi-structured interviews and a literature review. In total, fifteen families were interviewed in a random sampling (30% of the total number of small farmers engaged with landraces for case one). The families were randomly selected together with the Rural Extension Service and Research Corporation of Santa Catarina State (EPAGRI) extensionists who worked in the region in direct contact with the local farmers working. The interviews for this study were audio taped with the permission of the respondents without identifying their names. Interviews focus on understanding their experience in (a) food security and adaptation; (b) landraces; (c) knowledge exchange; as well as (d) social network and engagement. In this paper, the authors selected and organized the evidence of social learning in the process of understanding and solving food insecurity according to the research questions.

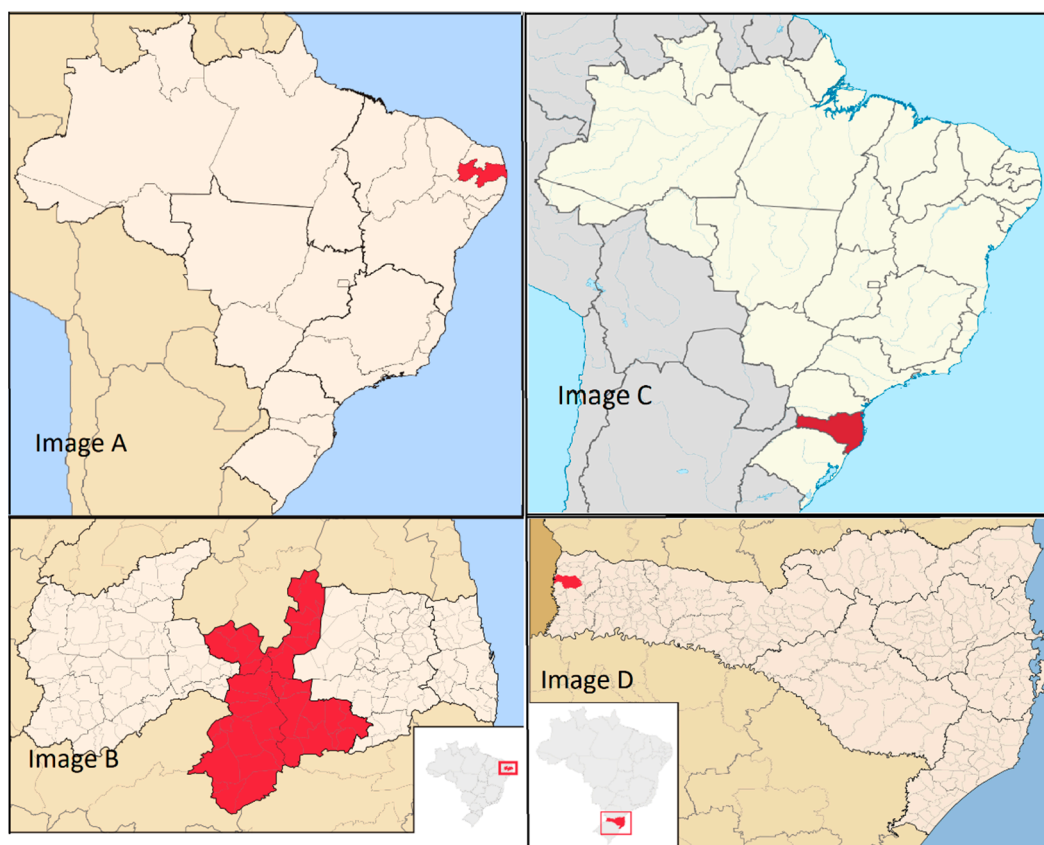


Figure 2. Case studies location. Case 1—Images A and B; Case 2—Images C and D. Source: adapted from wikipedia.com. Accessed 5 August 2021.

