

**Transformative food systems education in a land-grant college of agriculture:
the importance of learner-centered inquiries**

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Abstract

In this paper we use a critically reflexive research approach to analyze our efforts to implement transformative learning in food systems education in a land grant university by applying scholarly tools to the teaching processes and its learning outcomes. As a team of learners across the educational hierarchy, we evaluate our efforts of creating transformational learning outcomes through facilitating students' inquiries in Food Systems, an interdisciplinary, lower division undergraduate course at the University of California, Davis, and part of a new undergraduate major in Sustainable Agriculture and Food Systems. We provide an overview of the course's core elements — labs, exams, assignments, and lectures — as they relate to social constructivist learning theory and student-centered inquiries. Then, through qualitative analysis of students' reflective essays about their learning experiences in the course, we demonstrate important transformative outcomes of student-centered inquiries: (1) most students confronted the commodity fetish and tried to reconcile tensions between what the food system is and ought to be, and (2) students repositioned themselves, their thinking, and social deliberation in relation to the food system. Students' reflections point to the power of learning that emerges through their inquiry process, including in the field, and from critical self-reflection. We also highlight the importance of reflective essays in both reinforcing experiential learning and in helping us better understand students' learning vis-à-vis our teaching.

Keywords

critical reflexivity, food systems, social constructivism, student inquiry, transformative learning

Transformational theory is an expression of democratic culture: it demands that we become aware of how we come to our knowledge and about the values that lead us to our meaning perspectives. As individuals, we are accountable for what we know and how we come to know it. Effective learners in an emancipatory, participative, democratic society—a learning society—becomes a community of cultural critics and social activists. Our goal is a viable pluralism supported by openness to new perspectives, critical reflection, rational discourse, a willingness to negotiate differences, and action based upon these conditions.

— John Mezirow (1995: 70)

I. Teaching and Learning in Food Systems

Issues of justice and sustainability in the agrifood system have received a great deal of attention recently, with rising interest in farming and food among the general population, academics, and students, both undergraduate and graduate (Alkon and Agyeman 2011; Allen 2008; Bawden 2005; Lieblein et al. 2004; Parr et al. 2007; Redden 2009; Weise 2009). This rising interest means that many scholars have begun teaching “food systems” classes that focus on many of the issues prominent in this very journal.

As part of this burgeoning activity, we write to share our experiences and to advocate for critical reflexivity in teaching. We believe that bringing a critical reflexive research perspective to the process of teaching can greatly enhance it. We see this approach drawing on broader theories of reflective practitioners (Schön 1983) and reflective teachers (Brookfield 1995) and aligning with the recently minted field of the Scholarship of Teaching and Learning (SoTL) (McKinney 2007), which is the systematic study of teaching/learning in higher education and the scholarly review and public sharing of this work. In a key text advocating a critical reflexive research approach to teaching, Bain (2004: 17) argues for viewing teaching and all of its elements “as serious intellectual endeavors as intellectually demanding and important” as our (non-teaching) research scholarship. Bain (2004, 164) urges educators to ask the fundamental evaluation question — “does the teaching help and encourage students to learn in ways that make a sustained, substantial and positive difference in the way they think, act, or feel...?” — and answer it through “a careful examination and honest collection of evidence” and then to move toward “using that evidence to draw conclusions about

the nature and qualities of the teaching” (ibid., 167).

We take up Bain’s challenge here in relation to a Food Systems course in which we have been involved. Evaluations of teaching and the resultant learning should start by specifying goals, and then assessing progress toward them. Our primary, overarching teaching objective is to challenge and shift students’ taken-for-granted *meaning perspectives*, defined by Mezirow (1995) as a general frame of reference or worldview that shapes sensation and delimits perception and cognition. Shifts in meaning perspectives are prominent in his transformative theory of adult education:

While we assimilate and are guided by meaning perspectives and schemes, changing events in our lives can make us feel that old meaning perspectives have become dysfunctional, that no matter how much harder we try, things do not seem to fit old ways of seeing any longer The process of transformation is the same as that which Paulo Freire has called “conscientization.” It is a generic process of adult learning (Mezirow 1995: 44, see also the epigraph).

To this end, we ask: How does a food systems course that integrates student-directed inquiry processes across multiple assignments and experiences affect students? Specifically, does providing students critical reflective and self-reflective learning experiences through student centered inquiry contribute to their heightened critical consciousness about their personal, scholastic, and civic relationships to food, agriculture, and society? Our methodology is a phenomenological case-study, rather than an experimental one. Our research team¹ includes instructors and students collaboratively teaching, reflecting, and learning about sustainability and food systems. By contributing an example of a critical reflexive research approach in food systems education, we hope to spur further dialogue around creating transformational outcomes for our students, resulting in long-term changes in how they think, act, and feel.

¹ Galt is a professor and sole instructor of record for the class. Parr was a Ph.D. candidate in education during course development. Galt hired Parr to co-design the class and to facilitate the experiential learning aspects in lab. Course design also involved Lickter, an undergraduate student who provided regular feedback during the course. Van Soelen Kim was a teaching assistant (TA) for the course in 2008 and 2009. Beckett provided feedback on course design elements and became a course TA in 2009 and 2010. Ballard, a professor in the School of Education, provided consultation on revisions for the course between 2008 and 2009.

II. Institutional Context

Our home institution, the University of California, Davis, has a new undergraduate major in Sustainable Agriculture and Food Systems. The design of the major's core curriculum stands in contrast to the behaviorist, "banking model of education" (Freire 1973; hooks 1994). Faculty, staff, and students at UC Davis conducted educational research to inform the major's creation, including a Delphi survey of practitioners, academics, current students, and alumni in the field of sustainable agriculture and food systems (Parr et al. 2007; Parr and Van Horn 2006; Trexler et al. 2006). Research participants produced a list of content knowledge, experiences, and skills deemed important for undergraduates to gain from such a program. These findings informed the major as a whole and its core classes, which were also envisioned as incorporating a liberal arts approach to education, no easy feat given that our campus is a large, research-oriented land-grant university.

