Cultivating Sustainability: Impact of Campus Agriculture Projects on Undergraduate Student Connections to Nature, Environmentally Responsible Behaviors, and Perceptions

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To the many students I have been blessed to know and get my hands in the Earth with.

Thank you.

The architect Louis Kahn pointed to great campus architecture as the thing that would remind students that they have the power to do great work. I'd argue that great campus farms do the same work.

(Shannon-DiPietro, 2011, p. 312)

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Abstract

The number of colleges and universities with campus agriculture projects[1] in the US has grown from an estimated 23 in 1992 to 300 today with possibly increased numbers predicted. The profile emerging from campus agriculture projects looks a lot different from the traditional land grant colleges of agriculture. In spite of this emergent trend and staunch advocacy for campus agriculture projects, limited empirical research on agriculture-based learning in higher education exists outside agriculture degrees and theoretical work of scholars such as Liberty Hyde Bailey and David Orr. The purpose of this exploratory research was two-fold. First, prevailing characteristics and pedagogical objectives of campus agriculture projects were explored through a survey of all known US campus agriculture project managers and educators. Second, interviews, photo-elicitation, field observations, and use of the Connectedness to Nature Scale and Inclusion of Nature Scale were conducted during the summer of 2013 at Yale Farm and the University of Montana's Program in Ecological Agriculture and Society Farm (P.E.A.S.). At these two farms, I studied whether and in what ways did academic courses connected to campus agriculture projects at US colleges impact participating students' perceptions of and connection to nature.

This mixed methods research illustrates a re-visioning of how higher education is interfacing with agriculture and agriculture-based education beyond traditional land grant colleges of agriculture through attention to sustainability initiatives and pedagogies. Agriculture-based education and campus agriculture projects can distinctively impact students' perceptions of connectedness to nature through experiencing agriculture's role in establishing a new

[1] I am using campus agriculture project throughout the paper for ease of reference, but many of the sites consider their agriculture projects as educational farms or gardens.

worldview. Data offers empirical evidence that campus agriculture projects deepen connection to place, and offers substitutes to anthropocentric beliefs and behaviors. While experiences at the campus agriculture projects motivated pro-environmental and social behaviors specific to farming, food, and the more-than-human community at the farms, participating students did not report an increase in cognitive connectedness to nature or behaviors beyond food, farming, or the more-than-human community at the farms.

Keywords: campus agriculture projects, sustainability education, higher education, pedagogy, educational farms, place attachment, perceptions, connectedness to nature, environmentally responsible behavior

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PREFACE

In May of 2008 Chatham University acquired a 388-acre farm, a forty-minute commute outside Pittsburgh and its urban campus (albeit located on a 32-acre arboretum). Eden Hall Farm, willed to benefit women, was used as a retreat destination from 1938 to 2008 for women working in the Heinz Company factories to escape the heavy pollutants of the city and its steel mills. That event put in motion Chatham University's College of Women Organic Garden and joining the burgeoning number of campus agriculture projects. With a small amount of university funds, a large amount of labor, and the help of students enrolled in environmental studies and general curriculum wellness courses spring and fall, and a collaborative working community supported agriculture (CSA) during the summers, we established a half-acre vegetable garden in sight of an old orchard and root cellar. Each season and semester, including alternative spring breaks and short intensive Maymesters brought new groups of students to work, study, and learn. At the time there were murmurings of other college agriculture projects beginning across the country. Certainly, the writings of David Orr and Middlebury College's student farm were resources and inspiration, but at the time Dr. Lynne Bruckner, Dr. Nancy Gift, and I had no idea to the scale of the number of campus agriculture projects we were joining with our half-acre vegetable garden in those first years.

Creating the organic garden was a pivotal experience for me, and I believe, based on their comments and evaluations also for the students enrolled. From the very beginning, students were active participants in the decision-making process; they weighed in on everything from choosing plants, planning the garden layout to selecting the fence style. Through that first spring in 2009, we discussed our perspectives and hopes related to growing food and the environmental

sustainability. There were many successes and failures. The beans and hot peppers that first season were unpredictably plentiful as the students seeding flats in the greenhouse in the spring were often different than those harvesting late summer into fall. The vision was to create an inclusive place for students from all backgrounds, as well as faculty and staff. The goals were:

- *Connect* students and the Chatham community to gardening, and fresh produce, while addressing place-based sustainability education.
- *Provide* hands-on learning experiences for undergraduate and graduate students through growing at Eden Hall Farm Campus that link gardening and agriculture to curriculum across disciplines while addressing sustainability.
- *Establish* a system of growing vegetables, honey and mushrooms for our college community.

Walking into that first class to teach, I was not prepared for how gardening pushed students to confront their assumptions and perceptions about nature: dislike of dirt; how carrots grow, and how they look before being topped and sold in stores; the amount of damage deer, groundhogs, rabbits and pests can have without preventative measures; and, despite my enjoyment, the amount of work it required beyond classroom time. Through class discussions, journals, and observations I also witnessed how working and learning in the garden affected students' appreciation of and connectedness to nature and food. One student wrote, "I have a deeper understanding and appreciation for the earth, its soil and rain than I once had now I've been a part of producing food that actually grows from the earth." Although nine of the fourteen came to the class as vegetarians or vegans and favored organics, most left the class better educated, more inclined to pick local above organic and be more involved in their food choices.

Statements included: “I think it’s important to know where your food comes from and the processes involved in growing and harvesting produce. I feel that sustainable practices, like those of organic gardening are integral aspects of environmentally conscientious living,” and “I now shop for local and organic produce,” wrote two students. Not only did students describe a heightened awareness of choosing local and organic foods but many of them expressed interest in continuing to garden. More comments included: “It [the class] has made me enjoy growing my own food more and it has made me want to continue to be involved in the production of my food.” “Maybe someday I will attempt my own garden…as long as I can get someone else to help with the manual labor.” And just as significant, students connected to one another in ways only possible outside the classroom through experiential learning. According to one student Jessie Buckner (2009), “I confided and laughed with friends that were only possible through the organic gardening class. Every week, I could have the tiny bit of satisfaction that I had done something positive and productive” (p. 10). For this and many other reasons, the experience raised questions for me and became the impetus of this research.

My own perceptions of nature, agriculture, and food have also been forever changed through the experience of teaching about sustainable agriculture at Chatham University during three growing seasons. As destructive as agriculture can be, I align myself with Wendell Berry (1977), Aldo Leopold (1968) and phenomenologist like Merleau-Ponty (1996) by positioning agriculture as part of a more inclusive and dynamic vision of the natural world. This posits a holistic relationship between humans as a species, other species, plants, and acts of cultivation. It is a position in response to the presumption that separateness and individuality lies at the root of environmental issues (Kidner, 2001). From Merleau-Ponty’s perspective, “Our own body is in the world as the heart is in the organism” (1962, p. 203). My body and garden lie within nature

and the earth as part of a living system. As Wendell Berry (2009) writes, "We should understand 'the whole problem of health in soil, plant, animal, and man (*sic*) as one great subject'" (p. 231).

Reflecting of my own relationship with agriculture, I garden for three key reasons:

- The sheer joy of eating;
- Connectedness to the larger, more-than-human world; and
- Reverse focus from self to ground by participating in a working relationship with nature.

By consciously growing my own food, I engage in and place my own physical need for sustenance in the living system. This position is in stark contrast to writings of Paul Shepard (1998), Jared Diamond (1987), Chellis Glendinning (2007), who call into question the socio-economic underpinnings of large scale, industrial agriculture. Diamond (1987) condemned agriculture as "the worst mistake in the history of the human race" (p. 64), favoring hunter-gather societies instead. Wes Jackson (1985) "calls essentially all till agriculture, almost from the beginning, into question, not because sustainable till agriculture can't be practiced, but because it isn't and hasn't been" (p. 2). He criticizes the destructive effects of monocultures.

However, Jackson unlike Shepard, Glendinning, and Diamond argued these are legitimate "problems *in* agriculture" as opposed to "problems *of* agriculture" (p.1), and that only through solving problems of agriculture can problems in agriculture be addressed. Jackson proposes perennial polycultures as a solution. Although Jackson proposed what he calls a "bio-technical fix" (p.3), the agrarianism of Berry (1977) and Leopold (1968) submit problems in agriculture stem from remiss of behaviors as a result of held perceptions, beliefs, worldviews, and ethics. It is perceptions, beliefs, worldviews, and ethics of nature that underlie behaviors,

both environmentally responsible *and* irresponsible. Jackson's offered solution does not address the cause of problems of agriculture but serves as a solution stemming from a shift in perceptions, beliefs, worldviews, and/or ethics of nature. Berry and Leopold challenge the perceived separation between humans and nature in modern society. Although I agree agriculture even beyond conventional and industrial methods is fraught with issues, it exists within nature. To this point, agriculture is performed by many species of animals for crops, meat, and milk (Mueller, Gerardo, Aanen, Six & Schultz, 2005). It is from this theoretical position I start my own journey of questioning, understanding, and research into the diversity of perspectives and outcomes of campus agriculture project learning—intellectual, emotional and physical for students, and myself.

CHAPTER 1: INTRODUCTION

> *An educational farm is a medium for teaching sustainability via experience–even more than it is a vehicle for transferring the tools and techniques of a certain type of agriculture.*
>
> (Slotnick, 2011, p. 233)

Sayre and Clark (2011) cite a growth from an estimated 23 in 1992 to nearly 100 in 2011. The *New York Times* (Spencer, 2012) and *USA Today* (Grasgreen, 2011) to the *Chronicle of Higher Learning* (Carlson, 2008) all have written about the resurgence of campus agriculture projects in higher education. The profile emerging from the current rise in campus agriculture projects with a focus on sustainability looks a lot different from the traditional land grant university and colleges of agriculture. The effects of campus agriculture projects go further than just working towards carbon neutrality of campuses, but build on the knowledge and perspectives of the students, faculty, and staff involved. Leopold (1968), influential in developing modern environmental ethics focused his attention on setting students within nature, not just physically but perceptually. Leopold argued through experiences in farming students learn the basic concept of ecology and ethics, "that land is a community…to be loved and respected" (p. viii). Both ecology and ethics rest on the single principle—the individual is an interdependent member of a community. The moment we, as humans realize we are dependent upon nature, a perceptual shift occurs. We come to understand our place in the natural community. Through experiences on ecologically diverse campus agriculture projects, students understand:

(1) Human dependence on the land and its natural community;

(2) The interdependence between species that sustains all life; and

(3) Humans exist as a part of nature.

Once the exclusive terrain of land grant colleges of agriculture, campus agriculture projects present alternatives to the research and teaching of conventional agriculture. Instead agriculture-based education and campus agriculture projects through attention to sustainability initiatives and pedagogies as well as student leadership and initiatives can distinctively impact students' perceptions of connectedness to nature through experiencing agriculture's role in establishing a new worldview. Pramod Parajuli, Prescott College faculty in sustainability and co-founder of the Learning Gardens Laboratory program at Portland State University argues the difference between land grant colleges of agriculture and campus agriculture projects constitute in "*learning to* garden or farm versus gardening and farming *to learn* [emphasis added]" (P. Parajuli, personal communication, November 14, 2014). Tim Crews (2011) in reporting about Prescott College's Jenner Farm exemplified this distinction, writing that the liberal arts are enhanced by the encouragement of critical thinking around food and farming. Josh Slotnick (2011) wrote, "an educational farm is a medium for teaching sustainability via experience—even more than it is a vehicle for transferring the tools and techniques of a certain type of relationship" (p. 233). Similarly, Melinda Shannon-DiPietro (2011) writing about Yale Farm stated one of the three goals of the farm was, "to create opportunities for learning that would generate in students a belief in their abilities, a strong environmental ethic, and a visceral connection to the land" (p.311).

This dissertation explores whether and in what ways is higher education is interfacing with agriculture and agriculture-based learning beyond traditional land grant colleges of

agriculture, and how campus agriculture projects[2] deepen connection to place, impact perceptions of connectedness to nature, and offer substitutes to anthropocentric beliefs and behaviors. Through exploratory research, the two component mixed methods study addresses gaps in empirical research on agriculture-based learning in higher education outside agriculture degrees and the theoretical work of scholars such as Liberty Hyde Bailey (1905) and David Orr (1991, 2004) necessary to justify a commitment of resources by colleges—financial, physical, and human. Study 1 explored the diversity of characteristics of emerging campus agriculture projects, and pedagogical objectives–intellectual, emotional, and physical using responses of campus agriculture project managers and educators through a closed and open-ended survey. The survey was submitted to all known higher education institutions with campus agriculture projects. A list of 302 colleges and universities with a total of 353 separate campus agriculture projects was formed through compiling higher education institutions who self-reported on the Association for the Advancement of Sustainability in Higher Education's (AASHE) Sustainability Tracking, Assessment and Rating System (STARS), the Sustainable Endowments Institute's College Sustainability Report Card (Sustainable Endowments Institute, 2011a), as well as colleges and universities identified in *Fields of Learning: The Student Farm Movement in North America* (Sayre & Clark, 2011), "Rodale's Farming for Credit Directory" (Rodale Institute, 2011), "Student Farms in the US and Canada" (Parr, 2011), and through word of mouth to the researcher.

Study 2 studied the impact of summer internships at two campus agriculture projects on students' perceptions of connectedness with nature through seeing agriculture's role in

[2] I am using campus agriculture project throughout the paper for ease of reference, but many of the sites consider their agriculture projects as educational farms or gardens.

establishing a new worldview. Data collected during summer of 2013 at Yale Farm and the University of Montana's P.E.A.S. Farm, included student interviews, photo-elicitation, field observations, and use of the Mayer and Frantz's (2004) 14-item Connectedness to Nature Scale (CNS) and the one item Inclusion of Self in Nature Scale (INS) (Schultz, 2001), a 7-point Venn diagram representing connections between nature and self with incrementally overlapping circles, illustrates students' perceptions of nature, agriculture, food, cognitive connection to nature, and emotional connection to the farms.

This chapter outlines the context of agriculture-based learning in higher education and campus agriculture projects, the purpose of this exploratory, the scope of study, research questions, limitations, and definitions of key terminology.

Agriculture-based Learning in Higher Education

Land grant institutions have long operated farms focused on research and teaching practical conventional agriculture. A few colleges such as Berea College, Deep Spring College, and Sterling College outside of land grant colleges of agriculture have positioned sustainable farms at the center of the schools integrating farm work into academics and college life from their inception. However, in recent years there has been considerable growth in food and sustainable agriculture initiatives outside land grant colleges of agriculture both in scope and number occurring in universities and colleges nationwide (Barlett, 2013). The volume of sustainable agriculture education programs on college and university campuses has increased along with participation of students and educators in the newly established Sustainable Agriculture Education Association (SAEA) in 2006 (Parr & Trexler, 2011). Literature also indicates the number of campus agriculture projects has also grown (Barlett, 2013; Sayre &

Clark, 2011; Parr & Trexler, 2011). Ranging in size from under an acre to thousands of acres, agricultural products grown, scale of production, outlets of distribution, curriculum, and co-curricular activities, campus agriculture projects are committed to educational experiences in production, marketing, community building, and sustainability. Furthermore for the first time in generations, agriculture training is occurring in force outside traditional land grant institutions (Sayre & Clark, 2011).