3.1. Case 1: Community Seed Banks in Paraíba State, in the Northeast

In the Paraíba State, located in northeastern Brazil, agricultural areas are characterized by the occurrence of droughts that can last for up to two years (Figure 2A). The development of economic activities is rudimentary and the production system vulnerable. Widely disseminated technologies of the green revolution (seed + fertilizer packets) contributed to accelerating genetic erosion and the disappearance of eco-geographically adapted crops,

thus limiting farmers' choices. Farmers' knowledge about seed selection, treatment, and storage was lost during this process, as crops arising from conventional genetic improvement programs took over. Together these aspects make agricultural production and the management of natural resources in semi-arid unfavorable [19].

However, in the State of Paraíba, the Community Seed Banks (BSCs) in the semi-arid zone, which initially aimed to maintain stocks of corn and beans from one year to the next, have progressively contributed to the conservation and recovery of local species and cultivars adapted to the region's ecosystems and consumption modes [19]. In the BSC system, a family borrows a quantity of seeds and undertakes to return, at the time of harvest, the same quantity, plus a percentage, according to the rules defined by the community itself. The storage, delivery, and return of seeds are all actions carried out in the community, under the responsibility of an association or informal group.

There is a network of about 230 BSCs, which serves approximately 6500 families in 61 municipalities in Paraíba State [19]. The Paraíba Seeds Network was built on a partnership between NGOs operating in the region and farmers' organizations that have accumulated local knowledge [19]. The important participation of farming families in Paraíba State through agroecology is fostered through the different collective organizations, including associations and unions [20–22].

Through meetings, they identified the seeds that should be multiplied and the places to multiply them in multiplication fields. Some varieties of the *passion seeds* from each community were chosen. In Paraíba State, traditional native seeds are popularly known as seeds of passion (*sementes da paixao*). Seeds are named for the value and affection that family farmers have for the traditional varieties. The work was carried out as a collective effort, involving several communities, always with the participation of farmers, students, and technicians. They adopted agroecological management in the swiddens based on the knowledge of the families involved. They used biofertilizers, neem macerate (*Azadirachta indica*) and maniçoba (*Manihot* sp.). The activities also included storage and silo making workshops, with a view to promoting the training and autonomy of farmers who now know how to implement and conduct seed multiplication fields and carry out adequate storage and are seeking dialogue with public policies and recognition for their work [19].

These family farmers are promoting knowledge exchanges at educational, cultural events such as workshops, fairs, practical experimentation, artistic events, and celebrations. Through these events they share the values and culture of the countryside and provide legal backing for the strengthening of family agriculture [22]. The Seeds of Passion Festival (*Festa das Sementes da Paixao*) has been held every two years since 2003 and is already a tradition in Paraíba State. The Seeds of Passion Festivals are community celebrations epitomizing the collective efforts of family farmers to subsist through agroecology. At the festival evaluation meeting, participants recognized the importance of the various entities that helped organize the celebration [22].

In the Borborema region (*agreste*) of Paraíba State (Figure 2B in red), the Borborema Union Pole formed a community theatre group that developed a performance entitled, "*Pamonhada* in the House of Dona Nene." *Pamonhada* is a typical festival when foods based on corn, including *pamonha*, are cooked in northeastern Brazil. It presents a social construction of the food security concept based on the relationships between the concrete experience of farming and the local reality of smallholders [4,23]. The play presents a day of local celebration in Borborema. Seu Chico, a smallholder, goes to the field to harvest maize for cooking *pamonha*. The seeds are landraces, an inheritance from his grandfather. Dona Nene and her kids prepare to receive people from the community. They collect water from the cistern constructed with the community micro-credit system resources, obtain vegetables from the subterranean dam cultivated applying organic fertilizers, and cook the traditional local chicken recipe. The people from the community arrive and see Dona Nene's daughter water the vegetables (a kitchen-garden) with water reused from kitchen activities. The community learns about the agriculture strategies from a knowledge exchange visit with other women smallholders and now they can also teach their neighbors.