The major has two introductory core courses, "Food Systems" and "Sustainable Agriculture." We focus here on Food Systems (hereinafter, "the course"), an interdisciplinary, undergraduate, lower division course with a lecture and lab component.² Lectures emphasize social and socio-environmental issues in all sections of the food system from multiple perspectives (geographical political ecology and food studies being primary ones), and labs enable students to learn about and utilize social science research methodologies in the field. Using the educational research noted above as scaffolding, Galt and Parr designed the course to develop specific competencies (Table 1) — combinations of skills, abilities and knowledge needed to perform a specific task (US Department of Education 2001, cited in Voorhees 2001, 8). An iterative and collaborative design process used these competencies as the foundation for class assignments and

² As a lecture-lab class, the course is scalable; lecture size can increase and additional lab sections can be added to maintain the integrity of the course. Since 2008 we have found that labs of 15 students work very well, and likely can have 20 students before losing their close-knit atmosphere. Lectures can be larger since the techniques used can be used in larger class sizes. If teaching assistants are allocated to labs of 15 to 20 students, the grading burden, which is substantial because of the four papers involved, remains bearable for the instructor and TAs.

activities (Figure 1).³

III. Making Course Components Deeply Meaningful: A Social Constructivist Approach

Teaching about food allows the opportunity to tap into *meaningful learning* because food is so deeply personal. Meaningful learning occurs “when the *learner chooses* to relate new information to ideas the learner already knows” (Novak 2010: 23, original emphasis). Knowledge that is learned meaningfully is “constructed from a union of our actions, feelings, and thought” which gives us “a sense of ownership and control” over that knowledge (Novak 2010: 38). This stands in contrast to knowledge gained through *rote learning*, usually by memorization, which is easily forgotten. Our challenge to ourselves was to make our teaching meaningful enough to have transformative effects.

Galt and Parr, the primary designers of the course, drew upon social constructivist learning theory, which holds that individuals best develop new knowledge by building on or renovating their existing conceptual understandings (i.e., as meaningful learning). Social constructivist learning theory also maintains that better learning results from interactive social settings where learners of varying developmental levels work and play together (Jonassen 1994). These settings are crucial because they allow for experiencing and deliberating upon varying perspectives emerging from open discussion. These interactive social settings allow for non-judgmental comparisons of learners with their peers, which creates a better self-understanding, especially of motivations and values. Thus, adult learning can be made more meaningful and transformative by setting it in the context of open social deliberation (Mezirow 1995).

The instructors fostered an explicitly democratic and collaborative learning environment by increasing student participation in a less hierarchical structure (hooks 1994). This occurred by creating seven ground rules that validate everyone’s perspectives, questions, and contributions — e.g., “We agree to create a safe, respectful, and supportive learning environment for our own benefit

³ Lori Thorp of Michigan State University provided consultation to help Galt move from broad course goals to specify competencies that students would develop.

and the benefit of our class and broader community” and “We agree to respect and support our peers, Teaching Assistants, and professor in giving voice to their own viewpoints, even if they may be opposed to our own” (for details, see Galt 2010) — and through asking students to engage in many other activities.⁴

Another core strategy for creating meaningful learning was to build *students’ inquiry process* into lecture, exams, assignments, and lab (Table 2), each of which we discuss briefly below.

Designing student inquiry into all aspects of the class allowed for diversifying the inquiry process, including such characteristics as the creator of the question, objects of study, the social circles involved in deliberating on answers, and responsibility for deliverables. The people primarily responsible for shaping the inquiry varied from the individual learner to teams of students to the instructor. Objects of study included concepts and theories and students’ lived experiences and/or values. Social deliberation was built into most assignments and took place in many settings, including informal networks (i.e., students who know each other and use these relationships to discuss class content), lab teams, office hours, and in-class deliberation involving all students. These diverse deliberation venues allowed students to engage in a variety of social circles.

Galt served as the primary lecturer for the course and developed lectures under three thematic areas: food systems concepts, problems, and solutions. Each lecture session served as a forum for deliberating on the essay exams, which were available four weeks before the exam was due to provide students with a framework for placing new knowledge from all parts of the class. The midterm and final exams, with two questions each, focused on *ill-structured problems*.⁵ These are

⁴ These included elaborating and voting on lecture topics; interviewing the professor on the first day to break the ice and show the professor’s humanity; working together in team projects; and actively asking questions about the exam. We do not have space to elaborate on each of these techniques, but can more information through personal communication.

⁵ For example, one question asked: “Why do we humans eat what we eat? Why do some have plenty to eat, while others go hungry? Use at least two different social science perspectives in your answer to each question. Be sure to address the role of personal choice, culture and social structures, and the biophysical environment.”

problems with “more than one solution is often possible [They] require analysis through multiple frames of reference. Individuals must consider alternative arguments, seek out evidence, evaluate its trustworthiness, and construct a solution that is itself open to question and further evaluation” (Lattuca et al. 2004: 33). Students had to construct their own answers by integrating information from lecture, lab, readings, and their own research and thinking into outlines that answered the questions. Outlines had to be approved by the instructors before students could turn one outline of their choice into an essay to be graded (see Clarke and Hamilton 2010).

Early in the class, students completed a Food Diary assignment. By documenting their food consumption over three days, the Food Diary acted as an inquiry into their consumption in relation to the global geography of the food system and its environmental and social impacts, thereby grounding significant global problems in their own lives.

Labs were 3-hour weekly sessions focused on student-directed inquiry in actual food system locations. The class of 22 was divided into two smaller sections led by the teaching assistants (TAs). Labs were designed around topics from production to processing to distribution to consumption. Two TA-led field trips occurred during two different lab sessions and were structured to sequentially build students’ skills in social science research, providing a scaffolded approach as students moved from campus — the most familiar context — toward independent fieldwork regionally. The first lab field trip included the Student Farm; the campus dairy; the student managed, not-for-profit Coffee House; and the corporately managed Dining Commons for the university dormitories. During the next lab session, student teams conducted fieldwork by selecting the location from the previous lab field trip they were most interested in examining, creating a fieldwork protocol including research questions created with TA guidance, interviewing site hosts in person, analyzing the responses briefly, and reporting their findings to their lab. The second TA-led lab field trip explored off-campus local food system locations, including an organic farm, a nonprofit distributor, and the food processing facility for a public school district. In teams, the students then chose a food system

location to conduct their own inquiry and visit for independent fieldwork as they had for an on-campus location.⁶

In the labs' two team inquiry projects, facilitated exercises required teams to (1) pay attention to how values inform all research processes and the criteria for measuring success, and (2) seek out information, evidence, and argumentation from actors in specific food systems locations. During both team projects, students began by choosing a location for their fieldwork, and then deliberating on the values that mattered to them (e.g., fair wages paid for work) and deciding on criteria by which these values could be measured at the specific location (e.g., percentage of fair trade coffee purchased by a food retailer).⁷ Students then used this team-negotiated framework to develop their team's research and interview questions with TA guidance. The student teams then arranged a visit with a host at the location and used their fieldwork protocol to guide their inquiry at the location, asking their interview questions and taking field notes on the host's responses and their fieldwork experiences. Teams then analyzed the data to determine their findings in relation to their research question, and presented this back to their lab section during the following lab sessions.