Campus agriculture projects occurring outside of traditional land grant colleges of agriculture are incredibly diverse in curricular and co-curricular models, participants, and objectives even within the same campus or farm or garden. Evergreen State College operates community gardens, a permaculture demonstration site, and an organic farm. Sterling College's farm supplies their self-operated dining hall and is used to teach sustainable agriculture courses. Emerging campus agriculture projects often are difficult or messy to categorize between accepted divisions between farm, garden, market garden, and community garden. Scholars and practitioners use a variety terms sometimes interchangeably, including college farm, campus farm, student farm, educational farm, student garden, market garden, and community garden regardless to size, scale of production, or sales. Dividing gardens and farms by acreage, scale of production, agricultural products grown, outlets of distribution, and participants does not accurately group campus agriculture project objectives, missions, or models. To make matters more confusing, one-acre plots are called farms at some higher education institutions and gardens at others. For example, Yale University's one-acre sustainable food project is called Yale Farm; at the same time the University of North Florida names their one-acre plot UNF Organic Garden. The USDA defines a farm, "as any place from which $1,000 or more of agricultural products were produced and sold, or normally would have been sold, during the

year" without reference to size (MacDonald, Korb, & Hoppe, 2013). However, division along economics is also not appropriate at colleges and universities with small and large amounts of produce going to food banks, dining halls, or community members without cash sales.

In spite of differences in nomenclature, campus agriculture projects have several uniting characteristics. Campus agriculture projects do have a common objective to intellectually, physically, socially, or emotionally enrich students, learning, and campus life. Campus agriculture projects often operate outside of land grant colleges of agriculture or any agriculture degree programs. Instead of being solely connected to agriculture degrees, campus agriculture projects cross disciplines. Sayre and Clark (2011) use the term "student farm" to describe agriculture projects with a focus on students and sustainability. They define criteria of student farming as, "first, there must be some level of student initiative or possibilities for student leadership associated with the farm; second, there must be a degree of attention and concern paid to questions of environmental stewardship and sustainability" (p. 6). Sayre and Clarks' (2011) two factors precisely portray first, characteristics of current campus agriculture projects (as I will explain in this dissertation); and second, denote differences between the current trend and traditional land grant colleges of agriculture. Although these campus agriculture projects have multiple aims, sustainability physical initiatives and/or pedagogical objectives unite them. I am interested in how campus agriculture projects engage humans and nature in an analysis of ethics and experience. I use the term campus agriculture project here and throughout to unite projects whatever their name, size, scale, model, etc. under the criteria outlined by Sayre and Clark (2011).

Agriculture on US college campuses has a deeply rooted and rich history starting back in the nineteenth century, notably as a way to keep costs low for students by providing food to dining halls and the public while offering employment skills to students. At the turn of the century and through legislative means land grant colleges and universities became the site for practical agriculture training and research (Sayre & Clark, 2011). The Morrill Act of 1862 established the land grant colleges of agriculture system with a mission to teach agriculture and mechanical arts. The law gave states 30,000 acres of public land per senator and representative to sell or to profit from to provide funding for agriculture and mechanical arts instruction to broader portion of the population. The act introduced practical education to higher education and the study of philosophy, theology, law, medicine and the classics traditionally taught (NRC, 1995). Soon after, the Hatch Act of 1887 allocated monies to state land grant colleges for the creation of agricultural experiment stations to conduct original research to contribute the agriculture industry. The Second Morrill Act of 1890 followed, which provided annual appropriations to land grant institutions. The Second Morrill Act also forbade racial discrimination in admissions or required states to provide separate institutions with funds divided between the segregated institutions in a "just" way. As a result, the 1890 act led to the establishment of land grant institutions for African Americans, some still in existence today (NRC, 1995). The Smith-Lever Act of 1914 established cooperative extension services that delivered research done at land grant colleges of agriculture to farmers. In short, the Morrill Acts funded and mandated the teaching of practical agriculture. The Hatch Act increased agricultural productivity through research at experimental stations, and the Smith-Lever Act was written to disseminate knowledge produced at land grant colleges of agriculture with Hatch Act funds (NRC, 1995).

The three functions of land grant colleges of agriculture system, teaching, research, and extending knowledge and research to farmers increased farm productivity, and "generated many of the scientific and management advances" (NRC, 1995, p. 19). According to The National Research Council (1995) total factor farm productivity rose nearly 150% from 1948 to 1991. They attribute the increase in productivity to the substitution of mechanical and chemical inputs for labor and acreage. "The application of farm chemicals, combined with other yield-enhancing technologies such as improved crop varieties, has made it possible to produce more food and fiber on virtually the same amount of land" (NRC, 1995, p. 19). Advances made at land grant colleges and universities freed much of the US population from farm work at the same time transforming agriculture into a science and a business dependent on technology and manmade inputs.

In spite of the many successes of land grant colleges of agriculture, including increasing accessibility for higher education to broader segments of the population, bringing experiential education to colleges and universities, and increasing farm productivity and knowledge, critiques have arose to question the true success of increased farm yields and practices. Wes Jackson (1985) argued humans and the environment are experiencing "the failure of success" (p. 14). As farm productivity has increased, environmental and human health has been affected and often irreversibly. Soil becomes poisoned from chemical pesticides, herbicides and fertilizers, and salts from irrigation and eroded by the ton. Ground water is depleted. Genetic diversity through the development of genetically modified organisms is narrowed, encouraging vulnerability and loss of diversity to name a few. To increase farm production and success in the short-term, agriculture over the long-term has been set up to fail. Without addressing problems of and in

agriculture, the Earth will be unable to continue to support high agricultural yields, or possibly any agricultural yields and human life (Berry, 1977; Jackson, 1985).

Critiques also question the professionalization and institutionalization of agriculture as a science and as a single discipline (Berry, 1977; Mayer & Mayer, 1974; Orr, 1991, 2004). MacRae, Hill, Hennings and Mehuys (1989) contended the constructs that created success in productivity also created barriers to sustainable agriculture and the isolation of agriculture within colleges of agriculture. They wrote:

> [P]aradoxically, much of the research and research process that has made conventional agriculture so productive has been a barrier to implementing sustainable agriculture. It is our contention that we rely on too few approaches to agricultural science, that these approaches are not sufficiently comprehensive, and that agricultural scientists have traditionally been associated with too few players in the food system to establish a sufficient knowledge base for sustainable agriculture. (p. 174).

Specialization and establishment of the multi-versity, or separate colleges, a "pronounced trend with LGCA [land grant colleges of agriculture]…promoted teaching approaches that focused on and privileged the dissemination of packaged techno-scientific knowledge from specific disciplines" (Parr, Trexler, Khanna, & Battisti, 2007, p. 525). Land grant universities, meant to professionalize the trade of farming, expand research on farming practices, and educate farmers themselves instead began to isolate agriculture within an academic silo (Orr, 1991; Mayer & Mayer, 1974). André Mayer, a Tufts nutritionist in a landmark article written with his son, "Agriculture, the Island Empire" described, "the present isolation of agriculture in American life is a tragedy" (Mayer & Mayer, 1974, p. 83). They pointed to genetic research done in colleges of

agriculture without consideration to the effects on nutrition, or a strict focus on yield failing to consider of human or environmental health. Conversely, they also asserted:

> The failure of our secondary schools and liberal arts colleges to teach even rudimentary courses on agriculture means that an enormous majority, even among well-educated Americans, are totally ignorant of an area of knowledge basic to their daily style of life, to their family economics, and indeed to their survival. (Mayer & Mayer, 1974, p. 84)

Mayer and Mayer (1974) called for "a change, in both states of mind and in institutions, if agriculture is to benefit from the intellectual evaluation it deserves and needs" (p. 94).

Twenty years later, the National Research Council's Committee on the Future of the Colleges of Agriculture in the Land Grant University System was called to assess the current system in the context of the country's current needs and priorities, identify problematic conditions, and make recommendations. The National Research Council (1996) reported:

> The need to remove historic barriers and, indeed, encourage research, teaching, and extension exchanges; to make all programs in the system accessible to a wide variety of stakeholders as possible–that is, there is a firm need to create a 'new geography' that cannon be confined to a locality. (p. 20)

The National Research Council (1996) also asserted:

> There are important reasons to build partnerships among departments and among disciplines within the college, and among colleges within the university. Understanding and resolving many food and agricultural system issues requires an approach that

> accounts for complex interactions among physical, biological, social, and economic processes. (p. 52)

Critics argue multi-versity structure of colleges of agriculture had two lasting effects (Berry, 1977; Mayer & Mayer, 1974; Orr, 1991, 2004). First, agricultural research became insulated from both outside criticism and whole system thinking available only in combination with other disciplines. Critiques have gone so far to suggest if the liberal arts had originally included agriculture we might have developed not our current form of industrial agriculture but one that recognizes farming not just an economical activity but also one that is equally political, ecological, cultural and moral as well. To a great extent the development of sustainable agriculture was in response to conventional agriculture and its dependence on mechanical and chemical inputs (Parr et al., 2007).

Second, the intellectual and institutional isolation prevented students outside colleges of agriculture from engaging in farming and the food system. Critics believe the professionalization of agriculture has resulted in masses of the most educated, privileged and powerful from having any idea of the complexity of food and agriculture (Mayer & Mayer, 1974; Orr, 1991, 2004). While Bailey (1911), a key figure in the Nature Study Movement as well as the establishment of extension services championed the importance of teaching agriculture to all students, he also admitted, “the presumption is still against successful agriculture work in the literary and the liberal arts institutions, because such teaching demands a point of view on education that the men in these institutions are likely not to possess” (p. 82-83). Bailey acknowledged extending agriculture outside land grant colleges of agriculture was not feasible at the start of the twentieth century. Nearly a century later, “we have too many agricultural professionals and not nearly

enough people who understand farming and its wider social and ecological context" (p. 269) according to Orr (1991).

With the increasing recommendations by the National Research Council (1996), and research into the development and implementation of sustainable agriculture curriculum (Galt et al. 2012; Jacobsen et al. 2012; Parr et al., 2006; Parr & Horn, 2006), some land grant institutions are moving towards sustainable agriculture education. Although, Parr et al. (2007) admitted the trend "is recent" (p. 527). They contended educators and researchers of sustainable agriculture degree programs are "challenging the status quo" (p. 531) by taking an interdisciplinary approach and integrating both natural and social sciences into curriculum. Although Jacobsen et al. (2012) argued land grant institutions are "emerging as catalysts in innovative SA [sustainable agriculture] educational programs" (p. 2), they are still a small subset of undergraduate sustainable agriculture degree programs, and campus agriculture projects (Parr & Van Horn, 2006). Additionally, Parr et al. (2007) reported that although degrees in sustainable agriculture have lagged in and outside of land grant colleges of agriculture, campus agriculture projects "have been instrumental in supporting the growth of SA [sustainable agriculture] education on campuses nationwide" (p. 526).

The recently burgeoning number of campus agriculture projects happening largely outside of the land grant colleges of agriculture system as reported by Parr and Van Horn (2006), Sayre and Clark (2011), and Parr and Trexler (2011) points to a possible re-visioning of agriculture-based education—intellectually, institutionally and practically. The increasing number of campus agriculture projects echoes other agricultural and food activism in the public and private sector, including the Edible Schoolyard project in K-12 schools led by Alice Waters,

Growing Power led by Will Allen in Milwaukee, and the public embrace of critics like Michael Pollan, Mark Bittman, and others who have questioned the excesses of industrial agriculture and inequity of fresh, good in the American food system. Campus agriculture projects along with community gardens and urban farms have become places to change the world by addressing environmental and social problems in traditional agriculture, community dynamics, hunger, and food justice (Solnit, 2012). Students are playing central roles in the creation of campus agriculture projects on university and college campuses (Biernbaum, Thorp, & Ngouajio, 2006; Gardner, 2012; Parr & Van Horn, 2006; Parr & Trexler, 2011), participating in diverse experiences from tapping maple trees to growing salad greens, and managing apiaries. In the case of Greenfield Community College (Dry & Dresdale, 2014), Colby-Sawyer University (Walrod & Whife, 2013), and other institutions, students wanting alternatives to traditional agriculture and unsustainable relationships to nature are designing and implementing campus agriculture projects based on the principals of Permaculture. Creating campus agriculture projects, growing food, and teaching about the relationship between nature, people, and sustainability are activities and experiences that were not widespread in a typical college education ten years ago. A diversity of models, sizes, educational focuses, pedagogical objectives, community engagement, and student labor has emerged beyond the traditional land grant university and colleges of agriculture model (Sayre & Clark, 2011). Gardner (2012) in his qualitative thesis research found three institutional values prevalent in a study of sustainable agriculture and food systems education at sixteen liberal arts colleges and universities: community engagement, a focus on experiential learning in the liberal arts, and a commitment to sustainability all outside the traditional land grant colleges of agriculture model.

In spite of the limited research on campus agriculture projects, those that teach vegetable growing believe farming plays an important part in a student's education combining theory with practice, and instilling a connection with food, the land and nature. Campus agriculture project managers and faculty believe student experiences at campus agriculture projects will change the way students act for a lifetime. Melina Shannon-DiPetro (2011), director of Yale's Sustainable Food Project wrote, "I believe that the farm rounds out their liberal arts education and makes them a better version of themselves" (p. 313). Faculty and staff involved with campus agriculture projects identify connection to the land and integration into general education and the college as learning objectives. Evergreen College strives to incorporate their campus agriculture project into the broader curriculum at the college. Tim Crews in reporting about Prescott College's Jenner Farm (2011) wrote that the liberal arts are enhanced by the encouragement of critical thinking around food and farming. Josh Slotnick (2011) at the University of Montana identified the two outcomes for the Program in Ecological Agriculture and Society (P.E.A.S.) Farm is:

> (1) A high degree of attachment to the activity and the place and (2) a desire to maintain the feelings found at the farm, which implies the challenge of incorporating the personal changes gleaned from the farm experience into the next thing the students do…after the experience they should, quite literally, feel the potential for creating a different type of relationship between themselves and the greater world. (p. 233)

As they work in agriculture, students enter into a different relationship with the land. The experiential education campus agriculture projects afford, allow students to independently recognize their actions affect earth's living community, teaching them to be stewards of the land.

> This experience can deeply alter a student's sense of how he or she potentially fit into the surrounding reality and, more importantly, how he or she can effect positive change. I believe that this type of learning can change the world. (Slotnick, 2011, p. 234)

The transformation occurring on campus land and academic halls is being led by student interest and demand. The popularity of localism, books like *Omnivore's Dilemma* (Pollan, 2006), *Animal, Vegetable, Miracle* (Kingsolver, 2007), and films such as *Supersize Me* (Spurlock, 2004) have spurred administrators, faculty, and students to establish plots of land ranging from less than one acre to hundreds of acres for the production of food. Students want to explore the larger scope of human and ecological health through food and farming. In many cases, students are asking for farming and the modern food system to be incorporated into curriculum (Sayre & Clark, 2011).

This trend represents a commitment of resources by colleges—financial, physical, and human—to an activity that is traditionally the terrain of agricultural schools and land grant universities. The issue with the current resurgence of campus agriculture projects is the lack of assessment and empirical research available on the benefits of these projects especially outside formal sustainable agriculture programs. While there is emerging research on sustainable agriculture programs (Jacobsen et al., 2012; Parr & Trexler, 2011; Parr, et al., 2007; Trexler, Parr & Khanna, 2006), we just do not know the effect on students and learning outside land grant colleges of agriculture. With advocates believing strongly in the importance of experiences on a campus agriculture projects academically, emotionally, and physically the question then becomes how to perpetuate campus agriculture projects beyond a passing fad. Sayre and Clark (2011) note, "It is surprising how many of the seemingly novel challenges and questions posed by

campus-based farms today were raised as well by observers of the movement in its earliest decades" (p. 5). Without further evidence-based research agriculture-based education and campus agriculture projects may follow a similar fleeting path as prior agriculture-based learning movements such as the Nature Study Movement of the early 20th century occurring in elementary schools.

