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Food sovereignty education across the Americas: multiple origins, converging movements

David Meek[1] · Katharine Bradley[2] · Bruce Ferguson[3] · Lesli Hoey[4] · Helda Morales[3] · Peter Rosset[5] · Rebecca Tarlau[6]

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Abstract Social movements are using education to generate critical consciousness regarding the social and environmental unsustainability of the current food system, and advocate for agroecological production. In this article, we explore results from a cross-case analysis of six social movements that are using education as a strategy to advance food sovereignty. We conducted participatory research with diverse rural and urban social movements in the United States, Brazil, Cuba, Bolivia, and Mexico, which are each educating for food sovereignty. We synthesize insights from critical food systems education and the political ecology of education in analyzing these cases. We compare the thematic similarities and difference between these movements' education initiatives in terms of their emergence, initial goals, expansion and institutionalization, relationship to the state, theoretical inspirations, pedagogical approach, educational topics, approach to student research, and outcomes. Among these thematic areas, we find that student-centered research on competing forms of production is an integral way to advance critical consciousness about the food system and the political potential of agroecological alternatives. However, what counts, as success in these programs, is highly case-dependent. For engaged scholars committed to advancing education for food sovereignty, it is essential to reflect upon the lessons learned and challenges faced by these movements.

Keywords Food sovereignty · Critical pedagogy · Education · Critical food systems education · Political ecology of education · Social movements

Abbreviations

ANAP	National Association of Small Farmers (Cuba)
CaC	Campesino a Campesino (Cuba)
CPATI	Colonia Pirai Agroecological Technical Institute (Bolivia)
EBUFFS	East Bay Urban Farmer Field School (USA)
FW	Food Warriors (USA)
LabVida	Laboratorios para la Vida (Mexico)
MACaC	Farmer-to-Farmer Agroecology Movement (Cuba)
MST	Landless Workers Movement (Brazil)

Introduction

Agrarian scholars have long debated how political and economic processes mediate the production, circulation, and employment of agricultural knowledge (Cleaver 1972; Dissanayake 1992; Morgan and Murdoch 2000). Central questions include: whose knowledge counts in advancing agricultural development (Thompson and Scoones 1994; Carolan 2006; Lewontin and Levins 2007; Ingram 2008)?; how do financial incentives privilege particular forms of agricultural knowledge production (Shepherd 2005; Kloppenburg 1988; Henke 2008)?; how do class, racial and other forms of power relations mediate access to

✉ David Meek
ddmeek@ua.edu

[1] University of Alabama, 350 Mars Spring Road, Tuscaloosa, AL 35401, USA

[2] University of California-Davis, Davis, CA, USA

[3] ECOSUR, San Cristóbal de Las Casas, Mexico

[4] University of Michigan, Ann Arbor, MI, USA

[5] La Via Campesina/ECOSUR, San Cristóbal de Las Casas, Mexico

[6] Stanford University, Stanford, CA, USA

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knowledge (Gray et al. 1997; Daniel 2013)?; and what is the relation between knowledge and transitions to sustainable agriculture (Eshuis and Stuiver 2005; Stuiver et al. 2004; Caron et al. 2014)? Despite these extensive debates, agrarian studies scholars have devoted relatively little attention to analyzing how education contributes to food sovereignty.[1] This general absence is surprising given that agrarian movements and food justice organizations are deeply committed to educating for food sovereignty. From the landless movement in Brazil (Caldart 2004; Tarlau 2015a; Meek 2015b), to indigenous groups in Mexico and peasant networks in Cuba (Holt-Gimenez 2006; Baronnet 2008), social movements have prioritized forms of education that advance food sovereignty. These educational opportunities range from political leadership training to formal degree programs at various educational levels.

Food sovereignty means very different things in disparate geographic contexts, making it difficult to provide a universal definition of the concept. Despite this ambiguity, scholars agree that food sovereignty is a rights-based approach in which farmers, other producers, and communities are in control of their food system. Although La Via Campesina, a grassroots social movement, first articulated the concept, state-society interactions are increasingly central in advancing food sovereignty (Schiavoni 2016). For example, approximately 15 countries have developed policies around food sovereignty to date (Godek 2015). Political economic processes—in the form of public policies and economic incentives—are frequently tied to the institutionalization and expansion of food sovereignty (Wittman 2015).

The objective of this article is to comparatively analyze the thematic similarities and differences between disparate movements' food sovereignty education initiatives. Our understanding of "education" is intentionally broad—we focus on both non-formal education opportunities as well as formal degree granting programs. We highlight how many of same broad processes which shape food sovereignty, including state–society interactions, institutionalization, expansion, and political economy are intertwined with *educating* for food sovereignty.

We draw on two emerging theoretical frameworks to compare six examples of grassroots food sovereignty education programs that are embedded in social movements and other civil society organizations. First, the political ecology of education (PEoE) draws attention to how the distribution of power and resources among interconnected political and cultural entities mediates pedagogical processes—from tacit to formal learning—and related knowledge systems at various interconnected scales (Meek 2015a, b, c; Bradley and Herrera 2016). When applied to agriculture, the PEoE lens helps illuminate how movements gain access to the political and economic resources necessary to educate for food sovereignty. It also highlights how conflicting power relations between different educational institutions and forms of agricultural knowledge structure particular changes in agricultural practices, and ultimately transformations in the landscape itself.

It's here that the PEoE framework intersects with critical food systems education (CFSE)—a related perspective that integrates insights from food justice, political agroecology, popular education, critical pedagogy, and food sovereignty with traditional food systems education (Meek and Tarlau 2015, 2016). Many traditional food systems education courses seek to help students develop an interdisciplinary *understanding* of the food system. In contrast, the objective of CFSE is to leverage the broader educational system and innovative pedagogical techniques so that students and educators can utilize food system knowledge and agroecological practices to systematically dismantle the structural and ideological elements of the corporate food regime and develop transgressive subjectivities (Sawyer 2004). Drawing upon a synthesis of these two perspectives, our analysis of six case studies ultimately finds that political and economic processes lead to the genesis, advancement, institutionalization, and replication of forms of education that advance food sovereignty, transforming individuals' agrarian subjectivities, land relations, and understanding of agriculture itself.

Methods

The idea for the article arose at the University of Michigan's June 2015 Food Sovereignty conference. An emergent theme from the conference was the importance of education in advancing food sovereignty. Building upon that insight, the authors—most of whom participated in the conference—agreed upon the need for an article synthesizing experiences with food sovereignty education from diverse contexts. We chose six cases from across the Americas, including two U.S. programs, and one each from Cuba, Mexico, Brazil, and Bolivia (see Table 1). These cases were selected because each of the authors was directly involved with at least one of the projects. Some of the contributors are long-time activist-educators that have helped to found and contribute to these various programs,

[1] A review of the Journal of Peasant studies—one of the central journals in agrarian studies—shows only several articles that focus on the connections between food sovereignty and education, and these few have just been published in the last 2 years (Meek 2015a; Tarlau 2015a). Considering other fields, it is clear that the linkages between agroecology and education have received extensive attention, but not in the context of food sovereignty (Lieblein et al. 2007; Francis et al. 2013; Hilimire et al. 2014).

Table 1 Summary of six case studies

Program	Launch	Country	Setting	Founders	Students
Colonia Pirai Agroecological Technical Institute (CPATI)	1970s	Bolivia	Rural	Teachers and doctors	College students
Landless Workers Movement (MST)	1980s	Brazil	Rural	Farmer–activists	Activists and students of all ages
Campesino a Campesina (MACaC)	Late 1990s	Cuba	Rural	Farmer–activists	Activists
FW Youth Development Program (FW)	2000s	USA	Urban	Teachers	Children and youth
Laboratorios para la Vida (Lab-Vida)	2000s	Mexico	Rural and urban	Agroecologists and anthropologists	Teachers
East Bay Urban Farmer Field School (EBUFFS)	2010s	USA	Urban	Activists and urban farmers	Activist and urban farmers

while others are scholars who became familiar with the programs through in-depth research. Each contributor draws on primary data gathered through long-term qualitative research conducted at the field site, including interviews, observations, document review, and historical research.[2]

The methodology for conducting the comparisons and writing the article took place over the course of a year. Rather than drawing upon a particular cross-case analytical methodology (Yin 2013), we chose to develop our analysis through an organic process of dialog. Our group came together four times in online group conference calls to develop and comparatively analyze the case studies. We first began with an initial discussion about the six cases. We transcribed our first conversation, and then read through the transcription and initial case study descriptions, coding for the common themes that cut across the cases. We did this coding informally (i.e. without data analysis software), and the themes emerged inductively. To reach our research objective, we focused on coding thematic areas of similarity and difference in how movements educate for food sovereignty.[3] We then worked both independently and in pairs to write long-versions of each of these case studies. We circulated these case study narratives within our group for review; each individual was tasked to independently highlight emergent themes that cut across the case studies. Within a subsequent discussion, we collectively compiled a list of the similarities and differences in each of the food sovereignty programs. As part of this process, we consolidated themes that were similar. Through these discussions we identified three overarching themes and three subthemes (see Table 2). We then worked independently and in pairs to produce both short versions of each case study, as well as the synthetic thematic results sections. The final two conference calls involved fine-tuning these analyses.