The last inquiry activity for students was a seven- to 10-page reflective essay on their learning experience throughout the course (based on Lieblein et al. 2005). Self-reflection is a process which

⁶ Although each lab was designed beforehand, the TAs exercised a moderate amount of autonomy over the lab experience. Weekly meetings with the professor allowed TAs to rehearse and revise the lab. TAs helped alter the contents of the lab as the quarter progressed and for the next year. Subsequent course revisions based on student feedback have greatly increased the number of lab field trips, so that every other lab session involves fieldwork, while the sessions in between are debriefings from the previous week's trip and preparation for the next week's trip.

⁷ Giving students the framework of values and criteria explicitly linked the empirical and the normative, but was conceptually challenging for both new teaching assistants who independently instructed lab, and for undergraduate students, many of whom did not have the conceptual basis or vocabulary to grasp it immediately. In the subsequent year, the course renovations team (see Galt et al. 2010, v) chose to drop the values and criteria framework as a singular framing of the normative and empirical, focusing instead on pre-existing theoretical lenses with different epistemologies — positivism, political economy, and feminism — for students to employ in their fieldwork. The theoretical lenses made the connection between the normative and empirical explicit, but these were already decided for students because they were assigned one of these theoretical lenses for their fieldwork. The adoption of theoretical lenses yielded positive results to be described in future work.

entails scrutinizing and possibly rejecting the validity of one's own habitual beliefs about the operations, procedures, and structure of social relations and institutions (Mezirow 1995). The graded reflective essay was a deeply personal inquiry: students were asked to inquire within about their learning experiences in the course by connecting fieldwork experiences to theoretical and conceptual knowledge developed in lectures, lab discussions, and readings. The reflective essay served both as an activity to enhance student learning by continuing to construct their knowledge and practice their self-assessment skills, and as evaluation data for instructors to gauge the effectiveness of the course.⁸ Overall, most of these inquiry processes require students to reflect and explore what is valuable to them in a subjective way, and then link it to empirical inquiry and reportable results.

IV. Evaluation Data and Methods of Analysis

To understand the effects of placing the inquiry process at the center of the course in all of its various manifestations, we treat our 2008 course as a non-experimental, interpretative, and retroactive case study, where the activities and student responses and our own experiences serve as the basis for observations and interpretations about the learning process students went through; this is in contrast to a pre-designed experimental method that can elucidate the effects of a single or small number of practices. In addition to drawing upon our experience with the course (from our positions as instructor, co-designers, teaching assistants, and student), we analyze data on the course and its outcomes from two main sources, listed in descending order of importance below:

- 1) content of 19 students' reflective essays (our methods are described below as this is our most important data source, and we note that the course had a total of 21 students, so there were no issues of selection bias); and

⁸ This explanation does not include everything students did, and we note that the sheer number of activities and frequent due dates overwhelmed some students. In subsequent course offerings, we honed some assignments and cut those not helping advance the course learning goals.

2) end-of-quarter interview (EQI), run as a whole-group, singular feedback experience conducted by the UC Davis Teaching Resources Center (TRC) as a third-party course evaluation, without instructors present, which briefly supplements the analysis to draw broader conclusions about the range of student views and experiences.

At the most basic level, the reflective essays as data represent students' attempts at following assignment instructions and addressing its prompt, which was:

First, you should use food systems and learning terminologies to describe the food system's structure and functioning ("what" the food system is), the process of food system analysis ("how" you studied it), and the goals and values involved ("why" you studied it). Second, you should select one or more key issues that emerged during your food system fieldwork/analysis and explore them further in the light of relevant lectures, lab discussions, and readings. It is important to describe such issues ... through the lenses of multiple perspectives, including environmental perspectives ... and social perspectives Third, you should reflect on your personal (but not private) experience from the food systems inquiry. ... Pay special consideration to reflecting on, and describing if and/or how your learning was influenced by communication with food system actors (farmer, distributor, retailer, worker, etc.) and your peers (classmates, team members).⁹

Yet, many students' reflections went beyond the expectations of the assignment. We note that students might use positive exaggeration in their writing for dramatic effect. However, we maintain that assessing one's development is an important skill which requires practice, and that these kinds of reflections can be used as a source of data about individuals' subjective experiences that cannot be easily collected through another method.

We used qualitative methods by coding students' reflective essays to elicit data about the outcomes of core course activities and to explore emergent themes in student learning. Codes were developed in an iterative process involving all authors, starting with general discussion about major themes of interest, especially those related to course goals, and also using open coding to look for emergent themes. These two sets of codes — for preselected themes and emergent themes — were

⁹ The assignment has since been substantially modified, simplified in many parts but with greater elaboration provided on the reflection process.

refined to create a final set of codes. Final codes included: (1) the inquiry process and outcomes as they relate to food systems actors and locations, (2) the inquiry process and outcomes as they relate to teams and peers; (3) values; (4) interdisciplinarity; (5) systems thinking; and (6) metacognition. For all of these codes, we applied sub-codes to capture changes in reported cognition, behavior, and emotion. We then applied the codes to the 19 reflective essays and each essay was coded independently by two authors.¹⁰ From these coded essays, code sheets were produced that contained all data coded by the six final codes identified above. Subsequently, we analyzed the code sheets for noteworthy themes and engaged in dialogue and reflection to refine our understandings. The trustworthiness of the study is potentially limited by our tendency to highlight positive aspects.

V. Findings: Understanding Outcomes of the Inquiry Process from Students' Reflections

This section relies a great deal on students' direct reflections about their learning to convey the richness of the data and experiences, and uses two parts to understand students' inquiry processes. First, we explain the outcomes of the student-directed inquiry process during field trips and fieldwork by creating a framework to show students' transformations created by grappling with the commodity fetish and their routes of action as they attempt to reconcile empirics, or what is, with their values, or what ought to be. Second, we discuss how students in their reflections (re) situated themselves, their thinking, and the social deliberation process.

Student-directed Inquiries: Grappling with the Commodity Fetish

The experiential learning during fieldwork and field trips excited many students, as shown by the EQI, in which four of 21 students noted that they were the aspect of the class they liked the most (in comparison, two students mentioned lectures, two mentioned the readings, and two mentioned other assignments). Students' team project presentations after the fieldwork acted as

¹⁰ We normed our codes by independently applying them to a few reflective essays and comparing our results, which provided a venue in which to discuss discrepancies in our code use. Once normed, each reflective essay was independently coded by two of the authors. Both codings made it into the final code sheets.

debriefings and reflection to help solidify the experience; these are crucial elements sometimes neglected when requiring fieldwork (Kent et al. 1997). These field-based learning experiences helped bridge the gap between academic and lived experiences in a very tangible way, and it helped make the study of food systems more personally relevant — and therefore quite meaningful — to students. Starting with on-campus field trips provided a concrete entry point to begin to explore food systems from a social science perspective by examining students' everyday, often taken-for-granted, experiences. By focusing inquiries at actual food systems locations, an additional benefit is that values and ideologies “can be discussed in terms of apprehensible reality involving people and circumstances that are known, rather than as abstractions” (Allen 2010, 305).