Purpose of this Exploratory Study

The purpose of my research was two-fold. First, this exploratory study was undertaken to aid in understanding the broader campus agriculture project trend especially outside the traditional land grant colleges of agriculture by gathering online documentation of campus agriculture projects and surveying their pedagogical objectives. Second, the purpose of this mixed methods study was to explore how do academic courses connected to campus agriculture projects at US colleges impact participating students' connections to nature, environmentally responsible behaviors, and perceptions. This study attempts to understand the affect of experiential learning and engagement in the land within campus agriculture projects on students' relationship with nature. The purpose was to explore:

- What are the prevailing models, types, characteristics, and pedagogical objectives (intellectual, emotional, and physical) of campus agriculture projects?
- How pervasive is connection to nature and sustainability as pedagogical objectives
- Whether and in what ways do academic courses connected to campus agriculture projects at US colleges impact participating students' perceptions of and connection to nature?

Scope of Study

The research has two methodological components. The first, explored the diversity of characteristics of emerging campus agriculture projects, and pedagogical objectives–intellectual, emotional and physical using responses of campus agriculture project managers and educators, through a closed and open-ended survey. The survey was submitted to all known higher education institutions with campus agriculture projects. A list of 302 colleges and universities with a total of 353 separate campus agriculture projects was formed through compiling higher education institutions who self-reported on the Association for the Advancement of Sustainability in Higher Education's (AASHE) Sustainability Tracking, Assessment and Rating System (STARS), the Sustainable Endowments Institute's College Sustainability Report Card (Sustainable Endowments Institute, 2011a), as well as colleges and universities identified in *Fields of Learning: The Student Farm Movement in North America* (Sayre & Clark, 2011), "Rodale's Farming for Credit Directory" (Rodale Institute, 2011), "Student Farms in the US and Canada" (Parr, 2011), and through word of mouth to the researcher. Participating campus agriculture project educators or managers answered twelve questions asking identifying information: name; title; staff, faculty, or student; contact information; acres or feet in crop production; and date established. The researcher also questioned participants as to which model or models best describes their campus agriculture project: academic, community, student community, residence, dining, demonstration, collaboration, integrated work, or participants could provide their own model. The survey included questions about: agriculture-based curriculum offered by their institution, required participation in the campus agriculture project by academic curriculum offerings, accessibility and availability of all students regardless of course of study, degree that campus agriculture project objectives and college mission overlap, and the

level of importance of listed intellectual, physical, and emotional pedagogical objectives on a 4-point Likert scale. Participants were also given the option to provide their own objectives. Responses were analyzed using SPSS, Excel and self-reported pedagogical objectives, which were coded in NVivo qualitative software.

The second part of the exploratory study utilized mixed methods focused on students enrolled in internships at two campus agriculture projects and the affect of the experience on their perceptions of and connection to nature. Data collected in the summer of 2013 at Yale Farm and the University of Montana's P.E.A.S. Farm through student interviews, photo-elicitation, field observations, and use of the Mayer and Frantz's (2004) 14-item Connectedness to Nature Scale (CNS) and the one item Inclusion of Self in Nature Scale (INS) (Schultz, 2001), a 7-point Venn diagram representing connections between nature and self with incrementally overlapping circles, illustrates student perceptions of nature, agriculture, and food, cognitive connection to nature, and emotional connection to the farms. The quantitative data, the CNS and INS scales were analyzed for reliability, internal consistency and statistically significant differences in the distribution between the pre- and post-experience responses. Explanations provided in open-end boxes were coded and analyzed in NVivo qualitative software. The qualitative data, interviews, photo-elicitation, and field observations were analyzed, descriptively coded, and interpreted for indications of environmental perceptions, connections, attitudes, beliefs, and behaviors. Findings illustrate student cognitive connectedness to nature, affective attachment to the farms, pro-environmental and social behaviors as well as underlying perceptions, beliefs, and concerns of nature, agriculture, and food.

School administrators and educators will in all hopes find value of such research in the justification of limited resources and advancement of campus agriculture projects outside land grant colleges of agriculture, a burgeoning population with limited empirical data. Without further evidence-based research agriculture-based education and campus agriculture projects may follow a similar fleeting path as the Nature Study Movement that occurred in elementary schools of the early twentieth-century.

Research Questions

(1) What are the prevailing models, types, characteristics, and pedagogical objectives (intellectual, emotional, and physical) of campus agriculture projects?

   a. How pervasive is the connection to nature and sustainability as pedagogical objectives (intellectual, emotional, and physical) of college and university campus agriculture projects?

(2) In what ways do academic courses connected to campus agriculture projects outside land grant colleges of agriculture impact participating students' perceptions of and connection to nature?

Limitations

Research on campus agriculture projects have been described as "scant" (Parr & Trexler, 2011, p. 173). While I hope this research adds to the collective knowledge of agriculture-based learning in higher education, this study is exploratory in nature with several limitations. First, the sampling of college and university campus agriculture projects across the US may not represent all as the large majority of sites were found through green college rating systems.

Second, Study 2 is limited to the students enrolled in internships at the university farm of Yale University and the University of Montana. These two schools were chosen for several reasons: each offered internships for undergraduates in which students work five or more days a week at the farm; both campus agriculture projects are associated with environmental studies programs as opposed to traditional agriculture degrees within land grant institutions; students take active leadership roles in each project; and most important, each in essays written for *Fields of Learning: The Student Farm Movement in North America* (Sayre & Clark, 2011) posited student perceptions and connections of nature are affected by experiences in their campus agriculture projects. There were a number of factors I could have looked at: urban campuses versus rural, east coast versus west coast, single sex versus coed education, traditionally African American campuses versus traditionally white, signatory schools of the Real Food Challenge or not, and so forth. Although these factors offer much to learn from, there were too many for the scope of this study.

I recognize the limitation and bias narrowing to these two campus agriculture projects with already positive beliefs, but they each represent a great model of what is possible. Yale University's one-acre farm, a "radical" (field notes, 2013) venture by an Ivy League college, known better for educating civic-minded students, future US presidents and politicians. Alice Waters, famous for pioneering the Edible Schoolyard program in Berkeley, California helped form Yale Sustainable Food Project and the development of the Yale Farm. The University of Montana's P.E.A.S. Farm is showcased in Smith's (2010) *Growing a Garden City*. It serves as a model for integrating community, education, and sustainability. With the choice of studying Yale Farm and University of Montana's P.E.A.S. Farm, also came limitations of gender and race. The samples at both institutions were predominately Caucasian and predominately male at the

University of Montana (which mirrors common image of an American farmer). With this all in mind, I feel this was the right place to start this research.

Another limitation in Study 2 is that the concept of connectedness to nature is abstract. The Connectedness to Nature Scale (Mayer & Frantz, 2004) and the Inclusion of Self in Nature Scale (Schultz, 2001) presumes participants can reflect on their connection to nature. Brügger, Kaiser and Roczen (2011) pointed to the fact that self-reflection can be vulnerable to recollection and bias. However, the implicit measure of the IAT, which avoids self-reflection, has demonstrated only moderate correlation with explicit measures and almost no link with either ecological concern or behaviors (Brügger et al., 2011; Mayer & Frantz, 2004).

Although I use quantitative measures, Connectedness to Nature Scale and the Inclusion of Self in Nature Scale the sample size is too small to make any significant statistical statements. A total of twenty-three undergraduate students took the pre and/or post questionnaire. The Yale University sample consisted of six undergraduate students. The University of Montana sample involved seventeen undergraduate students with eleven students participating in both the pre and post experience questionnaire. In light of the small sample size, the questionnaire results are to be interpreted only in relationship with results of the entire study and not in isolation.

Glossary of Terms

Agriculture-based education. Agriculture-based education encompasses the whole of a long tradition in utilizing gardens, farms, and agriculture as a means of teaching a variety of academic disciplines, life skills, physical activity, ethics, and interconnectedness between humans and nature. It ascribes to deeper educational philosophies of uniting practice and theory,

and students and with their immediate natural community. Agriculture-based education ranges in models, sizes, pedagogical objectives, production goals, community engagement, labor, age of students, and structure of schools, etc.

Campus agriculture projects. Campus agriculture projects are incredibly diverse in curricular and co-curricular models, participants, objectives, acreage, scale of production, distribution, etc. Scholars and educators use a variety of terms without strong delineation and often interchangeably, including college farm, campus farm, student farm, educational farm, student garden, market garden, and community garden. However, they have several uniting characteristics. Campus agriculture projects do have a common objective to intellectually, physically, socially, or emotionally enrich students, learning, and campus life. They do so crossing and uniting disciplines and often outside of traditional agriculture degrees. Using Sayre and Clark's (2011) criteria, campus agriculture must first, involve student initiatives or leadership at some level. Second, sustainability must be an objective either pedagogically or physically.

Connection to nature. Connection to nature also referred to as connectedness to nature describes a person's cognitive, affective and behavioral relationship to nature thought to be key in understanding environmentally responsible behaviors. Bruni, Chance, Schultz, and Nolan (2012) defined it as, "an individual's belief about the extent to which he or she is part of the natural environment" (p. 198), a concept that includes both intellect and emotion. Several theoretically distinct models and measures exist to assess an individual's connection to nature: connectedness to nature (Mayer & Frantz, 2004); environmental identity (Clayton, 2003; Hinds & Spark, 2009); inclusion of nature in self (Schultz, 2000, 2001); attachment to place (Vaske &

Korbin, 2001); and nature relatedness (Nisbet, Zelenski, & Murphy, 2009). Although theoretical differences exist, strong correlations between these distinct measures lead us to suspect they reveal different sides of one psychological event (Brügger et al., 2010; Schultz, 2002).

Emotional pedagogy. An approach in teaching and learning that stresses the role emotion plays in learning and integrates emotion into cognitive teaching practices. Chabot and Chabot (2004) contended emotional pedagogy is, "an emotional process asserting that in order to learn, one must feel" (p. 6). Weiss (2000) wrote, "Emotion impels what we attend to, and attention drives learning" (p. 47). The cognitive cannot exist apart from the emotional. Emotion drives and determines "what is learned and what is retained" (Wolfe, 2006, p. 35).

Environmentally responsible behavior. Environmentally responsible behaviors also referred to, as pro-environmental behaviors constitute a wide range of behaviors, "that consciously seeks to minimize the negative impact of one's actions on the natural and built world (e.g. minimize resource and energy consumption, use of non-toxic substances, reduce waste production)" (Kollmuss & Agyeman, 2002, p. 240). The motivations and barriers to environmentally responsible behavior are "extremely complex" (Kollmuss & Agyeman, 2002, p. 240) with no definitive explanation in existence. Early models featured a linear progression, environmental knowledge leading to environmental awareness and concern then leading to environmentally responsible behavior. Although this is still a common model, research shows increases in knowledge and awareness or concern are not the main factor in predicting pro-environmental behavior; emotional factors such as values, attitudes, and connectedness to nature also affect behaviors (Kollmuss & Agyeman, 2002).

Garden-based education. Garden-based education, an instructional strategy utilizes gardens as a teaching tool chiefly in primary grades for a variety of subjects including science, environmental studies, the humanities and arts. Rooted in experiential and placed-based pedagogies, garden-based education is purported to encourage healthy eating habits, experiences out-of-doors, biological diversity, and "nurture interconnectedness" (Williams & Brown, 2012, p. x). Garden-based education also is referred to in learning gardens or school gardens.

Land grant colleges of agriculture. At the turn of the century and through the Morrill Act of 1862, Hatch Act of 1887, Second Morrill Act of 1890, and Smith-Lever Act of 1914 land grant colleges and universities became the site for practical agriculture training and research (Sayre & Clark, 2011). Through these legislative means, land grant colleges of agriculture perform three functions teaching, research, and extending knowledge and research to farmers. As a result, farm productivity and scientific and management advances in agriculture have increased, including the substitution of mechanical and chemical inputs for labor and acreage, and other yield-enhancing technologies such as improved crop varieties (NRC, 1995).

Perception. Perception is the active cognitive process of selectively filtering sensorial inputs for information (Gordon, 2007). Assumed to begin with stimulation of senses, information is then organized and interpreted by the human brain (Neisser, 1978). Where attention is placed can through repetition strengthen neural networks resulting in seeing a particular way or a specific perspective. While what individuals see depends a large part on their perceptual practices, including anticipations and available information (Neisser, 1978), culture and education mediate what is experienced, and perceived. For this reason Gibson (1979) calls perception an act of attention, not an automatic response. If the world is selectively filtered

through our expectations and desires, a particular worldview is confirmed and perpetuated (Sewall, 1998).

Phenomenology. Phenomenology is closely linked to philosophy, focusing on questions of meaning and being. Its roots in Kant, Husserl, Heidegger and Merleau-Ponty define it as a mode of philosophical inquiry as well as a methodology (Randles, 2012). As a framework for research, phenomenology asks what is the lived experience of both the subject group and researcher. To perform phenomenological research is to question how humans, individually and collectively experience the world. Phenomenological researchers want to understand and know the world in which we live and describe it with as much rich detail as possible.

Photo-elicitation. A qualitative visual research method utilizing photographs to construct a visual narrative, which can prompt more discussion during interviews (Rose, 2007). Photographs as an expression of meaning, represent an individual's experiences, knowledge, values and perceptions. The images are examples of ultimately how individual photographers see the world. Photo-elicitation "capture aspects of lived experience in ways that would not be possible with other methods" (Stewart & Floyd, 2004, p.450), reaching even reticent participants (Van Auken, Frisvoll, & Stewart, 2010). Two primary variations of photo elicitation exist, external driven or images selected by researchers, and participant-driven in which subjects choose the images.

Place attachment. Place attachment refers to the emotional connection between people and places, such as when a space becomes embedded with meaning and importance for the individual or group (Kudryavtsev, Stedman & Krasny, 2012; Vaske & Kobrin, 2001). Kyle, Graefe, Mannin, and Bacon (2003) define place attachment as "the extent to which an individual

values or identifies with a particular environmental setting" (p. 250). Place attachment exists within the broader concept of defining and characterizing an individuals' relationship with the place or resource (Williams & Roggenbuck, 1989). Vaske and Kobrin (2001) proposed two concepts, place dependence and place identity influence an individuals' place attachment.

Place-based pedagogy. An approach to teaching and learning that involves "using all of the environments in which students live–natural, social, cultural–as starting points to teach concepts in language arts, mathematics, social studies, science, and other subjects across the curriculum" (Smith & Sobel, 2010, p. x). Place-based pedagogy perform four key functions: combines experience with theory; broadens connections between disciplines, community, ecosystems and students; advances learning beyond abstract knowledge to include physical and emotional intelligence; and builds community by changing residents into inhabitants with knowledge of place (Orr, 2005). To Smith (2002), place-based education overcomes the alienation and isolation of students from the world and their knowledge of it.