The six cases enable comparison on two levels. First, they take place in diverse educational environments. Whereas some case studies consist of farmer-to-farmer conversational learning, others involve more formalized classroom instruction, highlighting the varied nature of food sovereignty pedagogy. Second, we chose case studies from diverse geographic contexts, underscoring the transformative educational work that is being done in urban and rural areas and in several countries. In our cross-case analysis, we compare how these educational environments and geographical locations motivated the founders to start each of these programs, their pedagogical practices, and each program's financial sovereignty, expansion efforts, and relationships to the state (see a summary of this analysis in Table 2). These variables emerged as common themes during our iterative discussions. In our cross-case analysis, we analyze the common patterns and differences among these variables.

Case studies

The contexts, timeframe, types of founders and students, and the scope of each of the six case studies are considerably different. They were launched in both urban and rural settings across the Americas, as early as the 1970s and as recently as 2013. Teachers, educators and activists are both the founders and the students of many of these programs, as are youth, doctors, agroecologists and anthropologists (See summary in Table 1).

[2] There is not enough space in this article to outline how each researcher collected and analyzed data, but for more information about some of these research methods please see Meek (2015a, b) and Tarlau (2015a).

[3] Some of the authors had already published research on the themes that had emerged, such as political economy (Meek 2015a), and horizontal pedagogy (Rosset 2015a).

Table 2 Cross-case analysis summary

Program	Issues that motivated the program's launch	Pedagogy models and content	Non-state finances	Expansion	Relations with the state
Colonia Pirai Agro-ecological Technical Institute (CPATI)	– Survival of indigenous farmers – Volatile 2008 food prices and climate change – Neoliberal social and economic models	– On-farm field schools – Applied research in own community – Indigenous knowledge, gender equity, agroecology, decolonization – Small-scale agribusiness practices	– Foundations – Self-funding	– Not trying to expand beyond the Institute	– No connection to State (in past, seen as "anarchist" and "communist")
Landless Workers Movement (MST)	– Land inequity – Education that does not valorize rural culture	– On-farm field schools – Critical place-based learning – Applied research in own community – Freirian *dialogo de saberes* – Seed saving as act of resistance – Cooperative production – Marketing and processing – Research skills/the scientific process	– Self-funding – Church and other donors – Volunteers – UN	– Large-scale expansion across country	– State used ag export profits to invest in agrarian reform – State applies MST's education model – MST maintains "movement schools" without state support
Campesino a Campesina (CaC)	– Nationwide food crisis after US embargo	– Farmer research on own farms – Freirian *dialogo de saberes* – Seed saving as act of resistance – Agroecology	– Self-funding – External donors	– Large-scale expansion across country – Members promote CaC to other networks	– Policies support peasant agroecology, but state yearns return to industrial agriculture
Food Warriors Youth Development Program (FW)	– Narratives of African Americans and agriculture – Food insecurity in communities of color – Lack of African-centered education	– African origins of food – Critical place-based learning – Cooking, nutrition, indigenous plant-based medicine, agroecology – Marketing and processing – Critical placed-based	– Foundations	– Difficulties expanding to more sites, schools – Creating handbook	– School where FW founders emerged was public charter – Today, only link is USDA
East Bay Urban Farmer Field School (EBUFFS)	– Devaluation/exclusion of communities of color – Food insecurity in communities of color – Agriculture education that marginalized social justice	– On-farm field schools – Farmer research on own farms – Horizontal knowledge production – Seed saving as act of resistance	– Foundations – Academic volunteers	– Not trying to expand field schools – Establishing regular participants	– No connection to STATE (formed because of little relevance of State funded training)

Table 2 (continued)

Program	Issues that motivated the program's launch	Pedagogy models and content	Non-state finances	Expansion	Relations with the state
Laboratorios para la Vida (LabVida)	– Food insecurity, health crisis, and erosion of indigenous livelihoods and traditions – Education divorced from local knowledge, traditions	– Formalized student research – Horizontal knowledge production – Research skills/the scientific process – Agroecology – Critical food system analysis	– Foundations – Volunteers	– Creating handbook – Launched network of state and international garden programs to share support, materials	– Program based in federal research centers – Most participating teachers in public schools

The oldest program we highlight, *Colonia Pirai Agroecological Technical Institute* (CPATI), was established by teachers and doctors in the 1970s in rural Bolivia. The program started as an orphanage, which later opened a grade school, and eventually, transformed into a three-year, residential agricultural technical college that enrolls between 120 and 150 students. Students who attend are all on scholarships, recruited from indigenous communities from throughout Bolivia.

The second oldest program is comprised of diverse educational initiatives of the Brazil Landless Workers' Movement (*O Movimento dos Trabalhadores Rurais Sem Terra* or MST), a large national and grassroots movement struggling for agrarian reform through the occupation of unproductive land estates (described below). Since the 1980s, the MST has mobilized for access to and control over a range of educational programs, from infant education to universities, to train students of all ages and social movement activists—all with the purpose of contributing to the struggle for food sovereignty (Caldart 2004).

The third case study, the *Campesino a Campesino Agroecology Movement* (MACaC; Farmer-to-Farmer Agroecology Movement), is also embedded within a grassroots social movement in Cuba, the National Association of Small Farmers (ANAP). Since MACaC began in the late 1990s, it has helped facilitate the agroecological transformation of roughly half of all peasant farms in Cuba through its horizontal peasant pedagogy.

Two programs began in the 2000s. Laboratorios para la Vida (LabVida) is an action research program that was launched in Southern Mexico to train teachers from elementary, middle and high school (up to 18 years of age) and college professors on agroecological production and local foodways. Its founders are agroecologists and an anthropologist based at Mexican public research centers in San Cristóbal de Las Casas, in the state of Chiapas. After realizing that working directly with schoolchildren would limit the reach of the program, LabVida began training teachers to establish school gardens and use them to strengthen formal education. An initial series of six, 4-hour workshops evolved into a 120-hour certificate program.

The other program that emerged in the 2000s is the Detroit, Michigan *Food Warriors Youth Development Program* (FW). FW grew out of a food security and community gardening project run by educators at the Nsoroma Institute, one of Detroit's African-centered charter schools at the time. These educators later went on to co-found the Black Community Food Security Network, where FW became one of several food-focused youth internship and summer programs. Today, FW serves over 50 children in elementary and middle schools (up to 14 years of age) through three afterschool programs.

Finally, urban farmers and activists launched the East Bay Urban Farmer Field School (EBUFFS) in 2013 to engage in co-learning with other farmers and activists in the East Bay of the San Francisco Bay Area. The activists involved are diverse, working on issues from unemployment to the school-to-jail pipeline, public education, social work case management and food justice. Inspired by the CaC methodology, this urban agriculture education group promotes agroecological farming and creates learning opportunities through visits to different farms that focus on technical skills development, community building, and leadership development.

Program origins

Each of these diverse programs converged on food sovereignty education as a response to three issues spurred by industrialized food systems: social inequality; food insecurity; and decontextualized education systems. First, the discrimination and inequality that many of the actors responded to was tied to structural marginalization that black, brown, peasant, and indigenous communities were suffering and the disregard for their agricultural and culinary knowledge. The MST, the largest and most influential agrarian reform movement in Latin America (Branford and Rocha 2002; Wright and Wolford 2003; Carter 2015), is the most obvious example. The MST arose outs of a concern for societal and economic inequities surrounding land distribution. The MST's food sovereignty education programs emerged from a recognition that agricultural knowledge, like land, is highly concentrated in the hands of elites, and inaccessible to marginalized groups. The MST seeks to "break down the fences around knowledge," in addition to those surrounding land, valuing alternative forms of agricultural knowledge and practice (Diniz-Pereira 2005; Barbosa 2015, 2016).