As evidenced in their fieldwork, essay exams, and food diaries, student-centered inquiries led to substantial transformation of understanding and values awareness. This commonly took the form of students' realizations of the complexities and problems that exist in the system that provisions their food on a daily basis, their struggles to reconcile empirical evidence with their views of how the world ought to be, and the need to act in a new way based on their changed, or challenged, understandings. We call these realizations by students “grappling with the commodity fetish.” Harvey (1990, 422) defines commodity fetishism as the way “markets conceal social (and we should add, geographical) information and relations:”

The grapes that sit upon the supermarket shelves are mute; we cannot see the fingerprints of exploitation upon them or tell immediately what part of the world they are from. We can, by further enquiry, lift the veil on this geographical and social ignorance and make ourselves aware of these issues ... But in so doing we find we have to go behind and beyond what the market itself reveals in order to understand how society is working. This was precisely Marx's own agenda. We have to get beyond the veil, the fetishism of the market and the commodity, in order to tell the full story of social reproduction (Harvey 1990: 423).

While commodity fetishism is a central concept for critical social scientific analysis of the capitalist food system, Galt did not explicitly explain the concept of commodity fetishism in lecture nor in the reading, yet much of lecture was based upon going more deeply into how food systems functioned,

and a core text, *Fast Food Nation* (Schlosser 2002), is a popular example of lifting the veil of the commodity fetish.

Eleven of the 19 students wrote about their own conceptual struggle with these issues in their reflective essays that we coded as grappling with the commodity fetish, and students attributed this learning to several aspects of the course. They particularly identified the lab experiences as helping them connect direct experience with abstract conceptual learning. Two illustrative quotes are: “The labs have given me the opportunity to see, touch, and interact with a few nodes of the almost infinitely sprawling food system. To try and move my brain back and forth between the scales of what I saw and how what I saw fits into the larger food system is an exercise for my brain (Student 9)” and “Information and concerns brought up in lecture and readings came to life in the fieldwork. I very much enjoyed learning through interactions with people whose livelihood is dependent on the food system” (Student 19).

These 11 students reported learning a great deal about things they had not thought about when they pushed beyond the products that confront them on store shelves. This came out in explanations about the veil of ignorance: “One of the most significant things confirmed to me in this class was the lack of transparency throughout the food system” (Student 14). Seeing past the commodity fetish, one representative statement from a student notes the system of people behind food: “I see now, more than ever, that the food I buy affects the lives of more than myself and the people who grew it; there is a system of people involved in every choice I make and every food I eat” (Student 18).

Learning more about conditions and processes behind the commodities of the food system produced novel insights which were often disturbing. Since we visited both industrial and alternative segments of the food system, students described confronting the commodity fetish for both segments. Students more versed in alternative agrifood systems were more likely to note a similar veil of ignorance across these segments of the food system and to be surprised by it. For example,

upon finding the unwillingness of an organic food distributor to disclose information, one student noted: “I assumed that they would be willing to answer most of my questions partially because, based on their supply of organic products, I assumed that we would share similar values. I would have expected this kind of non-cooperation from a multi-billion dollar food processor like Kraft, but not from this so-called ‘green’ distributor that sells to the Food Co-op” (Student 7).

The majority of students wrote in their reflective essays about experiencing, wrestling with, and attempting to resolve tensions between their values and how they found the food system to be, i.e., between is and ought to be. For example, one student wrote, “every individual operates under larger societal forces, forces that empower or disable them from consuming or producing simply in accord with one’s values” (Student 5). The fieldwork most strikingly brought out the tensions between values and empirical discoveries (Figure 2), although the tensions were also heightened by students’ experiences with their food diaries and the course material generally. For most, trying to resolve this tension between is and ought to be involved changing their ways of thinking, feeling, and/or acting. New behaviors come out prominently in their writing. Figure 2 identifies three main routes of action noted by students: (1) changing their consumption behavior to become more “responsible eaters” (Berry 1990), (2) bringing good food to others, as described by Guthman (2008), and (3) calling and organizing for social justice and structural social change through critical consciousness (Allen 2010; Freire 1973). We take this diversity of action as important; as Goodman (2008, 383) notes, “what could be more radical/critical than providing students ... with those tools of the geographical imaginary to make their own connections and, yes indeed, their own politics?”

The most common action described by students was that of changing their individual consumption behavior by becoming more responsible eaters (Figure 2), which is not surprising given that this is the most common route espoused by popular food writers (Guthman 2007). As one student noted, “As an individual I can see how I am the one who influence[s] the food system and how as individuals we can create the change” (Student 3). Another wrote, “[A]s I had learned more

and more about sustainability and our food system, I try even harder to have a better eating habit, being more sustainable by buying foods more locally, at the farmer's market; eating less processed and packaged foods; and just being more aware in my surroundings to help the environment and society be more sustainable" (Student 21). We see this new understanding by students, when it exists in isolation of the other routes of action, as stemming from "neoliberal consciousness" arising out of neoliberal subjectivities (Read 2009) and reinforced by recent moves in food politics as "a progenitor of a neoliberal anti-politics that devolves regulatory responsibility to consumers' via their dietary choices" (Guthman 2007: 264). This change in behavior, if focused on exclusively, constrains food system citizenship to personal choice enacted through individualized action and existing market arrangements.

The second route of action, "bringing good food to others" (Guthman 2008), stems from what we call "liberal consciousness." Only three of 19 students noted the importance of this form of action. For example, one student wrote, "Of course I am still learning myself, but am I helping others learn how to be better consumers? How can I help get the word out about what I believe in?" (Student 2).