Social constructivism. Constructivism proposes knowledge is not discovered as in the case of positivism, but constructed based on individual and cultural experiences (Yilamaz, 2008). Social constructivism focuses on the function of environment or social context in constructing knowledge. This approach stresses how knowledge is determined by "politics, ideologies, values, the exertion of power and the preservation of status, religious beliefs, and economic self-interest" (Phillips, 2000, p. 6). As a methodological approach, constructivist research seeks to describe how the subject group has constructed reality, both individually and collectively and how perceptions, beliefs worldviews shape reality (Creswell, 2007; Neuman, 2006).

Sustainability. Although many definitions of sustainability exists, the most pervasive is defined by the Brundtland Commission of the United Nations in 1987 as, "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." Broadly, sustainability must meet all three aspects, social, environmental and economic (Petrişor & Petrişor, 2014). This definition is action-oriented and does not reflect perceptions, affections, and beliefs (significant to this paper) that underlie behaviors. McEwen and Schmidt (2007) added, "Sustainability is as much about the mindset through which the world is seen as it is about the activities taken in support of it" (p. 30).

Dissertation Structure

In an effort to make this as clear and usable as possible this study is organized closely with the traditional five-chapter dissertation structure. Chapter 2 is a review of the literature. This chapter grounds the proposed research within theoretical and evidence-based arguments: past and present surrounding perceptions of nature, human/nature relationships, place-based education, and campus agriculture projects. Chapter 3 outlines the research design, rationale for instruments utilized, the positioning of study participants, data collection, and epistemological framework. Chapter 4 discusses findings of existing pedagogical goals of campus agriculture projects in higher education found, how many institutions identify students' connection to nature as one, and the implications of these results in combination with student connections to nature, environmentally responsible behaviors, and perceptions obtained through surveys, photo-elicitations, and interviews made at Yale University and the University of Montana. Lastly in chapter 5, I conclude the study summarizing the impact of campus agriculture projects on undergraduate student connections to nature, environmentally responsible behaviors, and

perceptions of food, farming, nature, and agriculture as well as implications for further research and development of campus agriculture projects.

Conclusion

Through two components of exploratory research, this study addresses important gaps in the literature regarding agriculture-based learning in higher education outside agriculture degrees and the theoretical work of scholars such as Liberty Hyde Bailey (1905), and David Orr (1991, 2004) necessary to justify a commitment of resources by colleges. This research examines the ways higher education is interfacing with agriculture and agriculture-based learning beyond traditional land grant colleges of agriculture, and how campus agriculture projects deepen connection to place, impact perceptions of connectedness to nature, and offer substitutes to anthropocentric beliefs and behaviors.

Once the exclusive terrain of land grant colleges of agriculture, campus agriculture projects present alternatives to the research and teaching of conventional agriculture. Campus agriculture projects focus on, "farming *to learn*" as opposed to traditional land grant colleges of agriculture goals of, "*learning to* garden or farm"[emphasis added]" (P. Parajuli, personal communication, November 14, 2014). Agriculture-based education and campus agriculture projects through attention to sustainability initiatives and pedagogies as well as student leadership and initiatives can distinctively impact students' perceptions of connectedness to nature through experiencing agriculture's role in establishing a new worldview. Campus agriculture projects set students within nature, not just physically but perceptually. Through attention to sustainability initiatives and pedagogies, campus agriculture projects raise environmental, and social awareness, knowledge, skills, concerns, and beliefs of alternatives in

the food system. Most important, experiences in farming students can development community, personal, and natural attachments that impact students' pro-environmental and social behaviors.

CHAPTER 2: LITERATURE REVIEW

All studies arise from aspects of the one earth and the one life lived upon it.

(Dewey, 1900, p. 107)

This chapter reviews empirical evidence and key theorists, including Bailey (1905), Leopold (1968), and Orr (1991, 2004) supporting agriculture-based learning and campus agriculture projects. Bailey, Leopold, and Orr argue agriculture-based education and campus agriculture projects can distinctively impact students' perceptions of connectedness with nature. To aid in empirically understanding the impact of campus agriculture projects I explore the arguments of these key theorists, and the relationships between perceptions, connectedness to nature, environmentally responsible behavior, and humans and agriculture. Each area of literature of agriculture-based education and its interactions is visually mapped in Appendix D. This literature reviews also situates the value and purpose campus agriculture projects serve in higher education. To provide a more thorough and comprehensive understanding, I review current critiques of agriculture-based learning.

This literature review also addresses pedagogies that inform campus agriculture projects, specifically placed-based pedagogy and emotional pedagogy (see Appendix D). Placed-based pedagogies perform key functions that contribute to perceptions and emotional connections to place in nature including: combining experience with theory; broadening connections between disciplines, community, ecosystems and students; advancing learning beyond abstract knowledge to include physical and emotional intelligence; and building community by changing residents into inhabitants with knowledge of place (Orr, 2005). In experiential, agriculture-based learning, emotion compels attention that drives both learning and perceptions (Weiss, 2000). Agriculture-

based learning fosters emotional relationships that help students see interconnectedness between themselves, the community and the larger natural community. These ideas and areas of research will be examined and expanded upon through this chapter.

Empirical Evidence for Agriculture-based Education

Overwhelmingly, research on garden-based learning targets elementary schools. Given their relationship to the environmental movements of the late 20th century, the goals of garden programs in K-12 schools provide a comparable example to campus agriculture projects in higher education. School gardens have already become significant tools used by primary and some secondary schools to teach ecological education and provide experiences in nature (Aguilar, Waliczek, & Zajicek, 2008; Williams & Brown, 2012; Williams & Dixon, 2013). School gardens provide interdisciplinary, experiential, place-based curriculum. Students learn about the life around them and the effects of their actions all while getting their hands dirty. Limited ethnographic research also suggests school gardens cultivate a sense of belonging as students witness the garden through seasons (Cvetkovic, 2009; Thorp, 2006; Thorp & Townsend, 2001). In a study by Vaske and Korbin (2001) attachment to a place in nature was found to lead to environmentally responsible behavior.

School gardens also provide sustained experiences in nature at a time students are increasingly separated from the out-of-doors and often witness nature through a screen (Cohen & Horm-Wingerd, 1993; Louv, 2005). Scholars argue a loss of experience in both environmental and agricultural realms equals a loss of knowledge (Berry, 1977; Kahn, 1999; Orr, 2004; Sewall, 1999b; Tuan, 1990). Furthering the idea, Sewall (1990b) and Tuan (1990) proposed that our experiences inform our perceptions, attitudes and worldviews. Hence loss of experience equates

not just a loss of knowledge, but also a loss of values and attachment to the land possibly deeply affecting actions taken. While this loss of experience has been slowly happening in the western world, in the space of a century the US experience and intimacy with nature has faded to "electronic detachment" (Louv, 2005, p. 16). By covering playgrounds and the surrounding landscape with asphalt, deeming knowledge worth knowing is abstract and learned indoors, and replacing free play out-of-doors with organized sports, education has not only separated students from nature, but lessened students' perceived connection. As Sharon Gamson Dank (2010) wrote, "When ecological schoolyards are incorporated into a school's curriculum, allowing children to make the connection between themselves and local natural systems, students learn they have an impact on their environment and have opportunities to heal it" (p. 5). By tearing away the asphalt covering the soil and creating gardens, students are given opportunities to reform their relationships with nature.

In the US school gardens number in the tens of thousands. California alone has 4,000 with a Department of Education state mandate for "a garden in every school" (California Department of Education, 2012). Florida, Louisiana, New York, South Carolina, Vermont, and Texas have state, extension, or private programs that encourage school gardening. In a 2005 survey of school-garden researchers found studies focused on predominantly elementary (85%) and middle schools (38%). Most studied learning objectives in and from learning gardens included: health and nutrition (69%), self-esteem or self-concept (30%) and environmental education (30%). In quantitative studies, achievement in science, knowledge of fruits and vegetables, and changes in food preferences and consumption preceded changes in environmental attitude, self-esteem, and life skills (Phibbs & Relf, 2005). A number of non-

profit centers and associations have attempted to identify the benefits of school gardens. For example the Center for Ecoliteracy (2012) stated:

> Gardens enable students to: care for other living things; learn ecological principles; draw on different learning styles; experience the joy of nature; practice leadership skills; make connections between science, social studies, math, language arts, and other subjects; be physically active; use all their senses. (para. 2)

The Edible Schoolyard Project, started in 1995 follows a similar mission in their curriculum. Other common garden curriculum models include: 1978 Life Lab K–5 Science Program (LifeLab, 2006); 1990 GrowLab curricula (National Gardening Association, 2006); Texas A&M's Junior Master Gardener Program (Dirks & Orvis, 2005); UC Davis' curriculum Nutrition to Grown On (California Department of Education, 2005; Morris & Zidenberg-Cherr, 2002); and New York's curriculum Kids Growing Food (Faddegon, 2005), Garden Mosaics (Kennedy & Krasny, 2005). Williams and Brown (2012) outlined garden curriculum that addresses seven principles: "cultivating a sense of place, fostering curiosity and wonder, discovering rhythm and scale, valuing biocultural diversity, embracing practical experience, nurturing interconnectedness, and awakening the senses" (p. 46).

More recent studies show positive correlations between elementary school gardens and some learning objectives. Many have demonstrated how gardens have a positive effect on knowledge, preference and consumption of fresh fruits and vegetables (Cotugna, Manning, & DiDomenico, 2012; Morgan et al., 2010; Parmer, Salisbury-Glennon, Shannon, & Struempler, 2009). Morris and Zinberg-Cherr (2002) found gardening was equally effective as classroom nutrition lessons on knowledge alone. Involvement in school gardens positively correlate with

higher achievement in science (Klemmer, Waliczek, & Zajicek, 2005a, 2005b; Smith & Mostenbocker, 2005) and increased knowledge on local sustainable food systems (Moore, 1995; Morris, Briggs, & Zidenberg-Cherr, 2000; Graham, Feenstra, Evans, & Zidenberg-Cherr, 2004). Edible schoolyards have been shown to positively affect behavior: self-esteem (Robinson, & Zajicek, 2005; Sheffield, 1992; Waliczek, Bradley & Zajicek, 2001) and increased interest in learning (Lieberman & Hoody, 1998; Skinner, Chi, & The Learning-Gardens Educational Assessment Group, 2012). In Skinner's et al. (2012) study of 310 sixth and seventh grade students and their six science teachers in the Pacific Northwest, engagement in within a school garden predicted both learning in the garden but overall achievement in school.

More significant to the proposed research, studies on the effects of primary school gardens on environmental attitudes report mixed results. Demas (1979) proposed school gardens cultivate sympathy with nature. In a qualitative study, Francis (1995) reported when students participate in gardens rather than act as passive viewers, "a deeper significance and meaning is established" (p. 8). Gardens that act as an idea, place, and activity at once can become significant places. Similarly, Skelly and Zajicek (1998) reported the degree of improvement in environmental attitude regarding their gardening subjects was directly related to the amount of outdoor-activities experienced in the garden. Skelly and Bradley (2007) also found high environmental attitudes in 427 third grade students involved in school gardens with little difference on the type (either vegetable, flower, or combination gardens), but also without a control. In an evaluative review of 48 studies on garden-based education, Williams and Dixon (2013) found thirteen examined environmental empathy with 77% yielding positive effects. In one of the reviewed studies, Aguilar et al. (2008) found "no statistically significant differences were found on either variable [environmental attitudes and locus of control] in comparisons of

experimental and control group responses" (p. 243). However, students from both groups displayed positive environmental attitudes. Ratcliffe in her 2007 dissertation found an un-substantial increase in students' environmental attitudes after participating in school gardens. But qualitative data from garden instructors from the same study, note experiences gardening may have influenced students' attitudes towards soil and insects, not addressed in student ecoliteracy survey. Ratcliffe also reported significantly higher frequency of environmentally responsible behaviors in a self-reported student survey. And in two evaluative studies of empirical literature on primary school gardening both Ozer (2007) and Blair (2009) discussed insufficient rigor especially in studying environmental attitudes and other behavioral changes: including reporting less 1% change in environmental attitudes as significant in Waliczek and Zajicek (1999); a large variation in ages in a second report using the same sample (Waliczek et al., 2001). Certainly more research is needed in this area to consider any causation.

In higher education, research on the objectives and uses of campus agriculture projects is "scant" (p. 173) as described by Parr and Trexler (2011). Land grant colleges of agriculture, meant to professionalize the trade of farming, expand research on farming practices, and educate farmers themselves under the direction of the Morrill Act starting in 1862, instead isolated agriculture within an academic silo (Mayer & Mayer, 1974). As a result, land grant colleges of agriculture have focused on agriculture programs with little to no interaction with other departments or colleges. Newer programs in sustainable agriculture, although more holistic and often interdisciplinary, still focus on the preparation of farmers and those entering the food system. Regrettably, empirical studies of agriculture-based education predominantly address curriculum development within agriculture programs. Although a growing amount of studies look at curriculum design and delivery in sustainable education majors or programs (Bawden,

1996; Francis et al., 2001; Lieblein, Ostergaard & Francis, 2004; MacRae et al., 1989; Parr & Van Horn, 2006; Parr & Trexler 2011; Trexler et al., 2006), little evidence-based research exists on agriculture outside of land grant colleges of agriculture. Bouthyette (1992) does advocate for the use of agriculture and food in teaching general science education as a means of making science more accessible to all students, but without evidence-based research. Related, but not specifically to the proposed research, Hoffman, Thompson and Cruz (2004) also found participating in campus agriculture projects raised college students' self-concept and self-esteem.

What is the Purpose of Education?

What is/ could be the purpose of education? More specific to the scope of this research, what is the purpose of higher education and what should it include? Centuries ago Socrates advocated for a well-examined life as a goal of learning. Our anthropocentric definition of "life" has influenced the aspirations of education as well as its content. Often this has resulted into the unsustainable and unjust beliefs and actions towards the rest of humanity and the environment (Schumacher, 1997; Sterling, 2001). The troubles of a techno-industrial society and its effect on the earth are not an issue of a lack of education, as eighteen million undergraduate students enrolled in colleges and universities in 2009 (National Center for Educational Statistics, 2011). As Schumacher (1997) wrote, "The volume of education…continues to increase, yet so do pollution, exhaustion of resources, and the dangers of ecological catastrophe. If still more education is to save us, it would have to be education of a different thinking" (p. 208). Could it be true as David Orr (2004) argued it is the "problem *of* education rather than problems *in* education" (p. 6)? It has been the most educated (or considered the most educated) that are responsible for such atrocities as the Holocaust, wars waged, and the effects of global warming

(Schumacher, 1997; Sterling, 2001). Scholars, such as Kennedy (2011) have insisted, "the forces for change facing the world could be so far-reaching, complex and interactive that they call for nothing less than the reeducation of humankind" (p. 339).

Over two thousand years ago, Aristotle (2000) wrote that above all other responsibilities government officials should focus on education of a nation's youth. A citizen "should be molded to suit the form of government under which he lives" (p. 300). Or more appropriate to today's times, a student should be molded to the environment or bioregion in which she or he lives. If change is needed in the human-nature relationship to address problems of society and the environment then change must occur in education. The better a student's relationship with each other and the world, the better society's relationship with each other and the world.