Many of the other programs we feature were also motivated by stories of discrimination and inequities. In Bolivia, the CPATI founders began their original grade school concerned about the discrimination and poor quality of education their orphans were receiving in neighboring rural schools. Later, when the institution transitioned to offer post-secondary training in agroecology, a concern for the survival of indigenous farmers motivated them to recruit and guarantee scholarships for indigenous youth from across Bolivia. In Chiapas, Mexico, too, LabVida formed in part as a reaction to the rapid urbanization and industrialization of farming and food systems, which is eroding rural livelihoods and indigenous agroecological traditions.

The two US, urban programs have common roots in the discrimination communities of color were experiencing in the food system. In Detroit, FW challenges the common narrative that people of African descent are only historically connected to agriculture through enslavement and sharecropping. The Black Community Food Security Network and FW rose out of a desire to ensure that African American histories and communities not be "marginalization and maligned", according to Hanifa Adjuman, a co-founder of FW and DBCFSN. In part, these co-founders were responding to a concern that young, white suburbanites moving into the city were disregarding the rich legacy of urban agriculture in Detroit (White 2011). Local food justice activists who formed EBUFFS in Oakland, CA similarly observed the systematic devaluation of communities of color over the course of many decades (Cadji and Alkon 2014; McClintock 2011; Nelson 2011), and the race- and class-based exclusiveness of prominent sustainable agriculture networks in the region (Guthman 2008).

Persistent food insecurity is the second common issue that motivated the formation of all six programs, although the causes of food insecurity varied. EBUFFS activists and FW educators observed the concentrated food insecurity in communities of color and saw jobs in urban agriculture as a key to not only improving access to food but also to escaping poverty and increasing local control of the food system (White 2010; Sbicca 2012). In Cuba, after the collapse of the socialist bloc in Europe in 1989 and the United States trade embargo, the country was no longer able to import sufficient food, or the machinery, inputs and petroleum needed to maintain a conventional production model. The economic and food crisis that ensued in the 1990s spurred ANAP to seek alternative approaches to recover and boost national food production. More recently in Bolivia, the CPATI coordinators began focusing on food sovereignty and agroecology after they experienced volatile food prices during the 2008 global food crisis. This coincided with observations that industrialized practices were causing extreme soil degradation and that climate change was affecting the survival of rural communities and indigenous farmers. Similarly in Chiapas, LabVida coordinators were concerned about indigenous communities of Mayan descent that consistently rank at or near the bottom of Mexican states for human development indicators and face persistent food insecurity. They saw how globalization of the food system was causing price volatility, increased reliance on purchased, processed foods, and a crisis in diet-related disease that rivals the United States.

Finally, a de-contextualized education system was the third, interconnected concern that motivated action across all these cases. In EBUFFS, some members did not see the relevance of the technical assistance cooperative extension agents and sustainable agriculture educators offered. Looking for training that honored, rather than marginalized the social justice elements of their work, the farmers invited other urban farmers and food justice activists to their farm to learn and teach, initiating EBUFFS' farmer-to-farmer

model. In Detroit, the K-8 Nsoroma Institute—the African-centered education program out of which FW emerged—was part of a broader movement among African American leaders to establish schools based on Nguzo Saba, the Seven Principles of Kwanza and a collective worldview. According to Adjuman, the school's focus on food was based on the sense that "food is a central part of what we are as a people…the foundation of our relationship to agriculture as African descendants".

In Chiapas, LabVida arose in response to an educational system that relies on a national curriculum, largely divorced from local knowledge and traditions (Klein et al. 2014). Teachers in state-run schools tend to be from cities, do not speak local languages, change schools frequently and rarely live in the communities where they work. Mexican public education prepares children and young adults in rural areas for urban jobs. By attending school, children lose much of their connection with the land and the knowledge of how to work it. At school, they often eat store-bought, processed food. Children in the city develop little understanding or appreciation of the rich cultures of the surrounding countryside. The garden work LabVida offers, in contrast, builds connections between school and community, providing experiential, culturally relevant learning opportunities for rural and urban students.

Similarly, in Brazil, MST founders also realized that traditional rural schools do not value rural culture, and seek to prepare rural students for life in urban centers. The MST sought to address this problem by developing alternative pedagogies for rural, public schools, based on local traditions, collective work practices, peasant culture, and student self-governance (Barbosa 2015, 2016). Also during the 1980s in Bolivia, the CPATI instructors saw themselves as contributing to a larger social and economic revolution during periods of dictatorships and the introduction of neoliberal economic models. The emphasis on agroecology today challenges the paradigms of industrialized agricultural education; it "encourages the restoration of local food, knowledge and biodiversity…[and changes the] model of accumulation towards one of redistribution with the active participation of all farming families and consumers" (CPATI 2015).

Pedagogical practices

Educational content

In educating for food sovereignty, the six cases we analyzed incorporate a wide variety of content. All groups emphasize agroecological principles—teaching why they matter and how to implement them. However, as their understanding of agroecology is political (Molina 2013), the education emphasizes the economic, political, and cultural dimensions of the agroecological transition (Rosset 2015; McCune et al. 2016). This ranges from framing seed saving and agroecology as political acts of resistance (MST, EBUFFS, MACaC) to deliberately teaching and linking a food sovereignty framework with indigenous knowledge, decolonization, and gender equity (CPATI, FW, EBUFFS). In the case of the MST, activists have drawn on the writings of Soviet pedagogues Anton Makarenko and Moisey Pistrak to strengthen the movement's organizing capacity and enhance community self-sufficiency by teaching communal social practices and cooperative production strategies (Tarlau 2012; Rosset and Martinez-Torres 2012). Several groups also provide opportunities for members to learn about marketing and value-added processes, such as cheese making (MST, FW, CPATI). To cultivate an ethic of self-care and cultural pride, some groups teach cooking, nutrition, and/or indigenous plant-based medicine (FW and LabVida), and FW also teaches about the African origins of food and agriculture.

While every group teaches a unique combination of these topics, the educational content reflects each groups' unique goals, capacities, and place. Political ecologists emphasize how ecological change is interrelated with larger historical and political economic processes; similarly, we see here that across these case studies the diversity in content is in part a function of the unique historical, political, cultural, economic, and ecological contexts in which these groups operate. Yet, variations in content also helps broaden our understanding of critical food systems education, because each group's pedagogical content is a function of their understanding of what constitutes food sovereignty, and how education can serve to mediate the opportunities and constraints towards advancing it. The content of critical food systems education will look dramatically different in divergent cultural contexts.

Educational approach

All of the case studies are theoretically grounded in the tradition of popular education, particularly Paulo Freire's work on critical pedagogy, dialogic education, and agricultural extension (1973a, b, 1986). These movements and organizations apply this approach by emphasizing education as a tool for developing critical consciousness and encouraging students to learn from their own reality, recognizing the power structures that shape their food environment, and focus on transforming the social and economic inequities in their communities.

Each of the groups prioritizes some form of experiential training as a form of critical pedagogy. Hands-on lessons occur on local farms, and topics are chosen that are most likely to have an immediate or short-term impact in each place, such as agroecological techniques for pasture

rejuvenation (MST) or greenhouse irrigation (EBUFFS). Farmer research is another important experiential learning tool, although each initiative uses it differently. In some contexts, the research is informal or incidental. For example, in the Cuban and EBUFFS context, farmers are encouraged to experiment and innovate on their own farms, and learn from their own experiments. Additionally, as a newly formed group, EBUFFS participants consider the entirety of their collective work as experimental. By contrast, more formalized student research is integral to the educational initiatives of LabVida, the MST, and CPATI. In these cases, teachers encourage students to use participatory action research to scientifically answer questions stemming from critical pedagogy. In the MST, CPATI and LabVida, students conduct participatory action research as part of an applied field project back in their home communities. Whereas in CPATI the objective is to make their agroecological education more visible and to spread concepts they learned in school to their rural communities, in the MST and LabVida it is also a method for developing critical consciousness. Students in MST programs engage in critical place-based learning (Gruenewald 2003), researching the tension between hegemonic and counter-hegemonic forms of agricultural production in their communities, and socializing their results as a means to cultivate broader mobilization. With participatory action research tools, LabVida students reflect on their own teaching practice. FW engages youth in similar critical analysis and reflection, and has had participating youth engage other youth and adults in the same exercises. One such lesson, "Who tells you what to eat?," guides students through a process of critically deconstructing media messages and then creating their own, using jingles and slogans that counter food marketing messages they critique.