More common than "bringing good food to others" was students' structural thinking and identifying the need for social change toward social justice. Following Freire, this route of action stems from "critical consciousness." Four students reflected directly on the need for structural change, and four others implied it in their writing. One student noted her own agency within the context of solidarity for social justice: "I want to walk lightly, speak loudly, and be respectful and accountable to people who do not have the power, resources or desire to act in the ways that I do. I want to face the toughest challenges and join hands to overcome them" (Student 7). More generally, critical consciousness was implicit in students' comments that the course gave them a new interest in the politics behind the food system, e.g., "The class has sparked my political interest and empowered me to stand up for what I believe in" (Student 2). Similarly, students' reflections implicitly called for

structural change, as in statements such as this:

The key issue about the food system that stood out to me ... is the extent of the unequal amount of distribution of resources around the world. ... Many of these poor countries have high levels of debt they cannot pay in terms of currency. Instead, cheap labor is used to grow high value crops and sell them to [repay] lenders. What bothers me most is that we can clearly see that developing countries have the resources, skills, and the ability to produce high energy foods but cannot use these foods for the survival of their own people (Student 10).

A small proportion of students noted feeling overwhelmed and flirting with disconnecting from mainstream society: “when I am constantly bombarded with ill news and mounting problems that are clearly unsustainable, hope can be hard to grasp. I too often think to myself, ‘Forget everyone else, I’m homesteading’” (Student 4). Helping students deal with despair that can arise from the tensions between students’ values and their empirical findings and content knowledge learned in class was addressed in the last class session being oriented around hope while asking what sustains the unsustainable (cf. Buttel 2006), and has since been the subject of many email exchanges and conversations between Galt and former students. We feel this kind of support is an ethical necessity for those engaging in transformative pedagogy, as the problem of things not seeming to fit old ways of seeing can “lead many persons to psychotherapy” (Mezirow 1995: 44).

We do not know all the reasons behind students’ various routes of action to overcome the normative tension discovered in pushing past the commodity fetish (Figure 2). Empowerment theory argues that “changes in beliefs and attitudes contribute to the participation of individuals in social change. In addition, the theory assumes that individuals will engage in social action and work for the collective good if they develop a sense of critical consciousness” (Allen 2008, 160, paraphrasing Gutierrez, 1995). Students’ reflections as data support this view. In addition to the insights from empowerment theory, we suspect students’ already-formulated political orientation shaped their routes of action. That numerous routes were taken to resolve the tension is far from a failure; indeed, the most important lesson for us as educators is that the student-directed inquiry process created changed understandings that were deeply meaningful, which commonly led to

changed behaviors as students sought to resolve the tension they felt between what the food system is and what it ought to be.

Overall, students' reflections suggest that it is very powerful for them to confront the commodity fetish in their own inquiry processes, and that most did so even when not formally introduced to the concept. We agree with Goodman (2008) that this style of learning based on their own research experiences, rather than just being fed defetishization "from on high" in didactic lecture, is best. We hypothesize that it has more transformative potential because it is based on meaningful learning stemming from an authentic challenge, and learners' need to reconcile existing understandings with new and different experiences that cannot be easily ignored — the basis of Mezirow's (1995) transformative theory of adult education and subsequent additions (Taylor 2007).

Students' Resituating of Themselves, Their Thinking and Their Community of Learners

In addition to grappling with the commodity fetish and the transformations that it produced, the course experience also changed how students thought about their position in the food system, their thinking processes, and learning through deliberation. Students frequently located themselves and their standpoint within the structure of the food system by explaining their role as individuals and understanding the system in relation to their agency to influence it. One student noted, "Dumpster diving is my personal favorite way to say 'f--- you corporate food consumerism'" (Student 7). Others explained how they were unwilling participants in a broken system, identified the interplay between structure and individual agency, and highlighted the uniqueness of bridging the academic study of food systems with their lived experiences. Students also noted that the course had given them a new interest in the politics behind the food system. As previously discussed, this sense of agency was directed in a number of ways, ranging from personal consumer choices to political organizing for structural change (Figure 2). In this way, students' systems thinking, especially relating themselves to the larger food system structure, was one of the emergent properties of the inquiry-based course experience.

Another important emergent property of the class experience was metacognition, or thinking about thinking. Metacognition marks a level of self-awareness that allows learners to be self-critical and to self-assess as they move forward in their learning (Flavell 1979); in other words, through metacognition, we can better understand, situate, and change our own cognitive processes. Metacognition is an important foundation for personal and societal transformation; as Bawden and Macadam (1988, cited in Ison 1990: 9) note, “when thinking about change we should start by thinking about thinking” Before we discuss how this manifested, we must note that many students did not like practicing self-reflection, and a handful of students failed to reflect at all, a necessary starting place for metacognition.¹¹ Others who succeeded in reflecting noted the difficulty they had. One wrote: “I don’t care for such self consciousness ... I do exercises like this with some reluctance; however, I think I reject it more from my own arrogance than the value that they actually bring me” (Student 5). Another student noted her difficulty but identified a more institutional or cultural reason: “It’s also been difficult for me to write seven to ten pages of reflection This problem might come from the fact that I have gotten little practice writing semi-lengthy reflection pages. Understanding what and how we know is little emphasized in most school work, making this essay a bit of a novel experience” (Student 9). The difficulty that students experienced with reflection also likely stems from issues of cognitive development; the most prominent typologies of students’ epistemologies, developed first by Perry, note that most students enter college as *received knowers* who have the view that knowledge is absolute and received from authorities (West 2004). Critical self-reflection as a cognitive process will not proceed very far if students are firmly locked in this epistemological stage. We note, however, that this stage should be disrupted by many experiences in the class, including learning from their peers and their location hosts, encountering multiple perspectives employed by the instructor and in readings, and direct exposure to the concept of

¹¹ Three students’ reflective essays completely lacked reflection, being instead descriptions of course activities and concepts learned, rather than reflecting on the personal outcomes of their learning processes.

epistemology itself. We also suspect that the difficulty of reflection is cultural as well; students' discomfort with reflection arises because it does not fit the hegemonic behaviorist, "banking model of education" (Freire 1973; hooks 1994), nor does it follow the format of disembodied scientific writing.

The vast majority of students did engage in metacognition through reflecting on their learning and knowledge. Most common were students' reflections on gaps in their awareness before the class, and in societal awareness generally. Specifically, six students mentioned a profound gap in their thinking — that they didn't think about food much before the course — and that their thinking had fundamentally shifted. Lickter, in a discussion with Galt after the course was over, noted that one of the most important outcomes for her was her increased ability to see gaps in her knowledge. Another student wrote, "I have realized how unaware of the complexities of food I was. But why had I never learned this before? Why had I never asked?" (Student 19). Some students wondered about the social structures shaping the general lack of knowledge: "What am I not being told? As this class has revealed, there are many things that we the public are not aware of" (Student 4).