In the US, as more and more families stop farming and move off the farm, generations are further removed from traditional ecological and environmental knowledge. As of 2012 Census of Agriculture by the USDA 3.2 million farmers operated farms, roughly one percent of US population of 312.8 million (USDA NASS, 2012). The number of family farms has also dropped 63% between 1900 and 2005; at the same time the average acreage per farm grew 67% (Dimitri, Effland, & Conklin, 2005). Orr (2004) wrote, "The decline of ecologically diverse farms and the experience of the natural world that they fostered explains in large part, I think, the…growing ignorance of how ecosystems work and how private consumption and economic growth destroy the environment." The decrease in farms and farming has significantly decreased our environmental knowledge (p. 117). Many scholars (Bailey, 1911; Dewey, 1900; Leopold, 1968; Minter, 2006; Orr, 2004; Sayre & Clark, 2011) are calling and have been calling for

ecological literacy, and even specifically agricultural literacy by a select few, within colleges and universities to address the missing knowledge about the food we eat and the planet we live on.

Connection to Nature

Human behavior has long been recognized as the root of environmental degradation (Koger & Winter, 2010; Leopold, 1968; Roszak, 1995). While endeavors such as Rachael Carson's *Silent Spring* in 1962, the first Earth Day in 1979, and Al Gore's *Inconvenient Truth* in 2006 have stirred some action; western society's overall behaviors still do not reflect enough concern long called for by scientists. The Yale Project on Climate Change Communication found only 64% of American adults in a 2011 survey believed climate change is occurring, down from 71% in 2008. Of adults surveyed 47% percent agreed new technologies could solve global warming without individuals making big changes in their behaviors (Leiserowitz, Maibach, Roser-Renouf, & Smith, 2011). Conservationists have focused on technological advances as solutions to the environmental crisis. Energy efficient appliances, gas efficient vehicles, and water treatment certainly have helped, but there is growing recognition that these technological advances cannot solve the problems alone. With more fuel-efficient cars individuals can afford to drive longer distances. Solutions to ecological damage must confront its cause—human behavior (Koger & Winter, 2010; Newhouse, 1991).

However, the motivations and barriers to environmentally responsible behavior are "extremely complex" (Kollmuss & Agyeman, 2002, p. 240). In the more than thirty years of research numerous frameworks have been developed, but no definitive explanation exist uniting factors of direct and non-direct environmentally responsible behavior. Early models featured a linear progression, environmental knowledge leading to environmental awareness and concern

then leading to environmentally responsible behavior. Although this is still a common model, research shows increases in knowledge and awareness or concern are not the main factor in predicting pro-environmental behavior (Kollmuss & Agyeman, 2002). Conversely, environmentally *ir*responsible behavior does not always indicate a lack of environmental concern in people. Many individuals care about the environment, though their concern is not always factored in their behavior (Dunlap, Van Liere, Mertig, & Jones, 2000; Kellert, 1993; Nisbet, et al., 2009; Pooley & O'Connor, 2000; Rokeach, 1968; Shultz, 2000). Instead research has demonstrated positive connections to nature have a stronger impact on pro-environmental behavior than strictly cognitive, knowledge-based relationships (Franz, Mayer, Norton, & Rock, 2005; Iozzi, 1989; Kals, Schumacher & Montada, 1999; Pooley & O'Connor; Stern & Dietz, 1994). Kals et al. (1999) in examining emotional aspects of nature-protective behavior found emotional affinity to be a strong predictor of environmentally responsible behavior when rooted in discourse on ecological responsibility and experiences in nature. How we as humans perceive, relate to and connect to nature determines our behavior.

Although empirical research is relatively recent, the significance of humans' connection with nature has long been a reoccurring theme in the writing of both environmentalists (Berry, 1977; Leopold, 1968; Orr, 2004) and ecopsychologists (Fisher 2002; Glendinning, 1994; Roszak, 1995). Leopold (1968) wrote, "We abuse the land because we regard it as a commodity. When we see land as a commodity to which we belong, we may begin to use it with love and respect" (p. viii). Our perceptions of self, others, and nature dictate our behaviors. Darwin's research on the origin of species rattled humanity by illuminating we are fellow-voyagers on this earth ship along with the rest of the natural community, to which we still have not entirely come to terms (Leopold, 1968). Darwin's research suggests we—humans— are not as above and separate as the

age of Enlightenment made us come to believe. Roszak (1995) echoes Leopold (1968) in upholding the illusion of separateness in modern society has in part lead to environmentally *ir*responsible behavior; asking us, "Let the 'you' become the Earth and all our fellow creatures upon it" (p. 17).

Several theoretically distinct models exist exploring the inclusion of nature in an individual's self-concept: connectedness to nature (Mayer & Frantz, 2004); environmental identity (Clayton, 2003; Hinds & Spark, 2009); inclusion of nature in self (Schultz, 2000, 2001); attachment to place (Vaske & Korbin, 2001); and nature relatedness (Nisbet et al., 2009). While some focus on a person's emotional, affective relationship to be key in understanding environmentally responsible behaviors (Mayer & Frantz, 2004), others point to cognitive self-concepts that include nature-in-self as an explanation (Schultz & Tabanico, 2007). Although theoretical differences exist, strong correlations between these distinct measures lead us to suspect they reveal different sides of one psychological event (Brügger et al., 2010; Schultz, 2002). Schultz explained connectedness to nature involves a combination of cognitive, affective, and behavioral components. Further, Bruni, Chance, Schultz, and Nolan (2012) defined connection to nature as, "an individual's belief about the extent to which, he or she is part of the natural environment" (p. 198), certainly a concept that includes both intellect and emotion.

Much of the research on perceptions of connectedness with nature comes from the study of human relationships. Aron, Aron, and Smollan's (1992) research argued closeness in relationships is a result of an individual expanding their sense of self to integrate other. Schematically represented in *Inclusion of Other in Self Scale* (see Appendix F), Aron's et al. showed how self and other overlaps incrementally. As perceptions of closeness increases, self

and other merge. Individuals also increasingly demonstrate empathy and willingness to help (Cialdini, Brown, Lewis, Luce, & Neuberg, 1997). Likewise, broadening practices such as perspective-taking increase self/other overlap (Davis, Conklin, Smith, & Luce, 1996; Galinsky & Moskowitz, 2000) and willingness to help (Coke, Batson, & McDavis, 1978).

Expanding one's own sense of self to include nature produces more empathic and altruistic behaviors to the earth's community. The emerging empirical evidence seems to support this theory (Brügger et al., 2010; Frantz et al., 2005; Mayer & Franz, 2004; Olivos, Aragones & Amerigo, 2011). Schultz (2000, 2001) in studies on the effects of perspective taking on concern for environmental issues found taking the perspective of non-human animals produced feelings of empathy in participants, as opposed to individuals not asked to take on perspectives. Schultz (2000) explains perspective taking, "may have expanded the participant's inclusiveness of self and reduced the degree of separation that participants perceived between themselves and nature" (p. 403). Davis, Conklin, Smith, and Luce (1996) found similar results between humans, when participants took the perspective of another person, a greater level of inclusion of other-in-self resulted. Although debate over the motivations of true altruism exist, research across the board seems to point to a positive correlation between a greater sense of connectedness and the ability to which people can take the perspective of other—whether that be human or nature (Maner et al., 2002). This provides evidence for Leopold's reasoning that a sense of community, interdependence, embeddedness, and connectedness to nature is an important predictor of environmentally responsible behavior (Frantz et al., 2005; Mayer & Frantz, 2004).

Bailey (1905), Leopold (1968), and Orr (1991, 2004) argued agriculture-based education and campus agriculture projects could distinctively impact students' perceptions of

connectedness with nature. Through experiences on ecologically diverse campus agriculture projects, students understand: human dependence on the land and its natural community; the interdependence between species that sustains all life; and humans exist as a part of nature. Instead of including agriculture within the liberal arts, education during the past century has worked to further isolate individuals from nature by containing them in the built environment, and implying learning worth knowing is abstract and separate from nature (Orr, 1991; Sterling, 2001; Williams & Brown, 2011). By Orr's (1991) account, "we have too many agricultural professionals and not nearly enough people who understand farming and its wider social and ecological context" (p. 269). Suggesting too, if the liberal arts had originally included agriculture we might have developed not our current form of industrial agriculture but one that recognizes farming as complex activity, balancing human and the natural community's needs (Mayer & Mayer, 1974; Orr, 1991). For this reason, "It is incumbent on us to take special pains… that all the people, or as many of them as possible, shall have contact with the earth" (Bailey, 1915, p. 23).

One common foundation of environmental education, agriculture-based education, and place-based education is the belief that experiences in nature will impact behaviors (Aguilar et al., 2008; Francis, 1995; Skelly & Zajicek, 1998; Skelly & Bradley, 2007; Stone & Barlow, 2005; Waliczek & Zajicek, 1999). Research supports the conclusion that certain outdoor experiences including gardening and farming can help shift an individual's perceptions of nature and their relation to it (Milton & Cleveland, 1995). Specific experiences in nature lend to specific perceptions, values and behaviors. Sandell and Ohman (2010) suggested this relational perspective with nature is significant in the development of environmental values. For example, experiences placing individuals in appreciative role with nature, focusing on preserving

wilderness without the presence of humans may then create a perception of nature without humans. Similar perceptions may result from a lack of experiences with the natural community. Environmentalists (Berry, 1977; Leopold, 1968; Nash, 1967; Orr, 2004), and ecopsychologists (Fisher, 2002; Glendinning, 1994; Roszak, 1995) alike view the perceived separation and elevation of humans from nature as the root of the current ecological problems and human irresponsible behaviors.

Conceptual Framework for Agriculture-based Education

Agriculture-based education has a long and intermittent history caught in the ongoing debate between traditional didactic education and experiential, place-based pedagogies starting heavily in the mid-nineteenth century but with roots in the seventeenth century with writings of John Amos Comenius and Jean-Jacques Rousseau (Subramaniam, 2002). Often paralleling theories in child and adult development and learning, school gardens have always incorporated progressive pedagogies and the environment (see Appendix D).

Primary to post-secondary school gardens are attributed with a number of benefits for students, the community, and the larger ecological community. At all levels, educational objectives involve academic, behavioral, social, political, and ecological outcomes (Blair, 2009; Gaylie, 2009; Sayre & Clark, 2011). Although school gardens were initially founded as a means to introduce science into US public schools in the late 19th and early 20th centuries, a wide variety of pedagogical goals quickly emerged, most of which still survive in the learning gardens of today. Pedagogical goals include teaching a variety of academic disciplines, life skills, physical activity, increasing biodiversity, civic engagement, ethics, and interconnectedness between humans and nature (Gaylie, 2009; Kohlstedt, 2008; Williams & Brown, 2012). Needs of

the day, have periodically lent trends and added expectations to school gardens. World War II school victory gardens rallied for increased production to relieve pressure on food supply (Kohlstedt, 2008). First Lady, Michelle Obama uses the White House kitchen garden as a platform to address nutrition, eating behaviors, childhood obesity and food insecurity. Although no singular learning objective can describe agriculture-based learning at any point in history, as differences exist in regions of the country, urban versus rural areas, and with varying levels of community, state federal support and engagement; advocates, critics, educators and parents alike insist school gardens focus on educational and cultural goals rather than vocational aims (although farming or food system employment could be an outcome) (Kohlstedt, 2008).

Agriculture-based education ascribes to deeper educational philosophies of uniting practice and theory, and students and their immediate natural community. Comenius stated every school should have a garden for students to learn how to appreciate nature (Weed & Emerson, 1909). Rousseau advocated for experiential learning, identifying the problem with teaching students "about" things instead of allowing students to experience the world itself. Rousseau believed nature is the greatest teacher (Subramaniam, 2002). In spite of some early beginnings, learning gardens did not gain popularity until the establishment of kindergarten, literally translated to "children's garden" by Frederick Froebel (1906). His research and curriculum development focused not just on how knowledge should be disseminated but how students learn and develop, including experiential learning within gardens. As early as the mid-nineteenth century Froebel wrote, "Education…is permanently manifested in nature" (p.5). Thompson and Geddes (1863), while building upon the theories of Froebel, argued for more place-based education. Students' natural exploration and learning starts with their immediate surroundings and progressing further and further. Thompson and Geddes, early proponents of place-based

education believed students understood the world- natural, human and cosmic alike through widening circles of "inter-relations" (p. 105).

Agriculture-based pedagogies first found wide spread acceptance in the US as the basis of the Nature Study Movement popularized by Anna Botsford Comstock (1911) and Liberty Hyde Bailey (1905), and promoted by John Dewey (1956) at the dawn of the twentieth century. The Nature Study Movement taught students to "use his senses instead of losing them; to train him to keep his eyes open to all things so that his powers of discrimination shall be based on wisdom" (Comstock, 1911, p. 22). Comstock felt nature could teach students about the "logical harmonious whole" (p. 1). Although nature study did not restrict itself to agriculture, gardens were its more common teaching tools. Comstock was concerned that agriculture dealt only with parts of nature meant to be controlled and not enough attention was paid to the "extraneous" parts of the system such as the butterfly or bee. Comstock argued against strictly using agriculture—in its current form—to teach as it overlooked the ecosystem. Instead through studying nature and ecosystems as well as agriculture, a farmer "understands the great forces of nature which are at work around him, and therefore he is able to make them work for him" (p. 22).

To integrate agriculture and nature more, Bailey (1905) advocated for agriculture-based education to move outside land grant extension services into general education of the masses. Bailey, now lauded as a father of the sustainable agriculture, called for a reformation in education, moving from an approach detached from nature to an experiential, placed-based learning (Minteer, 2006). Bailey (1905) advocated farming and nature as important subjects beyond occupational training, fundamental to living on earth. Writing, "sensitiveness to life is

the highest product of education" (p. 99); Bailey (1905) argued students should be "educated at first in terms of the world he lives in" (p. 122). Bailey saw a love of the land as essential to lasting societal health and environmental stewardship. In order to address societal and ecological ills he insisted on faculty, staff, and students alike to take on a more active role in transforming education, society, and land ethics. Bailey perceived the education methods of the past were unable to deal with issues of the day. A "new day" that he prophesized would call for new strategies and solutions especially within education (Minteer, 2006).

Both Bailey and Dewey were highly critical of didactic traditional education. Although Bailey's writings embraced Dewey's civic engagement, Dewey's pedagogical views integrated the Nature Study Movement's ideas on nature and gardens. Dewey supported school gardens as part of a highly experiential, place-based education that would cultivate intelligent students politically engaged and ethically attached to nature (Minteer, 2006). Although not explicit in politically supporting school gardens, he recognized both the value of the ethical and sentimental attachment to nature and the scientific learning offered by studying nature. To critics of school gardens and nature study, Dewey (1956) argued for an increased focus of scientific knowledge alongside sentimental and ethical bonds with the environment. He distinguished nature study and garden-based learning as a balanced interdisciplinary mode of teaching. According to Dewey, the school and school garden acted as microcosms within the larger human and earth community. He put forth, "The common needs and aims [of the school and community] demand a growing interchange of thought and growing unity of sympathetic feeling" (1956, p. 15). Although Dewey wrote before the environmental crisis and before modern technology pervaded western culture, his ideas on place-based ecological education could not be more appropriate now.

Influential in developing modern environmental ethics, Also Leopold (1968) focused his attention on setting students within nature, not just physically but perceptually. Leopold argued through experiences in farming students learn the basic concept of ecology and ethics, "that land is a community…to be loved and respected" (p. viii). Both ecology and ethics rest on the single principle—the individual is an interdependent member of a community. The moment we, humans realize we are dependent upon nature, a perceptual shift occurs. We come to understand our place in the natural community. For this reason, Leopold (1991) argued education, especially higher education should "teach the student to see the land, to understand what he sees, and enjoy what he understands" (p. 302).