Experiential learning opportunities for individual and/or collective reflection are also frequently tied directly to foodways in many of the programs. In at least four of the cases (FW, LabVida, EBUFFS MST), meals or tastings bring people together for reflection, which includes charting personal goals, evaluating group work, responding to local stressors, and honoring local culture.

The groups also share a similar vision of participatory knowledge production. Dialogic education, whereby knowledge is produced among equals through communication (Freire 1986), is an explicitly horizontal form of knowledge production that breaks down the dichotomy between teachers and learners. In this context, everyone has something to share and a perspective that is valuable. Horizontal knowledge production is exemplified by the Campesino-a-Campesino (CaC) approach, which the Cuban MACaC, EBUFFS, and LabVida cases utilize to varying degrees. The CaC approach involves farmer-promoters, who have either innovated new solutions or rediscovered older traditional solutions to common agricultural problems, using a popular education methodology to share them with their peers. For example, in EBUFFS, an urban farmer with experience installing an irrigation system on his own farm visited an urban farm needing to install such a system, guiding a discussion of how the system could work in a new setting. LabVida's constructivist approach encourages teachers to put local knowledge into horizontal dialog with the formal state curriculum, allowing students to learn from each other and teachers to learn from students and the surrounding community. In the MST, and La Via Campesina more broadly, horizontal knowledge production also takes the form of *diálogo de saberes*, which is translated as a "dialogue among different knowledges and ways of knowing" (Rosset and Martinez-Torres 2012, p. 2). This Freirian pedagogy seeks to bring peasants and extension agents into dialogue, with the goal of synthesizing traditional peasant forms of knowledge and academic forms to forge new knowledges, practices, and social relations (Leff 2004; Meek and Simonian 2016).

All of these horizontal methods are based in a critique of traditional approaches to agricultural extension, where knowledge is produced by experts and then imparted to what are perceived of as "backwards" and knowledge deficient farmers. This conventional vision of agricultural extension has been closely linked to the Green Revolution and the advance of capitalism in rural areas (Cleaver 1972). From a political ecology perspective, all cases can be seen as transforming intertwined material and immaterial territories. For Brazilian agrarian geographer Bernardo Mançano Fernandes, material territory consists of landforms and infrastructure, whereas immaterial territory is the ideologies associated with particular landforms (Fernandes 2009; Rosset and Martinez-Torres 2012). Education can structure the relationships between material and immaterial territories, because the dominant ideas of a society dictate norms concerning proper forms of agricultural management. As an example, traditional forms of agricultural extension based on a Green Revolution model of high inputs impart *technical* knowledge to create a *technical* landscape. In contrast, whether it singularly horizontal, or occurring in tandem with formalized classroom instruction, the learning strategies in all of these cases teach students to challenge the dominant means of production (Barbosa 2016), by developing agroecological practices, breaking reliance on fossil-fuel based inputs, and advancing new forms of sustainable production. These case studies illustrate the potential for critical food systems education to transform material territory in the form of higher farmer productivity. In the case of EBUFFS, the work is leading to greater productivity among urban farmers. Similarly, in Cuba, through MACaC the spread of agroecology in the peasant sector has coincided with a major relative increase

in its contribution to national food sovereignty (Machín Sosa et al. 2010, 2013; Rosset et al. 2011).

Each of these case studies highlights the potential of education to affect levels of political participation and civic involvement in the food system. All cases pointed to ways they have motivated and equipped participants to become food movement leaders, or "paradigm shifters", as a FW coordinator put it. Students go on to engage their communities to change perceptions and practices (FW, LabVida, MCaC, MST), or become involved directly in regional and national food justice movements (EBUFFS). Graduates also become local municipal authorities, extending the potential reach of their impact on agriculture policy and development (CPATI; MST).

Expansion and institutionalization

In addition to educational content and approach, educational scholars have shown that the political economy of education, or the influence of public policies and financial incentives (Carnoy 1985; Heyneman 2005), is key to understanding how market-based ideologies are promulgated in schools. Yet, from a political ecology of education perspective these questions of political economy are equally important to understand how subaltern forms of agricultural knowledge and practice are promulgated (Meek 2015a, b). We found that the extent to which each of the cases is able to disseminate and institutionalize its programs is related in complex ways to questions of financial sovereignty, and state influence.

Financial sovereignty

We identify funding as a central mechanism behind the expansion and institutionalization of critical food systems education across these case studies. Three main sources of funding—external non-governmental funding, state funding, and self-financing through productive activities—enabled these programs to grow and support teacher training, student travel, curriculum development, the construction of experimental gardens, and extra-curricular activities.

Both of the U.S.-based food programs have primarily relied on external funding, in the form of governmental grants and funding from foundations. FW, which is an educational program institutionally located within the Detroit Black Community Food Security Network, has received funding from the Kellogg Foundation and the US Department of Agriculture. This latter grant was part of a multi-institution 5-year grant, the Detroit Child Health Incubator Project, to support its work with children ages 2–8. While this large state grant provided the needed capital and materials, it has also limited FW's ability to reach older youth in the program (9–13 year olds). For these reasons, the program has searched for ways to self-fund as well, through youth farm stands, but the organization continues to primarily rely on national government or foundation funding. Similarly, EBUFFS in California has relied on external funding, more specifically resources from the Heller Foundation. Other non-profit backers, however, including Food First, Urban Tilth, and the Center for Popular Research, Education, and Policy, hope that EBUFFS will grow increasingly autonomous.

In Latin America, in contrast to the U.S., there is a tendency to rely more on self-funding and the creative use of state resources (rather than one-time grants). For example, in Bolivia, CPATI always strove to become financially autonomous. It launched pork, dairy, chicken and egg, and livestock feed operations to teach its orphans, and later college students, self-sufficiency and agricultural skills, while also contributing significantly to the school's expenses and scholarships. Although the school has also received grants from outside sources, such as donors in Spain and the Inter-American Development Bank, a 2015 report by school administrators cites that the organization is now close to financial independence (CPATI 2015).

In contrast to CPATI, the LabVida teacher-training program in Mexico initially mobilized resources through an outside grant from the Kellogg Foundation and from the public research centers that pay the salaries of the academics involved in the program. However, by training teachers in public schools to contribute to agroecological "literacy" and food sovereignty, LabVida leverages the tremendous resources invested in education by the Mexican State. Continued funding will likely rely on a mix of institutional resources, grants, and payments received for training and consulting. By providing little material support to participating schools, however, LabVida avoids creating dependency, a common pitfall for government programs. Instead, the program promotes autonomy and community by encouraging teachers to draw upon local resources and knowledge. Requesting help from families and community members to set up and maintain gardens also enriches the program, reduces the burden on teachers, and contributes to program continuity when teachers transfer schools.

In Cuba and Brazil, the educational programs we explore are both embedded in grassroots social movements, rather than a single school or institute. These programs, which affect tens of thousands of people, exemplify how a combination of self-funding through productive activities and the creative use of state resources can help institutionalize and expand radical educational programs. In the case of Cuba, external donors funded MACaC on a pilot basis in the late 1990s (Machín Sosa et al. 2013). Around 2000, when that funding began to dry up, the National Small Farmers' Association (ANAP) determined that this agroecological educational program should become a "movement" and

rely on its own resources. The program expanded much more rapidly since this period, funded primarily through the self-imposed quota from the sales of member cooperatives (Machín Sosa et al. 2013).

The MST has negotiated financial autonomy and dependency as it has developed its educational programs. Similarly to the Cuba case, the MST's first educational initiatives in the early 1980s relied on external support from progressive priests in the Catholic Church and national allies who would donate educational resources to the occupied encampments, in the form of money, schooling materials, or pedagogical expertise. For example, in the early-1980s two members of the Paulo Freire's literacy team visited one of the MST's camps in Rio Grande do Sul to talk to teachers about how to integrate Freirean pedagogies into their teaching (Tarlau 2015a). The teachers in the camps who developed these programs were entirely volunteer—activists in the movement who had some background or training in education. In 1987, the MST created a National Education Sector to think more strategically about transforming Brazilian education to support small-farming and collective agricultural production in the countryside (Barbosa 2016).