The reflective essays also revealed increased sensitivity to other perspectives, which is a characteristic of more advanced epistemologies in the Perry model (West 2004). Students explained the necessity of studying food systems from multiple perspectives and how problems and solutions differ depending on vantage point. One student explained, "One thing that I have really taken away from this class is the necessity of looking at a situation from multiple perspectives and realizing that problems are not one-dimensional but have many intricately interwoven issues" (Student 2). Another noted the complexity: "many of the issues we have covered in examining food systems are not linear and with that it is difficult to write an essay that begs for an intro, thesis, body, and conclusion. I almost cut up my paper and pasted it on a poster, with lots of arrows" (Student 9). Learning in the field helped make it evident that knowledge about a situation cannot be reduced to a single academic perspective or administrative responsibility, that "social problems" and

“environmental problems” are intrinsically interdisciplinary, and addressing them must be based on a recognition of complexity.

Many noted a change in their awareness about how other people learn and the value of including others in their learning process. For example, one student noted, “By identifying my learning style ..., I became aware of how [it] differ[s] from other people’s learning style” (Student 21). For a handful of students, this translated into explicitly noting the importance of the social deliberation: “Having conversations in classrooms, living rooms, and dining rooms about food and our power to change the way it gets produced for us, or by us, empowers us to take action and learn about our world” (Student 7). Another explained, “when we come together and present our ideas with one another something happens, and it goes beyond just hope and encouragement. Progress happens” (Student 4).

We have seen numerous students experience profound transformations in the course as well as the early ripple effects into our larger community. For example, one staff member of our campus’s dining services emailed Galt, discussing a student who became very active in petitioning for more fair trade food: “SHE IS SO INCREDIBLE, Ryan, and SO inspired by your class. Thank you for helping us light the fire within these students. The work you do is rippling into the world, in a beautiful way” (28 October 2010).

VI. Conclusion

Our studies of food systems throughout this quarter are relevant to every citizen of the world (assuming that they eat), and frankly should be duplicated in every scholarly institution worldwide.
— Student 13

The design and implementation of our Food Systems course has been challenging and rewarding for us as a team. Our analysis of the 2008 offering indicates that students learned a great deal, and that many were indeed transformed by their coursework experiences. The data from students’ reflective essays suggest that the student-centered inquiries prompted substantial learning — especially confronting the commodity fetish in their own investigations and trying to reconcile

encountered tensions between what the food system is and what they feel the food system ought to be — beyond what is possible in the classroom alone. This aided — indeed, required — students repositioning of themselves, their thinking, and social deliberation vis-à-vis the food system. As such, and even though our course contexts differ greatly, we concur with Goodman's (2008, 383) proposal that the research process should be part of pedagogy and “not simply as the mere transference of research.” We would go farther, arguing that facilitating students' inquiry processes produces transformative learning that is essential for today's global context.

Many of the learning experiences in the class were deeply meaningful for students because they were based on direct experience and took students' interests and values as a starting point. Students' reflective essays demonstrated their critical self-reflective learning prompted through the inquiry process. This supports Bawden's (2005, 175) idea that “assimilation of experiential stimuli,” especially those that create tension or productive conflict, trigger both epistemological and normative changes. We have seen these changes resulting in students' increased epistemic thinking, which allows thinkers to better recognize their worldview and the way it delimits what they know and how they know something; we suspect that many progressed along the epistemological stages in Perry's typology (West 2004). Students' ability to question, problematize, and transform how they have arrived at a particular position of knowledge is only made possible when they engage in epistemic learning (Mezirow 1995). The experiences in the course, especially the inquiry processes, were a powerful way to have students begin to wrestle with epistemology.

Our analysis highlights the dual importance of learners' reflective essays as assignments to encapsulate the experience of a course: (1) they are immensely valuable, and challenging, for students to write because they help them to summatively inquire about the changes — cognitive, affective, and behavioral — that have been prompted within themselves, and (2) they allow instructors to better understand how students experience assignments and activities and the class as a whole. On this second point, they offer data that is qualitatively different from, but

complementary to, formal student evaluations of the course, third-party evaluations, and instructors' reflections. Because they directly reflect students' meaning making, reflective essays are an *invaluable* data source for instructors seeking to understand students' learning in their classes.

We want to conclude on the contrast in outcomes between different pedagogical models and the need to build the movement to improve transformational learning. The outcomes of the course would simply not be possible through the banking model of education. The banking model produces less well-educated students, which can be demonstrated quantitatively and qualitatively, than that of social constructivist pedagogy. As Guskin (1994, cited in Barr and Tagg 2000: 199) pointed out almost two decades ago, “the primary learning environment for undergraduate students, the fairly passive lecture-discussion format where faculty talk and most students listen, is contrary to almost every principle of optimal settings for student learning.” One of the reasons we, as faculty, continue to replicate this impoverished learning environment is simple social reproduction within a constraining organizational context — why radically rethink the way we were taught, when this requires effort, especially within an institutional environment that has yet to strongly value transformational teaching and learning? The answer deep in many of us is that we feel we must change the way we teach to improve student learning — to facilitate their transformation into active knowledge producers, engaged citizens, and democratic members of our global community — to ultimately change the food system and the world.

It is very difficult to do this for a number of reasons. One is that the “transaction costs” of arranging and facilitating experiential learning activities are substantial. We have developed a number of strategies to reduce these for both the instructor and TAs. First, we capture the initial labor of the course designers by creating a shared Google Doc spreadsheet of possible fieldwork hosts, with one sheet for each different section of the food system — agricultural inputs, farming, processing, distribution, retail, consumption, disposal, and governance. This becomes an inter-generational, living document accessible and modified by the next teaching team. Second, we place

most of the labor of making contact and arranging the visits on the student teams themselves. The TAs give the corresponding sheets to the teams that need them, and they make the arrangements (with guidance by a standardized email form to explain the trip, and email and phone etiquette suggestions) as an integral part of the inquiry process.

Another important barrier is that we as faculty often feel quite alone in our want to provide these kinds of education experiences. Universities as organizations are “less interested in change than in preservation,” so we need a movement approach (Palmer 2000: 16). “As a movement grows, the affirmation one does not receive from organizational colleagues is received from movement friends ... it is important to recall that a healthy society is one in which organizations and movements are related symbolically” (Palmer 2000: 16). Thus, as we increasingly see ourselves as part of a movement to reform teaching, we need to increasingly share our learning with one another and help each other cultivate our own motivations and competencies to create change within our organizations.