Meanwhile, nearby, in the home of Seu José Cosme, also in Borborema, it is a day of planting, but he has no seeds. When Seu José wakes up, he asks his eldest son Zeca to buy seeds. His daughter, Dona Corrinha, goes to fetch water, first going to the bodega to buy food for breakfast. The land of the family is small. To pay for what they buy in the bodega and for the seeds, the family is forced to sell their ox and must wait for the money of the old José's retirement before buying a new calf [4,23].

3.2. Case 2: Biodiversity Kit in Guaraciaba, Santa Catarina State, in the South

Our second case study is in the municipality of Guaraciaba, located in the western region of Santa Catarina State, in southern Brazil (Figure 2C,D). Its population of 10,604 mostly lives in rural areas [24]. According to Bonatti et al. [24], 87% of farms in the region have been managed by family holders for generations. The average farm size is 30 ha, utilized mainly for subsistence crops including maize, soybean, wheat, and cassava. The western region of Santa Catarina has been under severe pressure from extreme weather events, mainly from increasingly frequent and intense droughts and rainfall extremes [24]. Faced with this growing vulnerability, smallholders in Guaraciaba have learned from experience that agricultural production can be maintained using the landraces identified over successive generations as tolerant of climate extremes, especially drought [15,24].

In response to growing concern over the falling number of smallholders using landraces on their farms, as well as to link and promote the advantages of landraces, a participatory process was established, involving smallholders, agricultural technicians, scientists, students, and the wider community worked together and run by organizations, such as Epagri, the Federal University of Santa Catarina (UFSC) and the Micro-basins Project (Projeto Microbacias). The co-operation worked to create a "biodiversity kit" with landraces that could be used in the region, including in Guaraciaba [25].

The kit was built through a participatory action research project within which smallholders and technicians worked together. Their work was based in the agroecology with attention to pesticide-free production techniques as well as soil management with culture rotation promoting knowledge and respect for the environment. The project comprised several phases and steps to compose local varieties of crops more adapted to local conditions and interests [26].

For the implementation phase, smallholders met with technicians, holding formal and informal meetings, interviews, and courses where they explained their food production for subsistence and articulated their demands and necessities. They also participated in courses on agrobiodiversity and participatory methods promoted by the Federal University of Santa Catarina State, Brazil. They identified those families that maintained the cultivation of the varieties of interest to the group and its main aspects of cultivation and conservation. They elected volunteer families to be responsible for multiplying the seeds that make up the kit. The planting and cultivation of the varieties in the kit by the volunteer families received technical assistance from *Projeto Microbacias* facilitators and *Epagri* extensionists. The farmers, monitored by technicians, harvested, selected, processed, packaged, and conserved the seeds. After that, the farmers themselves and community leaders, accompanied by the facilitator and extensionists from Epagri, set up and distributed the kit to all families in the communities of the Micro-basin Associations project [25].

After the evaluation of the implementation phase elaborated with the collaboration of researchers from UFSC, the dissemination was carried out and results achieved. Every farmer receives annually a "kit of biodiversity," a set of local varieties with the number of seeds necessary for cultivation that produces enough food for the family [25]. This autonomy in the production and availability of seeds assures a certain level of food security, therefore, characterizing a social reproduction and identity strategy for this rural community [24].

4. Results and Discussion

4.1. How Elements of Social Learning Can Be Exemplified in Existing Real-World Experiences of Food Security in Rural Communities?

The analysis of both cases reveals that farmers have self-managed their agricultural production, without depending on the government or markets, to access seeds at the right time for planting through community engagement, capacity building, and interactive learning [20,21]. This process can be directly associated with the four social learning components and Freire's concepts presented in our conceptual framework (Figure 1). As the cases exemplify, social learning was also based on collaborative groups and networks that: (a) integrate different sources of knowledge; (b) undertake iterative and transformative planning and management change in response to new learning and information; (c) ensure that there is an impact from such collaborative efforts. These aspects can be considered complementary to the four social learning components presented in Section 2. Further, social learning should demonstrate the emergence of an understanding that goes beyond individuals or small groups, including both wider social units [27].