The MST, much like the Mexican LabVida program, has also partnered with state governments in offering teacher-training programs that are grounded in an alternative educational approach. The movement has run large-scale literacy campaigns throughout Brazil, in partnership with state governments and university partners. These MST-state collaborations were possible because despite the MST's antagonistic relationship to the state, the MST's educational initiatives increased the state's capacity to provide educational access to citizens (Tarlau 2015a; Barbosa 2016). As the MST's educational initiatives gained more public recognition in the mid-1990s, international organizations such as UNESCO and UNICEF also began to fund these programs. Although the MST has found creative ways to use state and other resources to fund their educational initiatives in the formal school sphere, the MST's internal political education programs (administered independently from the state) are primarily funded from donations from the MST's agrarian reform settlements.

Taken together, these case studies highlight two important findings concerning financial sovereignty. First, all of our case studies received financial support at some point from external entities. This makes sense when seen through the sociological lens of resource mobilization theory (McCarthy and Zald 1977), which highlights how movement success frequently hinges upon creating material linkages with supporters. Similarly, drawing upon political opportunity theory (Tarrow 1994; McAdam and Snow 1997), we can better understand how movement reliance upon external funding is often contextual. For instance, the MST was able to get PRONERA approved in 1998 after the massacre of 19 MST activists in Eldorado dos Carajás 2 years previously, during which time there was intensive international pressure on the Brazilian government (Tarlau 2015a). However, our second finding on this theme is that developing financial autonomy is a process—one frequently intertwined with external reliance—and that movements and civil society groups seek to develop sovereignty over their educational funding through the commercialization of agricultural produce, and local donations (MACaC, CPATI, LabVida). When brought together, these two findings highlight how financial sovereignty is much like food sovereignty: not an end state, but rather an organic process that evolves as political opportunities emerge, sources for institutional partnerships develop, and the movement's base creates its own self-sustaining mechanisms.

Program expansion

The transfer and expansion of these educational initiatives differs drastically. The four educational programs that are located in a single school or program structure (FW, LabVida, EBUFFS, CPATI) all have had difficulties expanding, although as we will subsequently explore, in some cases teachers and activists are implementing creative solutions to increase the impact of these programs. In contrast, the two education programs embedded in social movements (Cuba, Brazil) have illustrated an impressive capacity for expansion and growth, although sometimes this can dilute the original aims of these educational programs.

The most recently developed program, EBUFFS in California, has not sought to expand its urban field schools, but rather to consolidate a group of regular participants from among the food justice and urban agriculture community. In Detroit, lack of funding has restricted FW program expansion, but instructors are developing a packet of activities to share their curriculum with other schools and teachers. Lessons are being aligned with state standards to facilitate their integration with teachers' daily practice. Similarly, in Mexico, LabVida has published a school garden handbook containing lesson plans designed and tested by teachers who participated in the certificate program and linked to Mexico's national curriculum. The handbook conveys the potential of school gardens for strengthening education across subject areas, helping students develop a scientific attitude, build critical consciousness around agro-food systems, and bolster school-community relationships. Although the push for educational standards is frequently associated with neoliberalism, and the transformation of public education into a private good (Apple 2006), the case of LabVida highlights how movements can creatively adapt to these situations—in which teacher autonomy is relatively

restricted—and still implement some counter-hegemonic goals in schools. LabVida has also founded state and international school garden networks (redhuertos.org) that facilitate the exchange of experiences, materials, and inspiration among schools and other programs.

In Cuba, as external funding dried up, ANAP mobilized internal resources to train successive generations of agroecology promoters (Machín Sosa et al. 2010). Using its "mass mobilization" methodology, ANAP holds each of its members accountable for promoting the CaC movement within his or her sphere of responsibility. Much of their work is ideological, emphasizing the peasant sector's 'historic mission' to feed the Cuban population. This methodology has allowed agroecological production to expand much faster than the conventional extension strategies ANAP employed before it started using CaC (Rosset et al. 2011; Machín Sosa et al. 2013).

In Bolivia, CPATI has grown in both size and breadth, from working with less than two dozen orphans on a single 100 ha site in 1973, to teaching over 150 technical college students across three sites that sit on 385 ha today. But beyond its own Institute, it has never tried to actively integrate its methods into the public school or university system. In contrast in Brazil, the MST's educational initiatives expanded rapidly throughout the 1990s and 2000s. Between 1998 and 2011, PRONERA has offered 320 courses, ranging from literacy training and high-school to university degrees, involving 82 different educational institutions, and training 164,898 students living in agrarian reform areas (IPEA 2015). Agroecological courses offered through PRONERA include agronomy, agricultural extension, pedagogy, and forest management. In addition to PRONERA, the movement currently has 2000 schools in its encampments and settlements, with over 8000 teachers attending to 250,000 students (Carter and Carvalho 2015). However, the MST's ability to implement their educational proposal in these schools varies widely across the country (Barbosa 2016). The case of the MST is a particularly stark illustration of why it is critical to pay attention to the state when analyzing program expansion and transformation.

Certain cases suggest that critical food systems education can increase educational opportunities for populations that would not normally have access to K-12 or post-secondary schools. In Bolivia, indigenous youth that participate from around the country would likely not have an opportunity to receive a post-secondary education without the scholarships CPATI provides. Similarly, the MST's educational initiatives have also given hundreds of thousands of rural communities access to schools, childcare centers, literacy programs, adult education, and higher education courses. These cases illustrate that social movements and other civil society groups—which mobilized around concerns about structural discrimination—can play an important role in 'breaking down the fences around knowledge' and improving access to education.

Relationship to the state

Finally, these six educational programs have had radically different degrees of interaction and collaboration with city, state, and national governments. Some groups have rejected the involvement of the state in their educational programs, while others have identified the state as the primary actor responsible for providing these educational courses.

The two movement-based programs offer an interesting contrast to state-society relations. In the case of Cuba, the government is known internationally as being "pro-peasant," however in reality, the Ministry of Agriculture only accepted agroecological peasant agriculture "during the crisis" and now yearns for a return to large-scale industrial agriculture "once the embargo is lifted." Thus, while ANAP has won a large number of public policies that are favorable to peasant agroecology,[4] the main thrust of government policy is still geared towards facilitating a "return to the future" of industrial agriculture. Consequently, the core budgets of ANAP and MACaC have not come from the Cuban government, but rather from a self-imposed, voluntary internal tax on sales by member co-ops.

Similar to Cuba, the Brazilian government has also promoted industrial agricultural production and a primary export model, despite the election of the Workers' Party to power in 2003. Nonetheless, during the first three terms of the Workers' Party government, the federal government used profits from primary exports to invest more money in agrarian reform settlements. In the educational realm, the government embraced the MST's educational proposal as an approach for all rural populations, known nationally as *Educação do Campo* (Education of the Countryside) (Barbosa 2016). In 2004 the Workers' Party government created an office for *Educação do Campo* in the Ministry of Education with dozens of new programs (Tarlau 2015a).[5] The

[4] These Cuban pro-peasant programs include: distribution of land, crop insurance, the National Programs for Urban Agriculture and Suburban, for Production of Biological Inputs, for Animal Traction, for Production of Organic Matter, the Forum Movement on Science and Technology, the Growing Popular Rice Program, the Participatory Plant Breeding Program, programs to acquire farm animals, to achieve decentralized self-sufficiency in dairy products, to redesign curricula, to produce special programs on TV and radio and newspaper coverage (Machín Sosa et al. 2013).

[5] Even before the PT took power, in 2001, the federal government passed national guidelines for *Educação do Campo*. This was due to a coalition of agrarian social movements and the rural union movement, who put pressure on the federal government to embrace these policies.

Workers' Party also gave more funding to PRONERA educational programs. However, although *Educação do Campo* is now nationally recognized, many MST activists fear that many of the more radical components, and the connection between the educational proposal and an alternative food system, have been lost. For example, agribusinesses are now even declaring "support" for *Educação do Campo* (Tarlau 2015b). Despite these contradictions, the MST continues to engage in a complex process of negotiation and contestation with different levels of the Brazilian state for educational resources and recognition of their schools throughout the country. Importantly, the MST *simultaneously invests in its own internal educational programs*, independent from the state, and has established dozens of *escolas da formação* (political training schools) across the country that offer courses on agroecology and food sovereignty without the direct state involvement (Barbosa 2015, 2016).