The propagation of school gardens in the late 19th and early 20th centuries was very much linked with the new educational theories of Froebel, Comstock, Bailey, and Dewey. Experiential, environmental, and placed-based pedagogies all found roots in school gardens (Subramaniam, 2002). However, educational value of school gardens waned after World War I, with a brief resurgence during World War II to aid the war effort. According to Lawson (2005) the economic, moral, ethical, and educational agendas school gardens were sought to remedy during those years weakened its legitimacy. She asserted, "The school garden, while a useful resource for a range of educational objectives, was promoted for accomplishing many other goals, with little evaluation as to its success" (p. 92). School gardens failed at finding a permanent place in education. A brief second wave of school gardens in the US between 1964 and 1975 as part of the "war on poverty," and the birth of the environmental education. However, school gardens disappeared quickly, weaken by the conservatism of the 1980s (Subramaniam, 2002). Generations of students as a result were left ignorant of the natural community. In a landmark article in 1974 by André and Jean Mayer, the authors argued "the present isolation of agriculture

in American academic life" (p. 83) within land grant colleges of education posed serious consequences for society. They cite far-reaching implications from the breeding of vegetable and fruit varieties without thought of nutrition and taste, to creation of new environmental studies curriculum without regard to agriculture. Mayer and Mayer (1974) also contended that without even basic education in agriculture, generations of students would come of age with no knowledge of both food and nature.

Agriculture-based curriculum has only again begun to gain momentum (Sayre & Clark, 2011). Alice Waters and Martin Luther King Jr. Middle School's Edible Schoolyard in Berkeley, California popularized primary school gardens from its start in 1995 and over 4,000 school gardens exist today in California alone (California Department of Education, 2012). College and universities campus agriculture projects are also growing. Sterling College established its gardens and farm in 1992 and many others have followed. By 2014, there are 302 colleges and universities in the US who have a campus agriculture project. David Orr (2004) in a central article identifies seven learning and physical outcomes of campus agriculture projects:

> (1) Provide experiences in nature, self-reliance, responsibility, hard work, and cooperation lacking for current generations living in urban areas,
>
> (2) Use as an interdisciplinary laboratory by sustainable agriculture, natural sciences, sociology, philosophy, land use, and economics,
>
> (3) Revitalize rural area,
>
> (4) Preserve wildlife, plant and soil life diversity,

(5) Cut global emissions by sourcing food locally and tree cropping,

(6) Recycle food waste from dining halls as compost, and

(7) Involve students in solutions instead of just problems.

To the list Laura Sayre added the simple skill of growing fresh foods (2011). Their lists draw heavily from the arguments of Bailey (1911), Leopold (1968), Berry (1977), and Mayer and Mayer (1974) for integration of agriculture into the liberal arts and echoes larger movements in environmental education, human/nature relationship, place-based pedagogies, and perceptions of nature.

Students do fear, and romanticize both nature and food as they do with things have unknown qualities and capacities (Louv, 2005). Many researchers suggest environmental empathy comes from our life experiences, especially with contact with nature (Koger & Winter, 2010). Respect and empathy for nature develops from psychological involvement with a place. Deeply knowing a piece of land or a bioregion immediately impacts of how we think about the land and act towards it. Burgin, Williamson, and Maheshwari (2010) used the term "environmental empathy" to describe this first step of environmental stewardship. Campus agriculture projects not only provide students experiences in the environment and place, but also are unique in offering engagement in a working relationship with nature. Aldo Leopold (1968) wrote in *A Sand County Almanac* that students should be taught humans' needs are dependent on the needs of nature. By cultivating the soil, humans act as part of the earth, just one of many species (Ralston, 2011). Agriculture-based education is "widening circles of learning from the school garden to local farms…to understand…family farming and agriculture as well as the

environment they will inherit" (Gaylie, 2009, pp. 13-14). The California Department of Education (2012) affirmed such views.

Place-based Pedagogies

Another crucial aspect of agriculture-based learning is how it is/could be informed by the sense of a specific place (see Appendix D). Campus agriculture projects are not necessarily about the minerals in the soil, its biotic life, the crops, the trees, the water table, the chickens, and the microclimate. They are/could be about how the minerals, the soil's biotic life, the crops, the trees, the water table, the chickens, and the microclimate are connected, specific and unique to place. Mollison (2011) argues the concept of connection is "the very opposite of what we are taught in school" (p. 5). But through nurturing interconnectedness between a web of life within the soil and above in campus agriculture projects, students become critical members of the biotic community and rooted in place (Williams & Brown, 2011). Likewise, education rooted in a specific, unique place forms "reciprocal relationships" (Williams & Brown, 2012, p. 58) between students and community.

Place embodies more than a combination of physical components. As the stages for experiences, places teach us about ecosystems, community, the world, and how we relate. Just as we shape places, the places we occupy shape our identities, possibilities and actions. Pedagogy of community, placed-based education reintegrates students into their community and the land reestablishing the essential links between person and place (Sobel, 2005). Similar to Mumford's regional survey, place-based pedagogies perform four key functions: combines experience with theory; broadens connections between disciplines, community, ecosystems and students; advances learning beyond abstract knowledge to include physical and emotional intelligence;

and builds community by changing residents into inhabitants with knowledge of place (Orr, 2005).

For philosophers from a range of backgrounds, including Dewey (1900), Freire (2000), Leopold (1968), and Orr (2004) place includes a radical notion of community, crossing boundaries between nature and humans. In today's globalized society, places are becoming more interconnected and physically, culturally, and economically indistinguishable. For many (Gruenewald, 2003a, 2003b; Stevenson, 2008; Williams & Brown, 2012), place-based education is a rallying platform for school reform and a response to standardized experiences and learning. Valuing locally produced knowledge, place-based learning challenges nationwide mandated curriculum. Proponents (Gibbs, & Howley, 2000; Gruenewald, 2003a, 2003b; Smith & Sobel, 2010; Stevenson, 2008; Williams & Brown, 2012 believe place-based pedagogy can be a transformative learning experience instead of a transmissive one. For Smith (2002), place-based education overcomes the alienation and isolation of students from the world and their knowledge of it. For Stevenson (2008), place-based education assists students to develop a "healthy identities in relation to both self and community" (p. 353) at a time when globalization has displaced traditional communities.

Sobel (2005) viewed place-based learning as developing stronger connections and commitments between student, community, and natural world. As Williams and Brown (2012) explained, "Humans protect what they love" (p. 62). Within campus agriculture projects, students spend hours throughout a semester or school year actively transforming a piece of land while also cultivating a sense of belonging, and emotional attachment (Cvetkovic, 2009; Thorp, 2006; Townsend & Thorp, 2001; Williams & Brown, 2012). According to Tuan (1990),

appreciation of nature and the land increases and endures with personal ties and memories. Developing an emotional attachment to place through regular interaction with a place is considered a significant factor in feelings of responsibility and stewardship (Williams & Brown, 2012).

Place attachment refers to the emotional connection between people and places, such as when a space becomes embedded with meaning and importance for the individual or group (Kudryavtsev, Stedman & Krasny, 2012; Vaske & Kobrin, 2001). Kyle et al., (2003) defined place attachment as "the extent to which an individual values or identifies with a particular environmental setting" (p. 250). Williams and Roggenbuck (1989) argued place attachment exists within the broader concept of defining and characterizing an individuals' relationship with the place or resource. Vaske and Kobrin (2001) proposed two concepts, place dependence and place identity influence an individuals' place attachment. They found place dependence precedes place identity that then influences environmentally responsible behavior. Humans come to truly depend or value a place when a setting carries some functionality beyond aesthetics. Although individuals may appreciate an area's view or hiking, they may or may not experience a strong sense of attachment. Dependence occurs when the setting symbolizes meaning and/or individuals are strongly attached to the functionality of the area. Place identity carries very personal meanings. Vaske and Kobrin (2001) described it as an emotional attachment developed over time. Often place identity is marked as childhood play areas, a location thought of as "home," or recurring visitation due to functional dependence. Place identity may bring a sense of belonging, community with surroundings and life meaning. Kyle, Absher, and Graefe (2003) also discussed the possibility of negative place attachment, in which places bring about conflict within an individual and repels them.

Evaluations of place-based curriculum indicate promising results. A number of case studies point to increased student interest and engagement in the community and classroom, as well as increased community investment in schools, while meeting or exceeding student academic achievement levels (Gibbs & Howley, 2000; Harvard Graduate School of Education for the Rural Trust 1999a, 1999b; Smith 2002; Sobel, 2005; Wood, 1992). A preliminary study within disadvantaged schools also found place-based education promoted school engagement and retention (Smyth, Angus, Down & McInerney, 2008). Much like place-based educators pull from other theoretical traditions, research on the psychological and cognitive benefits of nature and the effects of service learning on both students and community are often cited in support of place-based pedagogies. A growing number of studies demonstrate the positive effect nature has on psychological wellbeing (Berman et al., 2012; Kaplan & Kaplan, 1989, 2003; Kaplan, 1992, 1993, 2001; Kaplan, 1995; Mayer, Frantz, Bruehlman-Senecal, & Dolliver, 2009). Several studies show a correlation between time in nature and improved attention and memory (Berman, Jonides, & Kaplan, 2008; Cimprich & Ronis, 2003; Kaplan & Berman, 2010; Taylor & Kuo, 2009). Within student populations Lieberman and Hoody (1998) also found student achievement and in-school behaviors improve when the environment is utilized to teach. A major component in place-based education, the growing body of research on civic engagement in service learning contributes to our understanding. Service-learning experiences within the community have found to promote a "prosocial, active conception of citizenship" (Chi, 2000, p. vi) in students.

Critics argue place-based pedagogies lack a theoretical tradition (McInerney, Smyth, & Down, 2011), although this is partly an issue of naming. Place-based pedagogy, pulling from a number of practices and theories, lacks cohesion of a single theory. Gruenewald (2003b) criticized that not all place-based educators center the study of place as a multidisciplinary

construct, focusing only on the geographic or environmental aspects. Woodhouse and Knapp (2000) called place-based education "a recent trend in the broad field of outdoor education" related to environmental education. Another concern is that issues of race, gender, and class that are manifested in place are often ignored. Gruenewald (2003b) argued that the same social constructions that frequently marginalize ecosystems also marginalize human communities. A place-based pedagogy must be critical, identifying and confronting how power is manifested against humans and the more-than-human world. Environmental place-based educators are dedicated to nurturing citizens able to take significant steps towards environmental sustainability, including addressing social inequalities and concerns (Orr, 2004; Sterling, 2001; Traina & Darley-Hill, 1995).

Emotional Pedagogies in Environmental Education

Emotion plays a significant part in agriculture-based, place-based and experiential learning pedagogies for a number of academic and environmental reasons. First most and critical to all education, emotion is the entrance point to all learning (Iozzi, 1989). Weiss (2000) wrote, "Emotion impels what we attend to, and attention drives learning" (p. 47). Individuals throughout the course of a day or even a class period are inundated with sensorial input competing for attention. If conscious attention were given to all information taken in—from sight, sound, touch, smell, and hearing, the brain would be overburdened and unable to process information. The brain in order to function instead immediately filters the sensorial information and discards most of it, keeping only that has been tagged for importance. As the brain synthesizes data it also continually drops information that does not fit into the existing network of neural pathways. This process explains how humans consciously or unconsciously discard

unneeded information like where I put my sunglasses at different moments yesterday. In this context, learning is establishing, refining and repeating neural pathways. Emotion drives and determines "what is learned and what is retained" (Wolfe, 2006, p. 35). Dewey (1933) was absolutely correct in saying the cognitive cannot exist apart from the emotional, or Bloom's placement of the affective realm along side the cognitive and psychomotor realms in his taxonomy of learning (Dirkx, 2006). It is emotions that determine students' academic performance more strongly than cognitive reasoning (Reis & Roth, 2010).

The idea that learning is motivated by emotion and prior experiences is key in adult transformative learning. Dirkx (2006) posited emotion is fundamental to the process of transformative learning. Since Mezirow's conceptualization, research on transformative learning suggests learning in adults is just that, a transformative process that individuals confront their inherited assumptions about themselves and the world around them altering their worldview (Jackson, 2008). Mezirow, Taylor and Associates (2009) emphasized critical self-reflection in transformative learning. "Recognition of connection between one's [emotional] discontent and the process of transformation" (p. 19) is considered an important factor of transformative learning. Without emotions the experience of true learning involved with adults changing or reframing assumptions would not be possible. For this reason Dirkx (2006) argued encountering "powerful emotions" (p. 20) can be an expression of deep transformative learning and therefore should not be shied away from.

Proudman (1992) suggested it is the inclusion of the affective component that differentiates between experiential pedagogy, including agriculture-based and place-based, and traditional pedagogies. In experiential learning emotion is an important factor in interaction with

surroundings. “The primary goal of the experiential component is to deepen the students’ understanding of the main ideas of the course by enlisting experience and emotion as allies in the process of understanding…that extends to the students’ lives and actions” (p. 45) according to Johnson and Fredrickson (2000). Experiential learning provides kinesthetic, cognitive and affective connections to occur (Goralnik, Millenbah, Nelson, & Thorp, 2012). This can be manifested toward engagement with a class, program or school, or the development of community that includes humans, plants, and animals. Experiential learning fosters relationships that help students see interconnectedness between themselves, the community, and the larger natural community. Softening the dualism between the intellectual and emotional, as well as the student and their surroundings can create space for connective relationships with people, place and content. These experiences whether through civic or environmental engagement “can help students make the leap from relationship to responsibility” (Goralnik et al., 2012, p. 424) through the process of community building. Goralnik and Nelson (2011) reported an increase in feelings of responsibility for and empathy towards those identified in a sharing community. It is within this framework, I chose to focus on emotional learning objectives first as an expression of transformative learning, and second as a means to identify and understand possibilities in students’ connection to nature and of re-conceiving relationships with it.

Constructing Perception

> *The only true voyage of discovery…would be not to visit strange lands but to possess other eyes, to behold the universe through the eyes of another, of a hundred others, to behold the hundred universes that each of them beholds*
>
> (Proust, 2006, p. 657)

Re-conceiving humans’ relationship with nature has been a recurring theme, rooted in the writings of Muir, Emerson and Bailey and gaining recent interest (Leopold, 1968; Roszak, 1995;

Naess, 1989). According to Leopold (1968), conservation measures have failed because humans fall short in perceiving nature beyond a commodity. “When we see land as a community to we may begin to use it with love and respect” (p. viii). In Leopold’s view, connectedness to nature is not merely about love or appreciation but perceiving self as interdependent on the larger earth community. Sewall (1999b) building off Leopold’s argument proposed western human identities are now conceptually independent from the ecosphere. The surrounding world is not really being seen, heard, or sensed. Devall (1995) went so far to suggest a “deeper perception of reality” (p. 106) forms an ecological reality. The question then becomes how can we see what we are *not* looking for. How do perceptions shift?