For Case 1, the symbolic story presented by the Borborema Union Pole Theatre Group is a component of motivational narrative strategies for smallholders to transform their food production system through agroecology knowledge combined with local, territorial characteristics (difficulties and potentialities). The theatre play compares two distinct realities for smallholders happening in the same region. The show typifies the polarity between those families. The ones actively participating in the socio-organizational and technical innovations using traditional seeds, versus those who are isolated, using traditional agricultural systems using hybrid and genetically modified seeds that need fertilizers and pesticides, while continuing to live with severe food and nutrition insecurity. One reality is of a family with a strong social support network through the connection to other families and organizations, as well as collective learning. Together they form a community of agroecology experimenters using traditional seeds, they demand and have access to public policies, trainings, and technical assistance, thus obtaining quality food and living conditions. The other reality is of an isolated family of small farmers producing in a conventional way, without neighborhood bonds or participating in a union or the agroecology movement.

Celebrations, training meetings, conversation circles, as well as the production of narratives on websites, in music, in the theatre, in films, and on radio programs, are all part of a set of actions by family farmers that help build a peasant territorial identity and to solve their limit-situation of food insecurity. They are channeling social forces and shared identity. The Seeds of Passion festivities, for example, represent in a celebratory way, the practice of stocking traditional seeds—the Seeds of Passion. The celebration represents the culture of proximity, solidarity, and the exchange among family farmers in the region [22]. The festival is an important form of dialogic communication with society about agroecological family farming as well as the ecological wealth and knowledge represented in the Seeds of Passion.

For Case 2, the collaboration between farmers and technicians is recognized by farmers as essential for fostering the exchange of seeds among the communities and is acknowledged as an important channel for exchanging knowledge. Based in community engagement and interactive learning, they create the circumstances for the maintenance of family farming. The farmers mentioned that, since 2005, when the program for the conservation and exchange of landraces was initiated to improve food security in agricultural communities of Guaraciaba, the number of engaged families gradually increased. Based on the social network existing in the communities, the activities of some farmers and technicians were identified as essential in the persistent exchange and distribution of landrace seeds. These individuals are responsible for organizing a work plan for community engagement (with field days, meeting, courses, and community-based festivities) [24]. The smallholders producing their own seeds in Guaraciaba demonstrated a high degree of environmental

knowledge. They understand local trends in climate and have the ability to incorporate these into their decision processes; both are essential for the success of farming [15].

4.2. Can Social Learning Processes Help Empower Farmers, Giving Them a Say in Framing the Food Security Problem, in Defining the Research Questions, in Choosing Methodologies, in Evaluating Results, and in Controlling How Solutions Are Applied, thus Determining the Overall Shape of Technologies That Supposedly Benefit Them?

The change from food insecurity to food security and sovereignty is a historical process that takes great time and complex social relations. The cases presented are embedded in a social learning process to identify solutions to significant, concrete problems that afflict people. In general, both cases are rooted in complex historical action toward increasing the adaptation capacity of these vulnerable small farmers. Within these complexities of actions, occurring over a long period of time, we found key factors influencing their positive achievements, including collective action, social support, and learning.

The strategies for using traditional seeds happened through an intense social mobilization and interaction between farmers and technicians in both case studies. The strategy of landraces was developed through this interaction in a process of identifying and dealing with the problem. The visits, interviews, and trainings were ways to establish dialogues that better equate the problem and possible solutions. The implemented solutions were tested first by a small number of farmers, then gradually expanded to incorporate all members of the social group. The entire process of research, development, and dissemination can be read through the theoretical lens of social learning and the pillar concepts of the Pedagogy of the Oppressed. Solutions through landraces would not have been successful if they did not focus on education and awareness-raising proposals that take place in community settings, through the exchange of knowledge, research, experimentation, and communication.