In the four other cases, these state-society relations have been less complicated. In California, EBUFFS formed in response to the limited relevance of extension and other state-funded technical assistance programs to urban farmers, so their field schools have no connection to the state. In Detroit, before FW became a formal program, the founders of the program who began a school garden project had a direct relationship to the state when their school became a public charter (1997–2012). However, when the principal of the school co-founded the Detroit Black Community Food Security Network, FW was officially launched and hosted by the Network and since then, FW has only been connected to the state through national (USDA) government funding. In Bolivia, CPATI has maintained an autonomous relationship from the state, and in its early days was referred to as "an authentic island—with anarchist values" (CPATI 2015, p. 4). The founders of the school have generally maintained a good relationship to the state, although the school has also been critiqued for being a "breeding ground for communists" (CPATI 2015, p. 11).

Finally, in Mexico, although LabVida does not rely on state funding, the program attempts to mobilize state resources to support food sovereignty. The program and its research team are based at Mexican federal research centers (ECOSUR and CIESAS). Participating teachers are primarily from public schools associated with the Public Education Secretariat (SEP).[6] The certificate program is validated by ECOSUR but is not recognized by the SEP as part of teachers' continuing education requirements. Nonetheless, the program is designed to help teachers link school gardens to the specific elements of the official curriculum they teach. Recently, state education authorities began to support school gardens through the environmental education program *Educar con Responsabilidad Ambiental* (ERA). Anecdotal evidence suggests that while some teachers see ERA as an imposition, teachers in LabVida appreciate the help from ERA, suggesting that state support for school gardens could be key for their broader adoption.

Together, these cases suggest that if food sovereignty education programs are small-scale and local, a relationship with the state might not be necessary. In the case of the two U.S. programs, this autonomy from the state is purposeful, as the anti-racist nature of these two cases is most often antithetical to the U.S. curriculum. However, if educational initiatives develop a national scope, a relationship with the state is probably inevitable, and movements are then faced with the challenging task of wielding state power for counterhegemonic ends, without losing sight of their original goals. The only case where this movement-state relationship was not necessary, even with educational initiatives on a national scale, is the second iteration of the MACaC movement in Cuba when these programs became embedded in social movements and self-sufficient through internal funding.

Conclusion

This article helps to synthesize the political ecology of education and critical food systems education frameworks, by drawing attention to the relations between financial elements, educational approaches, and food sovereignty movements. Certain cases—CPATI and MCaC—suggest that food sovereignty can be a tool to advance financial sovereignty, and ultimately educational sovereignty. Educational sovereignty is a concept that has natural linkages with food sovereignty. Educational sovereignty centers upon communities' right to challenge enshrined systems of educational inequality, and develop their own educational systems (Moll 2002; Lomawaima and McCarty 2002; Moll and Ruiz 2005). By marketing agricultural products produced at the school (CPATI) and adding a tax on agricultural sales (MACaC), certain social organizations and movements showed how local control over the food system can contribute to financial control over an educational program, enabling alternative forms of pedagogy directed towards food sovereignty. Importantly, these examples highlight that both social movements and civil society organizations can become financially sovereign—in other words, this is not merely a capacity of solitary organization. These examples contribute to our understanding of how to actualize critical food systems education's primary objective of educating for food sovereignty, which means that pedagogy contributes

[6] Others teachers are from private schools recognized by the SEP, and a few teach at autonomous schools.

to a community's physical control over food system management (Meek and Tarlau 2016, p. 252).

Yet, these case studies also pointed to the fraught interrelationships between financial sovereignty and educating for food sovereignty. If obtaining financial resources requires becoming beholden to an external entity—whether it is the state or a donor—the original transformative intent of the movement can be diluted. Following this logic, institutionalization can be the death knell for critical food systems education. Yet, as this comparative study showed, in certain cases it is *through* institutionalization that movements preserve their ability to advance emancipatory objectives. As we discussed, the MST, for example, has helped create the National Program for Education in Agrarian Reform (PRONERA), which funds many MST critical agroecology courses in partnership with state and federal universities and technical institutes (Barbosa 2016). However, these results also highlight the incompatibility between some civil society organizations and the state (EBUFFS, FW)—when groups are struggling against structural discrimination, institutionalizing within the state may antithetical to a broader political project. Such results push both political ecologists of education and critical food systems educators to think in more nuanced ways about the relations between political economic processes, civil society, and the state. In certain contexts, to gain autonomy requires careful and sustained work within state apparatuses—and in others, the context precludes particular forms of engagement.

The dialogue between the case studies, which take place in both rural and urban contexts, calls for deeper analyses of the pedagogical relations between these spaces. Food sovereignty—historically a rural political project (Wittman 2011) —has increasingly become a focus of urban movements. As assumptions of a strict rural–urban divide continue to be deconstructed (Lerner and Eakin 2011), it becomes particularly important for scholars and activist to look at the pedagogical cross-fertilization that is taking place between the Global South and North, and rural and urban movements. The interrelations between the EBUFF and MCaC case studies are exemplary of this trend; as we showed, EBUFFs adapted a Cuban horizontal peasant pedagogy to an urban US context.

Similarly, the article pushes scholars, activists, and educators to rethink the horizon of critical food systems education. Guthman (2008) has used the phrase 'politics of the possible' to refers to one's perceived repertoire of viable tactics and visions for political economic and social change. The politics of the possible within many traditional forms of food systems education, such as garden-based learning programs, is largely limited to shaping the purchasing choices of future white middle-upper class consumers (Meek and Tarlau 2015, 2016). This reformist ideal does not address systemic class and race-based inequity in the food system. As these case studies demonstrated, critical food systems has the potential to create agents of change, increase agricultural productivity, and improve educational access.

At a broader level, these cases provide a unified response to Guthman's query about the politics of the possible, illustrating that "Another Type of School System" is possible, which represents a counter-proposal to the dominant capitalist approach to schooling and agricultural knowledge production. This represents what Erik Olin-Wright (2012, p. 9) refers to as a "real utopia," which allows us to "envision the counters of an alternative social world that embodies emancipatory ideals." Each of these cases constitutes in different ways real utopias, and many have already inspired hundreds of organizations and activists to re-think their educational practice.

As these case studies demonstrate, popular education is playing a progressive role in transforming food systems. We are in the midst of a rapidly changing political climate. As this article demonstrated, political opportunities are powerful moments for innovation in critical food systems education. Between the recent ouster of Brazilian President Dilma Rouseff, the opening of diplomatic relations between Cuba and the United States, and the upcoming elections in Bolivia, it is clear that scholars and activists need to be vigilant in ensuring that important gains in critical food systems education—such as PRONERA—are not lost. In this rapidly evolving political moment, ongoing critical analysis is needed of the role that education plays in either perpetuating or contesting the contemporary food system, both in formal and informal education systems.

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References

Apple, M.W. 2006. *Educating the "right" way: Markets, standards, god, and inequality*. New York: Routledge.

Barbosa, L.P. 2015. *Educación, resistencia y movimientos sociales: La práxis educativo-política de los Sin Tierra y de los Zapatistas*. Mexico City: LIBRUNAM.

Barbosa, L.P. 2016. Educação do campo [Education for and by the countryside] as a political project in the context of the struggle for land in Brazil. *The Journal of Peasant Studies*. Doi:10.1080/03066150.2015.1119120.

Baronnet, B. 2008. Rebel youth and Zapatista autonomous education. *Latin American Perspectives* 35 (4): 112–124.

Bradley, K., and H. Herrera. 2016. Decolonizing food justice: Naming, resisting, and researching colonizing forces in the movement. *Antipode* 48(1): 97-114.

Branford, S., and J. Rocha. 2002. *Cutting the wire: The story of the Landless Movement in Brazil*. London: Latin America Bureau.

Cadji, J., and A. Alkon. 2014. One day, the white people are going to want these houses again. In *Incomplete streets: Processes, practices and possibilities*, eds. S. Zavestoski, and J. Agyeman, 154–175. London: Routledge.

Caldart, R.S. 2004. *Pedagogia do Movimento Sem Terra*. Sao Paulo: Expresso Popular.