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Figure captions

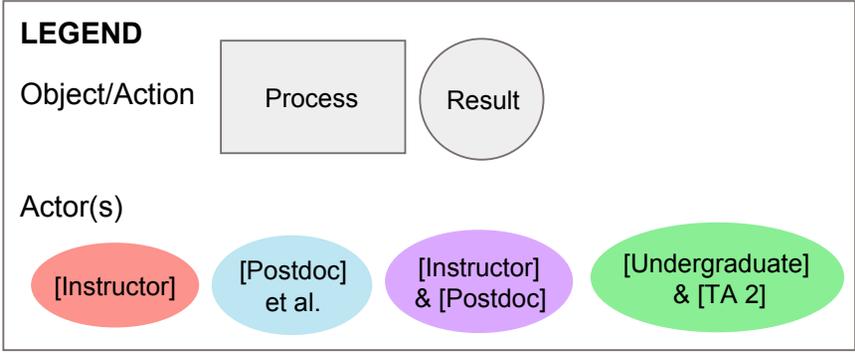
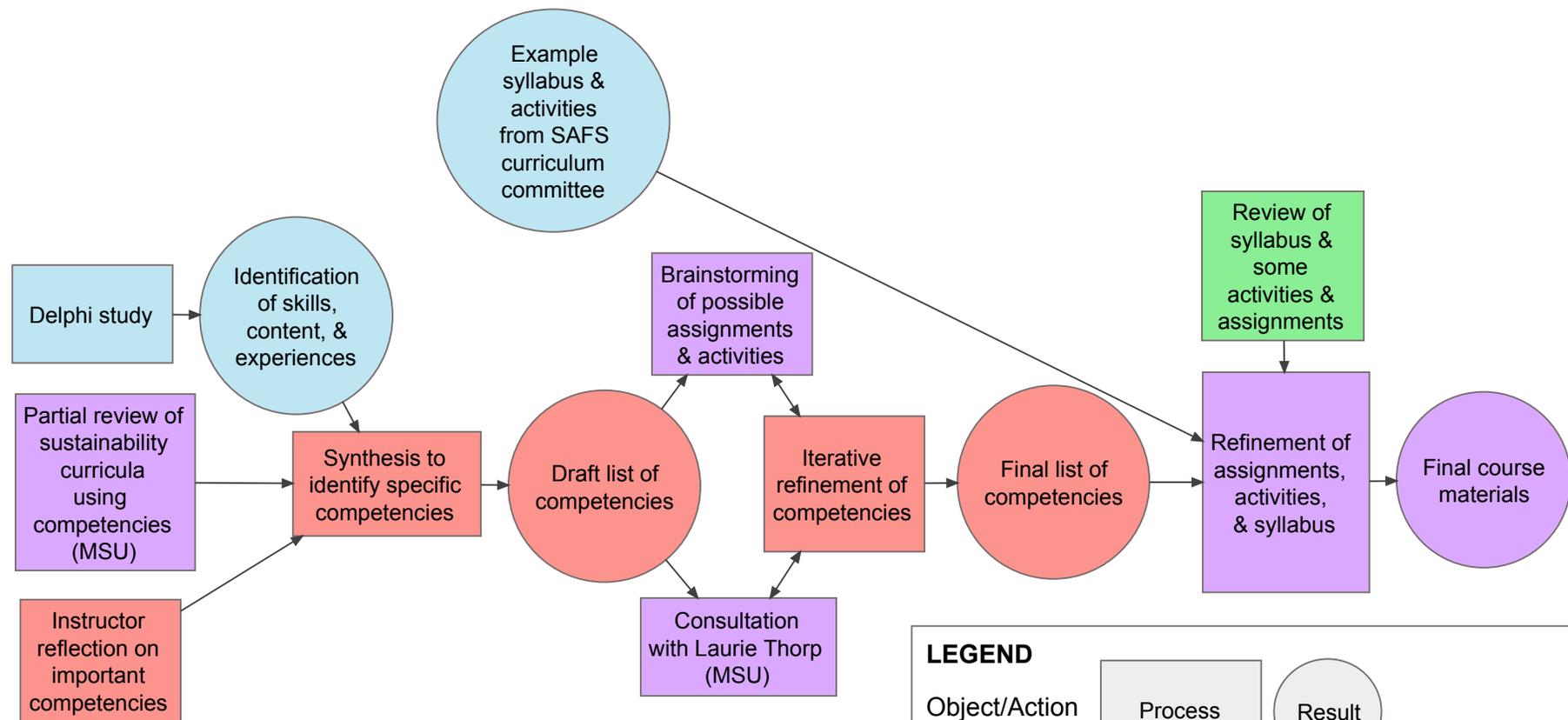
Figure 1: The course design process

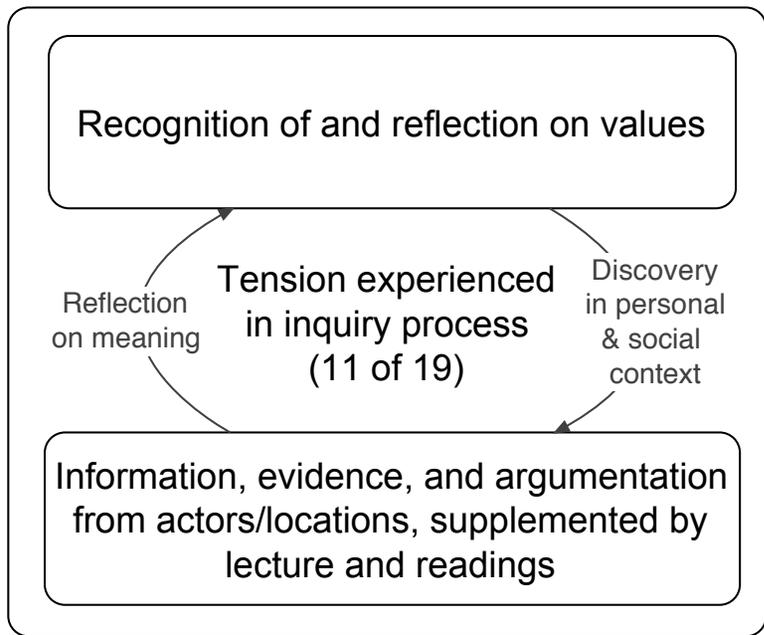
Figure 2: Tensions experienced in the inquiry process, and routes of action to resolve them (information in parentheses refers to number of students reflecting in this manner)