These families, integrated through their organizations, communities, and neighborhoods, are living a process of activating and channeling social forces. They are learning through their progress in associative ability, in exercising initiative and invention [28]. Furtado (1984) [28] claims that “development is a social and cultural process, and only secondarily economic.” For him, experience demonstrates that “development occurs when society reveals energy, an ability to channel in converging fashion forces that are latent or dispersed” [28].

For family farmers to increase their success, agroecology learning and changing are key factors. Garofolo (2017) [29] affirms the need for the existence of a network for exchange, dialogue, and socialization of knowledge, practices, and technologies for this type of production. Such interactions happen through diverse processes led by the collectively organized farming families themselves.

In the movement of farming families united in associations and unions promoting exchanges and communications through different activities, we realize a highly relevant model of popular education. This model helps to balance their traditional and empirical knowledge with scientific, technical, and technological knowledge. This is a process that builds peasants’ identity through the achievement of autonomy and productive sovereignty [29].

In the Guaraciaba case, for instance, smallholders suggested that the maintenance of local varieties and knowledge of how to use them was influenced by the social cohesion and reciprocity within their communities. When the smallholders were asked who would help them in case of any adverse situation, they acknowledged that they rely on the assistance of their neighbors, since the number of relatives is usually scarce in these communities mostly due to rural exodus [24].

The reciprocity, commitment to tradition, and strength of social networks all contribute to the ability of these communities to maintain landraces over successive generations. Reciprocity within the strong social networks in these communities is also important for maintaining access to seeds and other resources for agricultural production, especially in times of drought. The autonomy derived from the cohesion of these communities

also enables them to resist the complete displacement of local varieties by commercial varieties [24].

Participants reviewed and proposed changes in their own reality through various processes, including dialogue, narratives, theatre plays (Case 1), games, improvisation, music, visual arts (Case 2), research, social interaction, and political action. The collective and collaborative production and presentation of the theatrical work, for instance, was an active posture built and operating in the transformation of reality [4].

Applications of this rationality in operational interventions show enormous potential for generating the necessary changes for a sustainable world, specifically in a food security and sovereignty project, as described in the case studies. Food insecurity is an important limit-situation for those communities. The examples portray different actions of facing this limit-situation toward food sovereignty through agroecology. Access to seeds is a determining element within the notion and actions for food sovereignty through formal and informal education. Within the context of food sovereignty and agroecology, the theme of seed sovereignty is fundamental, as farmers' access to various traditional species breaks dependency on the agroindustry and fosters the preservation of agrobiodiversity [30].

5. Conclusions

The key findings of this work show that local initiatives can be developed through the interconnections of social learning and Freire's concepts to improve food security as experienced in both of our case studies. The practice of seed research and celebration is strengthened through a culture of closeness and solidarity, values that are celebrated during the festivities and other exchanges of experiences.

The ability of smallholders to collectively conserve climate-adapted landraces indicates the depth of local knowledge and capacity to share wisdom within local communities that can be drawn on when meeting future challenges. Through this study, we understand that education, transformation, and development are all aspects of the same process if they are carried out around the limit-situations that challenge people and their communities.

Overcoming food insecurity requires a comprehensive, complex, and diverse understanding of the problem involving participants' perceptions and motivations. Paulo Freire's lessons propose that education and social transformation must consider the centrality of the participants' subjectivities, their life histories, formations, methods, practices, understandings, and motivations to be successful. Furthermore, as shown by Case 1, arts and other forms of imagination reveal and improve participants' states of consciousness, allowing the alienation to be gradually supplanted with critical and alternative actions.

We recommend that instead of a common food security approach based on knowledge transfer, technology transfer, or a monologue by the one who knows what must be learned by others, food security programs should foster a dialogue and knowledge exchange.

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