Carnoy, M. 1985. The political economy of education. *International Social Science Journal* 37 (2): 157–173.

Carolan, M.S. 2006. Social change and the adoption and adaptation of knowledge claims: Whose truth do you trust in regard to sustainable agriculture? *Agriculture and Human Values* 23 (3): 325–339.

Caron, P., et al. 2014. Making transition towards ecological intensification of agriculture a reality: The gaps in and the role of scientific knowledge. *Current Opinion in Environmental Sustainability* 8: 44–52.

Carter, M., ed. 2015. *Challenging social inequality: The Landless Rural Worker's Movement and agrarian reform in Brazil*. Chapel Hill: Duke University Press.

Carter, M., and H.M. Carvalho. 2015. The struggle on the land: Source of growth, innovation, and constant challenge for the MST. In *Challenging social inequality: The Landless Rural Worker's Movement and agrarian reform in Brazil*, ed. M. S. Carter, Chapel Hill: Duke University Press.

Cleaver, H.M.J. 1972. The contradictions of the Green Revolution. *The American Economic Review* 62 (1/2): 177–186.

CPATI (Colonia Pirai Agroecological Technical Institute). 2015. *Cuarenta Años de la Fundacion Colonia Pirai: Memoria Historica*. Santa Cruz: CPATI (Colonia Pirai Agroecological Technical Institute.

Daniel, P. 2013. *Dispossession: Discrimination against African American farmers in the age of civil rights*. Chapel Hill: University of North Carolina Press.

Diniz-Pereira, J.E. 2005. Teacher education for social transformation and its links to progressive social movement: The case of the landless workers movement in Brazil. *Journal for Critical Education Policy studies* 3 (2): 92–123.

Dissanayake, W. 1992. Knowledge, culture, and power: Some theoretical issues related to the agricultural knowledge and information system framework. *Knowledge, Technology & Policy* 5 (1): 65–76.

Eshuis, J., and M. Stuiver. 2005. Learning in context through conflict and alignment: Farmers and scientists in search of sustainable agriculture. *Agriculture and Human Values* 22 (2): 137–148.

Fernandes, B.M. 2009. Sobre a tipologia de territórios. In *Territórios e territorialidades: Teoria, processos e conflitos*, eds. M. A. Saquet, and E. S. Sposito, 197–215. Sao Paulo: Expressão Popular.

Francis, C., T.A. Breland, E. Ostergaard, G. Lieblein, and S. Morse. 2013. Phenomenon-based learning in agroecology: A prerequisite for transdisciplinarity and responsible action. *Agroecology and Sustainable Food Systems* 37: 60–75.

Freire, P. 1973a. *Pedagogy of the oppressed*. New York: Continuum.

Freire, P. 1973b. *Education for critical consciousness*. New York: Seabury Press.

Freire, P., et al. 1986. *Pedagogia: Diálogo e conflito*. Sao Paulo: Cortez.

Godek, W. 2015. Challenges for food sovereignty policy making: The case of Nicaragua's Law 693. *Third World Quarterly* 36 (3): 526–543.

Gray, I., et al. 1997. Power, interests and the extension of sustainable agriculture. *Sociologia ruralis* 37 (1): 97–113.

Gruenewald, D.A. 2003. The best of both worlds: A critical pedagogy of place. *Educational Researcher* 32 (4): 3–12.

Guthman, J. 2008. Neoliberalism and the making of food politics in California. *Geoforum* 39: 1171–1183.

Henke, C.R. 2008. *Cultivating science, harvesting power: Science and industrial agriculture in California*. Cambridge: The MIT Press.

Heyneman, S.P. 2005. The history and problems in the making of education policy at the World Bank. In *Global trends in educational policy*, vol. 6, eds. A.W. Wiseman, and D.P. Baker. San Diego: Elsevier.

Hilimire, K., S. Gillon, B.C. McLaughlin, B.M. Dowd, and K. Monsen. 2014. Food for thought: Developing curricula for sustainable food systems education programs. *Agroecology and Sustainable Food Systems* 38: 722–743.

Holt-Gimenez, E. 2006. *Campesino a Campesino: Voices from Latin America's farmer-to-farmer movement for sustainable agriculture*. Oakland, CA: Food First Books.

Ingram, J. 2008. Agronomist–farmer knowledge encounters: An analysis of knowledge exchange in the context of best management practices in England. *Agriculture and Human Values* 25 (3): 405–418.

IPEA. 2015. *Relatório da II Pesquisa Nacional sobre a Educação na Reforma Agrária*. Brasilia: Instituto de Pesquisa Aplicada.

Klein, M. G., J.A. Girón, B. Hernández Zavaleta, M. López López, S.I. Navarro Martínez, B.C. Salazar Narvaéz, A. Saldívar Moreno, N.E. Santos Baca. 2014. Desde Chiapas: Criterios básicos para la exigencia de pertinencia cultural y lingüística en la educación, In *Desenmascarar la discriminación: La violencia del sistema educativo mexicano hacia los pueblos originarios y las personas con discapacidad*. eds. P.T. Baltazar, 69–94. San Cristóbal de Las Casas, Mexico: Incidencia Civil en la Educación.

Kloppenburg, J.R. 1988. *First the seed: The political economy of plant biotechnology, 1492–2000*. Cambridge: Cambridge University Press.

Leff, E. 2004. Racionalidad ambiental y diálogo de saberes. Significancia y sentido en la construcción de un futuro sustentable. *Polis. Revista Latinoamericana* 7: 1–29.

Lerner, A.M., and H. Eakin. 2011. An obsolete dichotomy? Rethinking the rural-urban interface in terms of food security and production in the global south. *Geographical Journal* 177: 311–320.

Lewontin, R., and R. Levins. 2007. *Biology Under the Influence: Dialectical Essays on Ecology, Agriculture, and Health*. New York: Monthly Review Press.

Lieblein, G., T.A. Breland, E. Ostergard, L. Salomonsson, C. Francis. 2007. Educational perspectives in agroecology: Steps on a dual learning ladder toward responsible action. NACTA Journal 51: 37–44.

Lomawaima, K.T., and T.L. McCarty. 2002. When tribal sovereignty challenges democracy: American Indian education and the democratic ideal. *American Educational Research Journal* 39 (2): 279–305.

Machín Sosa, B., A.M. Roque Jaime, D.R. Ávila Lozano, and P.M. Rosset. 2010. Revolución agroecológica: el movimiento de campesino a campesino de la ANAP en Cuba. *Cuando el campesino ve, hace fe*. La Habana: ANAP y La Vía Campesina. http://www.viacampesina.org/downloads/pdf/sp/2010-04-14-rev-agro.pdf

Machín Sosa, B., et al. 2013. *Agroecological revolution: The farmer-to-farmer movement of the ANAP in Cuba* [online]. Havana and Jakarta: ANAP and La Vía Campesina. http://viacampesina.org/downloads/pdf/en/Agroecological-revolution-ENGLISH.pdf. Accessed 21 May 2016.

McAdam, D., and D.A. Snow. 1997. *Social movements: Readings on their emergence, mobilization, and dynamics*. Los Angeles: Roxbury Publishing Co.

McCarthy, J., and M. Zald. 1977. Resource mobilization and social movements: A partial theory. *American Journal of Sociology* 82 (6): 1212–1241.

McClintock, N. 2011. From industrial garden to food desert: Demarcated devaluation in the flatlands of Oakland, California. In *Cultivating food justice: Race, class, and sustainability*, eds. A. H. Alkon, and J. Agyeman, 89–120. Cambridge: The MIT Press.

McCune, N., P. Rosset, T. Cruz, A. Sandíval, and H. Morales. 2016. Mediated territoriality: Rural workers and the efforts to scale out agroecology in Nicaragua. *The Journal of Peasant Studies*. doi: 10.1080/03066150.2016.1233868

Meek, D. 2015a. Learning as territoriality: The political ecology of education in the Brazilian landless workers' movement. *Journal of Peasant Studies* 42 (6): 1179–1200.

Meek, D. 2015b. Towards a political ecology of education: The educational politics of scale in southern Pará, Brazil. *Environmental Education Research*, 21 (3): 447–459.

Meek, D. 2015c. Taking research with its roots: restructuring schools in the Brazilian landless workers' movement upon the principles of a political ecology of education. *Journal of Political Ecology* 22: 410–428.