Perceptual psychology contends only part of what is perceived originates from the senses; the possible larger part comes from previous collective and individual experiences and knowledge. This can be easily recognized in the adage, artists, musicians, and athletes seem to be born, not made. But as Burroughs (2001) argued, “To know is not all; it is only half. To love is the other half” (p. 3). Success comes from devoted love of the sport, art, etc. Levinas (1997) similarly contended the path to knowledge is a path of love. To Goethe (1963), “One learns to know only what one loves, and the deeper and fuller the knowledge is to be, the more powerful and vivid must be the love, indeed the passion” (p. 83). These philosophers asserted it is not merely the abilities and inabilities to see or hear, but the mind and soul that interprets and constructs how humans perceive the world and ourselves. Individuals have a role in what is seen and perceived. The ability to see reflects the desire to see it. Burroughs (2001) posited nothing else exists that people diverge more than their observations. The range of both individual experiences and knowledge permit multiple ways of seeing.

Where attention is placed through repetition it can strengthen neural networks resulting in seeing in a particular way. The Hebbian Learning Rule asserts a neural pathway or synapse develops stronger connections with use and thus requiring less energy to fire between connections. The stronger the neural pathway the more readily firing is between neurons, and more arduous to form new synapses. As a result, individuals more readily see one perspective—one reality. If the world is selectively filtered through our expectations and desires, a particular worldview is confirmed and perpetuated, an example of confirmation bias theory (Sewall, 1998). For example, observers when asked to attend to a visual cue like scissors in a cluttered kitchen drawer or position of certain letters in a display cannot describe other aspects in the drawer or display. They cannot describe where the stapler is or the color of other letters. This famous demonstration first performed by Kulpë in 1904 showed the selective nature of perception. Although all the visual cues reached the eye, the mind selected specific cues as key to remember, disregarding the rest. The assumed perceptual 'set' of the viewer determined what the viewer saw. Perceptions are not just sensorial inputs but selective cognitive processes similar to both thinking and imagining (Gordon, 2007).

Learners prefer and seek confirming information, consistent with prior knowledge and experiences. Confirmatory information feels good; we feel right. Psychologists establish this as confirmation bias. For the brain, it is more difficult to process and store conflicting information, putting our framework and prior knowledge and experiences at odds (Koger & Winter, 2010). Research shows, humans fail to accept or account for dissenting information (Jonas, Schulz-Hardt, Frey, & Thelen, 2001). Even when evaluating information, preference-consistent information is viewed as better, identified as evaluation bias. Bias toward confirmatory information deters individuals from taking on new perspectives and thinking critically (Schwind,

Buder, Cress, & Hesse, 2012). Even within just the visual realm, highly improbable or unknown objects tend to be mistaken for expected objects. Gregory's example of a hollow mask of face demonstrates the viewer's tendency to see the face protruding outward when viewed from the rear, even if the true orientation of the mask is known (see Appendix G: Hollow Mask). Other well-known experiments confirm prior expectations influence what is seen. Bartlett found study participants wrongly reported a beard on an image of a British naval officer when briefly shown the image. They expected the stereotype of a British naval officer, complete with a beard. Similarly when a red King of Spades was shown, participants described the color as "brownish," a mix between black and red. Observers compromised what they knew and were looking for, and what they had actually seen. Many other examples exist of how a desired object in a cluttered drawer, a voice from a crowded room, etc can be extracted (Gordon, 2007). Finding a desired item is relatively easy especially as the object is imagined (Sewall, 1998). Sanford in 1936 showed ambiguous images to groups of children and found twice as many students saw food within indistinct pictures before meal times, than after mealtimes (Gordon, 2007).

For these reasons, perception is commonly defined as information processing. Assumed to begin with stimulation of senses, the information is then organized and interpreted by the human brain (Neisser, 1978). The brain interprets patterns of light and color into categories and relationships based on prior knowledge and experiences (Sewall, 1999b). German physician, Helmholtz argued constructive cognitive processes exist between the stimulation of the senses and perceptions, which we are largely unaware (Gordon, 2007). But Abram (1996), Sewall (1999b), and Tuan (1990) argued narrowing perception to a cognitive process is a form of reductionism limiting the relationship between the seer and the seen. Abram defined perception as "a mutual interaction" that is inherently participatory (p. 55). For Tuan (1990):

> Perception is an activity, a reaching out to the world. Sense organs are minimally operative when not actively used. Our tactile sense is very delicate but tells the differences in the texture or hardness of surfaces it is not sufficient to put a finger on them; the finger has to move over them. It is possible to have eyes and not see, to have ears and not hear. (p. 12)

These writers view perception as encompassing more than the self, to include the "other." Implying perception includes participation on the part of the viewer and the viewee contrasts to the traditional paradigm of self-object perspective.

While what individuals see depends a large part on their perceptual practices, including anticipations and available information (Neisser, 1978), culture and education mediate what is experienced, and perceived. For this reason Gibson (1979) called perception an act of attention, not an automatic response. His ecological approach to perception in 1966 rejected the prevailing theory of stimulus and response. Although Kant claimed humans inherently placed concepts onto the perceived world, Gibson viewed perception as a dynamic cognitive process. Gibson argued perceptions informed conceptions and vice versa (Gordon, 2007). Acknowledging perceptions is in part human construction creates space for other ways of seeing and relating to the earth.

Gestalt psychologists established the flexibility of human perception. The classic example of the Rubin vase demonstrates the power of the human mind to reconstruct the perceived world by shifting attention between the central black vase and the two facing profiles (see Appendix H: Rubin Vase). The illusion makes it obvious how attention creates a different view of reality. Gordon (2007) notes figure-ground reversals occur in all senses. Our attention also modulates between a noisy gathering and single voices from the background, as well as an

ant crawling on our skin and the larger sensations. Sewall (1998) suggests exchanging the object for ground may be similar to how perceptions are constructed. By focusing attention on the self, western society has shifted perceptual reality from the biosphere to the ego.

Gestalt psychologists concluded that humans construct perceptions based on relationships, to self and to other objects. Songs played in different keys are recognized. Even chickens trained to peck the darker of two shades will peck the yet darker color when the original darker color is paired with it. The chickens learned the relationship not the specific shade (Gordon, 2007). The perceptual world is organized into patterns rather than a random mosaic.

In contrast, Sewall (1998) argued western society focuses on objects, and that relationships are unseen. The relationships become one-sided; the seen becomes an object rather than a participant. A long intellectual tradition exists of separating man from nature and in-here from out-there (Sewall, 1999a). This movement to objectivity can be tracked to Plato's dichotomy between true reality experienced by the mind and soul and the material reality of the body and Descartes' mind-body dualism. Intellectual traditions have led us to the point that we as humans perceive ourselves separate and distinct from the surrounding world, no longer participating in a two-sided relationship.

However, perception plays two significant roles in environmentally responsible behavior. First, perception provides an understanding and context of the surrounding world. This is can be understood as our worldviews as argued above. But while perception is essential for understanding our surroundings it "does not mean this understanding is an end in itself" (Dijksterhuis & Bargh, 2001). Perception is also and more important the means that humans interface with our surroundings. It is a behavioral response whether conscious or unconscious.

Evolutionally, perception is intended for doing not just thinking. A frog, owning a simpler perceptual process exhibits the same behavior in response to the same perceptual process. Frogs perceiving a large object looming above the water's surface flee while a small, irregularly moving object signals a prey response. Conversely, in humans specific perceptions do not elicit the same behavior responses. Although certain perceptions stimulate specific reactions and response (e.g. seeing an ice cold beverage drives a thirst), humans with varying degrees of ability can respond in multiple ways. However, strong connection still exists between perceptual inputs and behavioral outputs (Dijksterhuis & Bargh, 2001).

Research argues behavioral tendencies are learned responses influenced and activated by perceptual activity (Chartrand & Bargh, 1999; Ferguson & Bargh, 2004). In a seminal study, Carver, Ganellen, Froming, and Chambers (1983) found individuals use interpretive schemas for perceiving and interpreting behaviors and behavioral schemas for producing behaviors. Both perceiving and behavior schemas overlap and activate at the same time. Researchers have found the same area of the premotor cortex is active when perceiving an action in others and performing the behavior themselves (Ferguson & Bargh, 2004). In a study by Bargh, Chen and Burrows (1996), participants primed with rudeness, slowness and hostility were more likely to act in a manner adhering to that trait than those not primed. Notably, none of the participants reported any knowledge of the connection between the priming activity and their behavior. Testing the link between perceptions and behavior further, Dijksterhuis and van Knippenberg (1998) found similar results when priming participants with either intelligence or stupidity they acted in accordance in an unrelated knowledge test. Again, none of the participants reported awareness of the connection between the priming activity and their performance on the test. Researchers have also looked into whether people unknowingly mimic perceived behaviors like

shaking a foot or rubbing a face (Chartrand & Bargh, 1999). The mere perception of actions increases the performance of the same behavior without intention or awareness. Critical to this exploratory dissertation study and understanding the relationship between perceptions of nature and behavior towards nature, perception can also activate knowledge that can automatically influence behavior that persists over time and interruption as well as strengthen with repetition and association (Bargh, Lee-Chai, Barndollar, Gollwitzer, & Trötschel, 2001).

Fostering Perceptual Shifts

> *I ask God, "Do not take this experience away, but give me the strength to perceive this experience differently.*
>
> (Corn, 2011)
>
> *How we see determines our relationship to the world*.
>
> (LaChapelle, 2004, p. 237)

Many writers talk about the circumstance that humans began to perceive the self as more significant than and separate from the animate world. The extent that one perceives self as part of nature is predictor of environmentally responsible behavior and crucial in addressing environmental issues (Clayton, 2003; Dunlap, Van Liere, Mertig, & Jones, 2000; Dutcher, Finley, Luloff & Johnson, 2007; Franz et al., 2005; Mayer & Frantz, 2004; Nisbet et al., 2009; Musser & Malkus, 1994; Schultz, 2001). A number of measures have been designed to study the relationship between connection with nature and pro- environmental attitudes and behaviors, including Connectiveness to Nature (Mayer & Frantz, 2004), Inclusion of Nature in Self (Schultz, 2001), Environmental Identity Scale (Clayton, 2003), Nature Relatedness Scale (Nisbet et al., 2009), New Ecological Consciousness Scale (Ellis & Thompson, 1997), and New Environmental Paradigm Scale (Dunlap et al., 2000). Shultz (2000, 2001) building off of Stern

and Dietz's (1994) research argued environmental concern is tied to an individual's sense of self and the level of interdependence with other people and nature finding clear support for greater sense of inclusion through altruistic and biospheric perspective taking. Clayton (2003) suggested environmental identity as a collective identity describes our level of recognition of similarity between self and the more-than-human world. The study established a significant correlation between environmental identity as defined by a designed scale and self-reported environmental behaviors. Similarly, Franz et al. (2005) found heightening individuals sense of self as separate, or objective self-awareness combined with a lack of pro-environmental attitudes leads to detachment from nature, building off of research indicating empathy and willingness to help increases as individuals expand their sense of self to include others.

As Abram (1996) suggested, an ecological ethic might emerge, not through laws reducing or preventing carbon emission, pollution, or use of natural resources, "but through a renewed attentiveness to this perceptual dimension that underlies all our logics, through a rejuvenation of our carnal, sensorial empathy with the living land that sustains us" (p. 69). To that fact, Gordon (2007) argued the role of learning is to instruct how to shift and focus attention. Sewall (1999b) argued perceptual practices form and perpetuate our worldviews and behaviors unless intentionally and willfully shifts in attention are made. Research indicates repetitive visual experiences can alter the makeup of neural networks. Channels laden with memories are molded as information is selectively filtered through the senses. Since sense stimulation and therefore attention is to some level automatic, impact of attending is not often recognized. However, perceptual psychology has established the flexibility of perception as demonstrated in the Rubin vase and the impact of intention on our perceptions. The ability to see and experience the world differently is within reach. Intentional perception requires to sense with eyes, ear, fingers and

mind open. To see what we are *not* looking for is a true sign of an observer (Burroughs, 2001). By not ascribing to the conditioned and assumed worldview, individuals can critically think and mindfully shift our perceptions and behaviors (Sewall, 1998). "By seeing differently, we do differently" (Hillman, 1989, p. 54). Research shows strong connections exists between perceptual inputs and behavioral outputs (Bargh et al., 2001; Chartrand & Bargh, 1999; Dijsterhuis & Bargh, 2001).

Sewall (1995) identified five perceptual exercises to open perception:

> (1) Learning to attend, or be mindful, within a domain; (2) learning to perceive relationships, context, and interfaces; (3) developing perceptual flexibility across spatial and temporal scales; (4) learning to reperceive depth; and (5) the intentional use of imagination. (p. 204)

Reversing the figure and the ground can shift perceptions to the larger environment and larger relationships with it. By extending sense of self beyond the barrier of the skin, individuals recognize the interconnection between humans and the more-than-human world.

Fostering Perceptual Shifts in Agriculture

> *Agriculture has the sole potential to provide the lead into a different relationship with our ecosphere*
>
> (Jackson, 2011, p. 15)

Sewall (1999b) proposed western lifestyles and education have left identities conceptually independent from the ecosphere. According to her, individuals in western culture are not truly seeing, hearing, and sensing the surrounding world. A "deeper perception of reality," one that takes on perspectives in nature is needed to form an ecological reality (Devall,

1995, p. 106). The question then becomes how can we see what we are *not* looking for. How do perceptions shift?

This study is built upon a framework that resonates with Bailey (1915), Leopold (1968), Berry (1977), and Jackson (2011) in seeing agriculture's role in establishing a new worldview. These words might seem erroneous and perhaps vain to some ecologists and naturalists. Since agriculture began in the seventh century BC, humans have exhausted and eroded the land and then moved on (Montgomery, 2007). Now in the twenty-first century there are fewer lands to move on to when the carrying capacity is worn out. To that point, Lester Brown (2011) warned peak soil might be reached before peak oil. Agriculture is attributed as the cause of a significant amount of the environment's problems, including erosion, and the salinization of soils. The world's growing herds of cattle, sheep, and goats are stripping grasslands of their vegetation stretching deserts farther and farther. Thirteen million acres of forest are being cut annually for expanding agricultural land, wood, and paper (Brown, 2011). Through deforestation, carbon normally sequestered in the soil is released into the atmosphere. Globally, an estimated 78 billion metric tons once captured in the soil have been discharged into the atmosphere. If this was not enough, agriculture also consumes 30% of America's oil use (Montgomery, 2007).

The question needs to be asked whether working the land can connect humans to nature and establish an ecocentric perspective and way of living or can agriculture never be more than anthropocentric? Is Thomas Jefferson right, is farming virtuous, equating to a deeper relationship with the land (Montgomery, 2007)? Does all farming promote a deep connection to nature? It is dependent on method: organic versus nonorganic or till versus non-till? Or, is it dependent on size?

Certainly, industrial agriculture is believed to be the largest cause of environmental problems today but issues of erosion, salinization, and loss of biodiversity due to farming are also much older than the oldest mechanized plow. Ancient Roman officials identified farmer-owned-and-operated as a distinguisher of more sustainable farms from soil mining farm enterprises (Montgomery, 2007). The reasoning may be similar today; large and industrial farms are reliant on immigrant and mechanized help removing connection, attachment and feelings of stewardship from those working the land. The focus becomes purely economic and raising yield and profits for the immediate. Although this may be a simplified view of a complex socio-economic system, Dutcher et al. (2007) found an increased connection to nature in a survey of 741 riparian landowners in Pennsylvania. Forty percent of the landowners reported significant feelings of overlap between self and nature as opposed to 6% of the sample that felt separate from nature.