References

- Alkon, A.H. and J. Agyeman, eds. 2011. *Cultivating food justice: race, class, and sustainability*. Cambridge, Massachusetts: MIT Press.
- Allen, P. 2008. Mining for justice in the food system: perceptions, practices, and possibilities. *Agriculture and Human Values* 25(2): 157-161.
- Allen, P. 2010. Realizing justice in local food systems. *Cambridge Journal of Regions, Economy and Society* 3(2): 295-308.
- Bain, K. 2004. *What the best college teachers do*. Cambridge, Massachusetts: Harvard University Press.
- Barr, R.E. and J. Tagg 2000. From teaching to learning: a new paradigm for undergraduate education. In *Learning from change : landmarks in teaching and learning in higher education from Change magazine, 1969-1999*, ed. Deborah DeZure, xxvii, 460. Sterling, Virginia: Stylus Publications, Published in association with the American Association for Higher Education.
- Bawden, R. 2005. A commentary on three papers. *Agriculture and Human Values* 22(2): 169-176.
- Berry, W. 1990. The pleasures of eating. In *Our sustainable table*, ed. Robert Clark, 125. San Francisco: North Point Press.
- Brookfield, S. 1995. *Becoming a critically reflective teacher*. San Francisco: Jossey-Bass.
- Buttel, F.H. 2006. Sustaining the unsustainable: agro-food systems and environment in the modern world. In *Handbook of rural studies*, eds. Paul J. Cloke, Terry Marsden and Patrick H. Mooney, 213-229. Thousand Oaks, California: SAGE.
- Clarke, P. and T. Hamilton. 2010. Beyond tinkering: high demand x high support: challenging rather than accommodating problems in higher education. http://web.mac.com/beyondtinkering/Beyond_Tinkering_In_Higher_Education/Welcome.html. Accessed 15 November 2010.
- Flavell, J.H. 1979. Metacognition and cognitive monitoring: a new area of cognitive developmental inquiry. *American Psychologist* 34(10): 906.
- Freire, P. 1973. *Education for critical consciousness*. New York: Seabury Press.
- Galt, R.E. 2010. CRD 20: Food Systems. http://hcd.ucdavis.edu/faculty/webpages/galt/personal/Galt_Faculty_Page/CRD_20.html. Accessed 15 October 2010.
- Galt, R.E., D.M. Parr, J. Van Soelen Kim, J. Beckett, L. O'Sullivan, M. Lickter, A. White, H.L. Ballard and M. Van Horn 2010. Lab manual version 3.0 for CRD 20: Food Systems. Davis.
- Goodman, M.K. 2008. "Did Ronald McDonald also tend to scare you as a child?": working to emplace consumption, commodities and citizen-students in a large classroom setting. *Journal of Geography in Higher Education* 32(3): 365-386.
- Guthman, J. 2008. Bringing good food to others: investigating the subjects of alternative food practice. *Cultural Geographies* 15(4): 431-447.
- Guthman, J. 2007. Commentary on teaching food: why I am fed up with Michael Pollan et al. *Agriculture and Human Values* 24(2): 261-264.
- Harvey, D. 1990. Between space and time: reflections on the geographical imagination. *Annals of the Association of American Geographers* 80(3): 418-434.
- hooks, b. 1994. *Teaching to transgress: education as the practice of freedom*. New York: Routledge.
- Ison, R.L. 1990. Teaching threatens sustainable agriculture. *Gatekeeper Series* 21).
- Jonassen, D.H. 1994. Thinking technology: toward a constructivist design model. *Educational Technology* 34(4): 34-37.
- Kent, M., D.D. Gilbertson and C.O. Hunt 1997. Fieldwork in geography teaching: A critical review of the literature and approaches. *Journal of Geography in Higher Education* 21(3): 313 - 332.
- Lattuca, L.R., L.J. Voigt and K.Q. Fath 2004. Does interdisciplinarity promote learning? *The Review of Higher Education* 28(23-48).
- Lieblein, G., T.A. Breland and N. Sriskandarajah 2005. Analysis of a Farming System and Conversion Planning: Guidelines for the project work in Agroecology and Farming Systems (PAE302), NOVA Agroecology M.Sc. Program.

- Lieblein, G., E. Østergaard and C. Francis 2004. Becoming an agroecologist through action education. *International Journal of Agricultural Sustainability* 2(3): 147-153.
- McKinney, K. 2007. *Enhancing learning through the scholarship of teaching and learning: the challenges and joys of juggling*. Bolton, Massachusetts: Anker Pub. Co.
- Mezirow, J. 1995. Transformation theory of adult learning. In *In defense of the lifeworld: critical perspectives on adult learning*, ed. M. R. Welton, 39-70. New York: State University of New York Press.
- Novak, J.D. 2010. *Learning, creating, and using knowledge: concept maps as facilitative tools in schools and corporations*. New York: Routledge.
- Palmer, P.J. 2000. Divided no more: a movement approach to educational reforms. In *Learning from change : landmarks in teaching and learning in higher education from Change magazine, 1969-1999*, ed. Deborah DeZure, 15-19. Sterling, Virginia: Stylus Publications, Published in association with the American Association for Higher Education.
- Parr, D.M., C.J. Trexler, N. Khanna and B.T. Battisti 2007. Designing sustainable agriculture education: academics' suggestions for an undergraduate curriculum at a land-grant university. *Agriculture and Human Values* 24(4): 523-533.
- Parr, D.M. and M. Van Horn 2006. Development of organic and sustainable agricultural education at the University of California, Davis: a closer look at practice and theory. *HortTechnology* 16 (3): 426-431.
- Read, J. 2009. A genealogy of homo-economicus: neoliberalism and the production of subjectivity. *Foucault Studies*6): 25-36.
- Redden, E. 2009. Green revolution. Inside Higher Ed, 23 April. <http://www.insidehighered.com/news/2009/04/23/agriculture>.
- Schlosser, E. 2002. *Fast food nation: the dark side of the all-American meal*. New York: Perennial.
- Schön, D.A. 1983. *The reflective practitioner: how professionals think in action*. New York: Basic Books.
- Taylor, E.W. 2007. An update of transformative learning theory: a critical review of the empirical research (1999–2005). *International Journal of Lifelong Education* 26(2): 173-191.
- Trexler, C.J., D.M. Parr and N. Khanna 2006. A Delphi study of agricultural practitioners' opinions: necessary experiences for inclusion in an undergraduate sustainable agricultural major. *Journal of Agricultural Education* 47(4): 15-25.
- Voorhees, R.A. 2001. Competency-based learning models: a necessary future. *New Directions for Institutional Research* 2001(110): 5-13.
- Weise, E. 2009. On tiny plots, a new generation of farmers emerges USA Today, 13 July. http://www.usatoday.com/news/nation/environment/2009-07-13-young-farmers_N.htm.
- West, E.J. 2004. Perry's legacy: models of epistemological development. *Journal of Adult Development* 11(2): 61-70.





Routes of action, as attempted resolution of tension:

Personal (neoliberal consciousness)

Community wellbeing (liberal consciousness)

Radical (critical consciousness)

Changes in consumptive behavior (10 of 19)

Bringing good food to others (3 of 19)

Promoting and organizing for structural change (4 of 19, 4 others implicit)