Meek, D., and L.L. Simonian. 2016. Transforming space and society? The political ecology of education in the Brazilian Landless Workers' Movement's Jornada de Agroecologia. *Environment and Planning D: Society and Space*. doi:10.1177/0263775816667073.

Meek, D., and R. Tarlau. 2015. Critical food systems education and the question of race. *Journal of Agriculture, Food Systems, and Community Development* 5 (4): 131–135.

Meek, D., and R. Tarlau. 2016. Critical food systems education (CFSE): Educating for food sovereignty. *Agroecology and Sustainable Food Systems* 40(3): 237–260.

Molina, M.G. 2013. Agroecology and politics. How to get sustainabillty? About the necessity for a political agroecology. *Agroecology and Sustainable Food Systems* 37: 45–59.

Moll, L. 2002. The concept of educational sovereignty. *Penn GSE Perspectives on Urban Education* 1 (2): 1–11.

Moll, L., and R. Ruiz. 2005. The educational sovereignty of Latino/a students in the United States. In *Latino education: An agenda for community action research*, eds. P. Pedraza, and M. Rivera, 295–320. Mahwah, NJ: Lawrence Erlbaum Associates Publishers.

Morgan, K., and J. Murdoch. 2000. Organic vs. conventional agriculture: Knowledge, power and innovation in the food chain. *Geoforum* 31 (2): 159–173.

Nelson, Alondra. 2011. *Body and soul: The Black Panther Party and the fight against medical discrimination*. Minneapolis: University of Minnesota Press.

Rosset, P.M. 2015. Epistemes rurales y la formación agroecológica en La Campesina. *Revista Ciência & Tecnologia Social* 2 (1): 4–13.

Rosset, P.M., B.M. Sosa, A.M.R. Roque Jaime, and R.A. Ávila Lozano. 2011. The Campesino-to-Campesino agroecology movement of ANAP in Cuba: Social process methodology in the construction of sustainable peasant agriculture and food sovereignty. *Journal of Peasant Studies* 38 (1): 161–191.

Rosset, P., and M.E. Martinez-Torres. 2012. Rural social movements and agroecology: Context, theory and process. *Ecology and Society* 17 (3): 17.

Sawyer, S. 2004. *Crude chronicles: Indigenous politics, multinational oil, and neoliberalism in Ecuador*. Chapel Hill: Duke University Press.

Sbicca, Joshua. 2012. Growing food justice by planting an anti-oppression foundation: Opportunities and obstacles for a budding social movement. *Agriculture and Human Values* 29 (4): 455–466.

Schiavoni, C.M. 2016. Historical, relational and interactive perspectives in food sovereignty research, *ICAS Review Paper Series*, no. 7.

Shepherd, C.J. 2005. Imperial science: The Rockefeller Foundation and agricultural science in Peru, 1940–1960. *Science as Culture* 14 (2): 113–137.

Tarlau, R. 2012. Soviets in the countryside: The MST's remaking of socialist educational practices in Brazil. *Logics of Socialist Education*, 53–72. Dordrecht: Springer.

Tarlau, R. 2015a. How do new critical pedagogies develop? Educational innovation, social change, and Landless Workers in Brazil. *Teachers College Record* 117 (11): 1–36.

Tarlau, R. 2015b. Education of the countryside at a crossroads: Rural social movements and national policy reform in Brazil. *Journal of Peasant Studies* 42 (6): 1157–1177.

Tarrow, S.G. 1994. *Power in movement: Social movements and contentious politics*. Boston: Cambridge University Press.

Thompson, J., and I. Scoones. 1994. Challenging the populist perspective: Rural people's knowledge, agricultural research, and extension practice. *Agriculture and Human Values* 11 (2): 58–76.

White, M.M. 2010. Shouldering responsibility for the delivery of human rights: A case study of the D-Town Farmers of Detroit. *Race/ethnicity: Multidisciplinary Global Contexts* 3(2): 189–211.

White, M.M. 2011. Sisters of the soil: Urban gardening as resistance in Detroit. *Race/ethnicity: Multidisciplinary Global Contexts* 5(1): 13–28.

Wittman, H. 2011. Food sovereignty: A new rights framework for food and nature? *Environment and Society: Advances in Research* 2: 87–105.

Wittman, H. 2015. From protest to policy: The challenges of institutionalizing food sovereignty. *Canadian Food Studies* 2 (2): 174–182.

Wright, E.O. 2012. Transforming capitalism through real utopias. *American Sociological Review* 78 (1): 1–25.

Wright, A., and W. Wolford. 2003. *To inherit the earth: The Landless Movement and the struggle for a new Brazil*. Oakland: Food First!.

Yin, R.K. 2013. *Case study research: Design and methods*. London: Sage.

David Meek Dr. David Meek (PhD University of Georgia, 2014) is an environmental anthropologist, critical geographer, food systems education scholar with an area specialization in Brazil. Dr. Meek theoretically grounds his research in a synthesis of political ecology, critical pedagogy, and agrarian studies. His interests include: sustainable agriculture, social movements, and environmental education. In a series of recent publications, Meek has begun advancing a theoretical framework of the political ecology of education. This perspective illuminates how the reciprocal relations between political economic forces and pedagogical opportunities—from tacit to formal learning—affect the production, dissemination, and contestation of environmental knowledge at various interconnected scales. The various research projects that Professor Meek is involved with provide empirical data to support the advancement of the political ecology of education framework.

Katharine Bradley is a traveling faculty for the International Honors Program: Rethinking Food Security. In collaboration with activists and urban farmers in the Bay Area's food justice movement, she previously helped to start the East Bay Urban Farmer Field School (EBUFFS). Other research topics include participatory research ethics, government support for urban agriculture in the neoliberal era, and race and class dimensions of Community Supported Agriculture. She was a contributor to the Food Dignity Project, which supported her work with the EBUFFS. Food Dignity was supported by Agriculture and Food Research Initiative Competitive Grant no. 2011-68004-30074 from the USDA National Institute of Food and Agriculture.

Bruce Ferguson is a researcher and professor at El Colegio de la Frontera Sur (ECOSUR) in Chiapas, Mexico, where he is a member of the Massification of Agroecology research group. He co-coordinates Laboratorios para la Vida, an action research program that trains educators to use school gardens and local food systems as venues for learning in agroecology, the scientific process, and healthy eating, and for fostering horizontal dialog between local and academic knowledge. His research explores the interface between ecological restoration and agroecology. He teaches graduate courses in restoration ecology and food systems.

Lesli Hoey is an Assistant Professor of Urban and Regional Planning at the University of Michigan (UM), where she is the Coordinator of the Global and Comparative Planning Concentration, Co-Director of the International Planning Case Study Project, and a founding member of the UM Sustainable Food Systems Initiative. She conducts research on food and nutrition planning, policies and programs, which has included research on Bolivia's national Zero Malnutrition Program and the application of collective impact as a tool for promoting policy- and equity-based food systems change in Michigan.

Helda Morales is researcher and professor at El Colegio de la Frontera Sur (ECOSUR) in Chiapas, Mexico, where she is a member of the Massification of Agroecology research group. She co-coordinates, Laboratorios para la Vida, an action research program that trains educators to use school gardens and local food systems as venues for learning in agroecology, the scientific process, and healthy eating, and for fostering horizontal dialog between local and academic knowledge. She also works with urban agriculture from the perspectives of food sovereignty, landscape ecology, and autonomous pest prevention. She teaches graduate courses in food systems and agroecology.

Peter Rosset is professor and researcher at El Colegio de la Frontera Sur (ECOSUR) in Mexico, where he is a member of the Massification of Agroecology research group. He is also a visiting researcher at the Universidade Estadual de Ceará (UECE) and a visiting professor at the Universidade Federal de Ceará (UFC), both in Brazil, and is co-coordinator of the Land Research Action Network (LRAN).

Rebecca Tarlau is a Postdoctoral Scholar in Education at Stanford University. Her ethnographic research agenda has three broad areas of focus: (1) Theories of the state and state-society relations; (2) Social movements, critical pedagogy, and learning; (3) Latin American education and development. Her most recent project examines the educational initiatives of the Brazilian Landless Workers Movement (MST), exploring the movement's attempt to transform public schools across the countryside. Her scholarship engages in debates in the fields of political sociology, international and comparative education, critical pedagogy, global and transnational sociology, and social theory.