Industrial agriculture also caused the departure of generations off farms and loss of direct knowledge of human dependence on nature. According to Orr (1991) farms "taught directly and sometimes painfully the relationship between our daily bread and soil, rainfall, animals, biological diversity, and natural cycles, which is to say land stewardship" (p. 268). Even at the dawn of the 1900s ignorance of nature was considered a sociological problem contributing to society's ills. Students in Manhattan when asked what are the signs of spring would answer, "I know when spring is here because the saloons put on their swinging doors" (Lawson, 2005, p. 56). Instead of learning lessons in ecology and ethics from agriculture, students have become separated from nature physically, emotionally, and intellectually. Students taught knowledge worth knowing is human-centric and abstract (Orr, 1991). Bailey (1915), and Leopold (1968) also point to the cultural narrative of dominion over nature leading the western world. Bailey

writes, “The first observation that must be apparent to all men is that our dominion has mostly been destructive (p. 18).

Masanobu Fukuoka (1978) in his landmark book, *The One-Straw Revolution* purported a revolution towards an ecocentric view could start with as he called natural farming. He writes, “A revolution can begin from this one strand of straw. Seen at a glance, this rice straw may appear light and insignificant. Hardly anyone would believe it could start a revolution” (p. 1). His method of farming relying on four principles: no cultivation, no chemical fertilizer or prepared compost, no weeding by tillage or herbicides, and no dependence on chemicals, threw scientific knowledge and traditional agricultural practices out the window. In a moment of transcendence, Fukuoka abandoned the common belief of the specialness and separateness of human intelligence and being. His move inspired Mollison’s (2011) work in permaculture, Foley’s terraculture (Overland, 2012), and Jackson’s (2011) perennial polyculture cropping system—all alternative ecocentric agricultural practices. Instead of starting with just human needs, Mollison identifies relative location, the immediate landscape and natural community as the first principle. Similarly, Jackson (2011) advocated starting with the ecosphere to “gain a sense of respect for matters beyond and larger than people” (p. 245). Both place humans and human needs within nature as an alternative to a position of dominion. Permaculture furthers the reintegration of nature beyond strictly agriculture to all aspects of human living. It brings, “humans and nature into a mutually enhancing embrace as co-creative participants in our shared health and evolution” (Jacke, 2005, p. 1).

The practice of agriculture though relegated to humans has also been found in other species. Biologists have discovered many other species farm, including damselfish, termites,

ambrosia beetles, marsh snails, weaver ants, leafcutter ants, nematodes, and certain amoebae in symbiotic relationships with other flora and fauna (Brock, Douglas, Queller, & Strassman, 2011; Mueller et al., 2005). In fact, non-human farmers have practiced agriculture for centuries longer than humans, all independently adopting farming in separated time and space of continents. Insects including ants, termites and ambrosia beetles have successfully farmed for fifty million years as opposed to the 10,000 years of human agriculture. Similar to humans, non-human farming species carry, seed, and then reap the harvest of their production. Non-human modes of animal husbandry involve tending, protecting a flock in order to milk or harvest meat. Whether microscopic beings living in the soil to larger fauna of the sea, non-human farmers can be described as habitually planting, often actively cultivating improved growing conditions, including weeds, moisture, temperature and disease prevention, and partially nutritionally dependent on the crop or livestock (Brock et al., 2011). These are just a few examples of the parallels between humans and other members of the natural community.

Critique of Agriculture-based Education

Criticism of agriculture-based education, and food and garden-based learning although limited is by no means absent in the public discussion of its value. Caitlin Flanagan's (2010) critical article on school gardens for *The Atlantic* raises a needed cautionary flag around privilege, education and agriculture. Although school garden proponents assert the many benefits discussed in this paper thus far, Flanagan argued subjugating students of California, in which Hispanics comprise 49% to garden-based learning is racially insensitive and keeping them from academic achievement. She argued school gardens do not allow students a generation from working in fields to use education as a means to rise out of agricultural work.

Institutionally from this country's agricultural beginnings, Black farmers have been subjugated and discriminated first through slavery and later tenancy and sharecropping. Green, Green and Kleiner (2011) argued even today minority farmers are treated with indifference to contempt by the agricultural establishment. Aware of the embedded racism in the US Department of Agriculture, Secretary of Agriculture, Tom Vilsack even referred to the Department of Agriculture "as the last plantation" (para. 29) upon his appointment (Federation of Southern Cooperatives, 2009). Vilsack went on to admit the Department of Agriculture has, "a pretty poor history when it comes to taking care of folks of color. It's discriminated against them in programming and it's made it somewhat more difficult for some of color to be hired and promoted" (Federation of Southern Cooperatives, 2009, para. 29). The Civil Rights Action Team in the Department of Agriculture found discrimination still prevalent in 1997, more than thirty years after the Civil Rights Movement (Gilbert, Sharp, & Felin, 2002). A class action suit by Black farmers disputing the US Department of Agriculture discriminated in its credit programs in 1999 (Green et al., 2011). The effects of the institutionalization of discriminatory practices can be seen in part in the estimated loss of 98% of Black farm operations between 1900 and 1997 as opposed to only 66% loss of White farm operations (Wood & Gilbert, 2000). Gilbert et al. (2002) reported that in 1920 Black farmers (926,000) made up 14% of all US farmers and owned over 16 million acres of land. By 1997 the number of Black farmers fell to fewer than 20,000 and owned roughly 2 million acres. African American farmers consistently have been at a disadvantage in ownership, decision-making, and scale due to institutional challenges: the decline of economic viability of small to mid sized farms; the push to mechanization requiring additional capital for implements and land; tenuous land and tenancy agreements; forced sale of land after a lack of a will after death; pressure from the consolidation of commercial markets to

lower costs and increase volumes; restricted access to credit by discriminatory lenders; and the lack of access, participation and knowledge of government agriculture programs (Gilbert et al., 2002; Green et al., 2011).

Historically agriculture workers have been subjected to racially motivated legislation as well. From the time of European settlement to the end of the Civil War in 1865 African Americans have performed the majority of agricultural work in the south to create an agricultural system built on white power and wealth (Green et al., 2011). President Roosevelt in passing the social and economic reforms of the New Deal were forced to compromise with southern congressmen to preserve the economic and social subjugation of minorities. Agriculture workers, as a result were and still continue to this day to be largely exempt from legislative reforms in labor including minimum wage, unemployment insurance, overtime pay and social security benefits (Linder, 1987; Norton & Linder, 1995-1996). A report done by National Commission on Unemployment Compensation called, "their exclusion from coverage is not only discriminatory, it denies the program's protection to a segment of the work force that needs it the most" (United States National Commission on Unemployment Compensation, 1980, p. 26). Norton and Linder (1995-1996) explain the continuation of exclusion in the face of repeated studies, reports and recommendations with two reasons. First, economically burdened groups are disadvantaged in achieving favorable legislation and rulings against financially powerful lobbies. Second, and more complicated reason is that federal law has given preferential treatment or special exemption to agricultural employers since labor, wage, and welfare laws were put into place under the New Deal. Eighty years of status quo in the courts and law created an inherent advantage to privileged White Americans difficult to reverse (Norton & Linder, 1995-1996).

Migrant farm workers continue to be one of the "most underprivileged groups in our society" (Slesinger & Pfeffer, 1992, p. 135), the majority today in the US today Hispanic immigrants from Mexico. In spite of the work and advocacy of Cesar Chavez and the United Farm Workers, farm workers material conditions, including low earnings, unstable employment, food insecurity, affordable housing, unsafe working conditions, and exposure to pesticides and other chemical has failed to make any significant improvements. Brown and Getz (2011) reported wages even fell for farm workers at least 20 to 25% between 1975 and 1995. They pointed to the "persistent devaluation of agricultural labor" (p. 123) achieved in part as a result of the invisibility of farm workers politically and economically due to their undocumented immigrant status (Brown & Getz, 2011).

In this context, how are school gardens interpreted in cultures traditionally relegated to low paying manual farm work? For Hispanics and African Americans, where some family members may be one or three generations from migrant agriculture work or share cropping what message is being given and how will the experience be internalized? This is especially true if the beliefs held and the rhetoric used to describe education is for job preparation or social and economic benefits. Founder and CEO of the Inner City Education Foundation Public Schools, Michael Piscal when interviewed by Flanagan (2010) commented:

> The only question in education reform that's worth anything is this: What are you doing to prepare these kids for college? If I can get a kid to read Shakespeare and laugh at the right places, I can get him to college. That's all that matters to me. (para. 18)

Advancing students into college and out of poverty is part of the American dream. If school gardens are seen as or even in actuality keeping minorities from achieving intellectually or

economically this needs to be dealt with. Minorities have continually been on the receiving end of social initiatives without being part of the research, planning or leadership (Morales, 2011).

Flanagan's (2010) critique is especially true when reasoning for school gardens includes food access and nutrition education. She pointed that, "the suicidal dietary choices of so many poor people are the result of a problem, not the problem itself" (para. 17). Flanagan goes on to suggest that the solution lies within an educational system able to lift students into a higher economic class and therefore able to eat better. Although her argument is correct in that the lack of fresh foods in a diet is a symptom of economic disparity and needs to be addressed within that context, food insecurity is not just a result of poverty. It is symptomatic of a larger injustice within the agrifood system. Food justice activists call attention to institutional discriminatory policies such as that of US Department of Agriculture's against minority farmers and farm workers or the redlining of supermarkets in minority neighborhoods. Sociologists recognize food and agriculture can both reflect and *create* social and economic inequalities. Throughout history lower classes and disproportionally women and children have been burdened with the lack of access to food while those in power (or those that resembled them) ate meat. This can be seen in ancient times and today (Alkon & Aygeman, 2011; Poppendieck, 1999). Brown and Getz (2011) called to attention the contradiction that "those who produce our nation's food are among the most likely to be hungry or food insecure" (p. 121) in a study of farm worker food insecurity in the profitable agricultural landscape of California. They argued devaluing of farming and inequality inherent in capitalism as cause.

A critique of the contemporary food activism, often labeled "the food movement" is that its proponents proselytizes organic, local, slow and whole foods as right and the only way to eat

while demonizing foods available to lower economic peoples and minorities—often stereotyped as processed or industrial foods. Economic disparity has increased at the same time disparity between the access to and prices of fresh and convenient foods has grown (Morales, 2011). In 1914 US cities averaged fifty neighborhood grocery markets per square mile. Today, many of these areas have lost access to fresh foods entirely (Eisenhauer, 2001). A 2002 study found four times as many grocery stores in white neighborhoods in comparison to black ones (Moreland, Wing, Diez Roux & Poole, 2002). Compounding the issue, several studies have found higher prices for healthy foods in lower economic neighborhoods contributed to the lack of larger markets as opposed to convenience stores or small independent grocery markets (Chung & Myers, 1999; Franco, Diez Roux, Glass, Caballero, & Brancati, 2008; Krukowski, Smith West, Harvey-Berino & Prewitt, 2010). Eisenhauer (2001) reports stores left in inner cities stock smaller selections of produce often of lesser quality and higher prices. Morales (2011) argued addressing food security is not enough. He called for the dismantling of injustice and racism within food and agriculture establishments, an endeavor possible by seeking research and solutions from a variety of perspectives (Green et al., 2011).

Lastly and in light of the discussion above, Flanagan (2010) questioned whether school gardens or campus agriculture projects actually enhance learning. Rightly, she asked for evidence that agriculture-based education enhances students learning. Do school gardens improve graduation rates, assessment or student engagement? With all the benefits purported by advocates empirical evidence needs to exist to sustain interest and value of campus agriculture projects. In particular, some argue that “since gardens are on school grounds, there needs to be justification for their *academic* value” (Williams & Dixon, 2013, p. 2). Indeed, C.D. Jarvis, Agricultural Education Specialist at the Federal Bureau of Education in the 1920s debated

whether the point of agriculture-based education was scientific training or an emotional connectedness to nature. Jarvis, in essence is asking about the very question: What is/should be the goal of education? Is the intention of education job training, abstract intelligence, or knowledge of life and living? He felt agriculture-based education was wrongly seen as "a means to an end rather than as a subject having real value in itself" (Lawson, 2005, p. 74).

Conclusion

Literature suggests agriculture-based learning and campus agriculture projects can provide students with knowledge, skills, perceptions of nature, and emotional connections to place needed to address what the American College and University Presidents' Climate Commitment (2104) described as, "critical, systemic challenges faced by the world in this new century" (para. 3). Both Bailey (1911), and Leopold (1968) envisioned the unique opportunity agriculture could play in teaching ecology, ethics, and shifting students' perceptions of connectedness with nature through seeing agriculture's role in establishing a new worldview. This literature review and subsequent research study into agriculture-based learning and campus agriculture projects was framed by place-based pedagogies, emotional pedagogies, as well as research in the relationships between perceptions, connectedness to nature, environmentally responsible behavior, and humans and agriculture (see Appendix D). Within this framework and prompted by the unproven theories of Bailey (1911) and Leopold (1968), I begin explore the characteristics of US campus agriculture projects, and in what ways participating students' perceptions of and connection to nature are impacted by academic courses connected to campus agriculture. In the following chapter I detail the theoretical framework and research methods utilized in this research.

CHAPTER 3: RESEARCH DESIGN, METHODS AND METHODOLOGIES

I have designed this exploratory mixed methods study to question first, the pervasiveness of connection to nature and sustainability as pedagogical objectives of college and university campus agriculture projects, and second, the effects of experiences at campus agriculture projects on students' perceptions of and connectedness to nature. To holistically understand campus agriculture projects and students' connection to nature, my research involves two study systems: the faculty or staff managing over three hundred campus agriculture projects existing in the United States, and undergraduate students at two campus agriculture projects that identify connection to nature as a pedagogical goal.

The first methodological component involves a closed and open-ended survey submitted to all known higher education institutions with campus agriculture projects and questioning the pedagogical goals, intellectual, physical and emotional of campus agriculture projects. Questioning campus agriculture project educators and managers about their objectives will provide a broad picture of who and how many campus agriculture projects identify connectedness to nature as an emotional objective and what they look like.

The second component comprises of an exploratory mixed method study of students from two campus agriculture projects, Yale University and the University of Montana using questionnaires and interviews prompted by elicited student photographs of their campus agriculture project. This part of the study is the core element of the research providing the richest data and insight into connectedness to nature and campus agriculture projects. Within this research component there are several segments, including pre and post questionnaires, field observations, photo-elicitation, text from *Fields of Learning* (Sayre & Clark, 2011) and

interviews. Each segment explicitly looks at connectedness to nature. The pre and post questionnaires are comprised of the Connectedness to Nature Scale and Inclusion of Self in Nature Scale. Field observations focused on the workings of the campus agriculture project, and how students interact with nature and the farm. I elicited photographs from all students of what they feel connected to at the campus agriculture project and then used the photos as interview prompts to go deeper into their thoughts, feelings, perceptions of and connectedness to nature.

While I looked at two methodological components, this research studied one phenomenon—whether and how campus agriculture projects affect students' perceptions and connection to nature. The layers add depth and a more holistic understanding of factors involved. I believe this research allowed me to understand at once the circumstances and process of how student experiences within campus agriculture projects at US colleges affect perceptions of and connection to nature, but also the prevalence of connectedness to nature as a learning objective on a national level.

This chapter outlines my research methodology and methods. I first describe the rationale and general research design chosen. I then, describe processes of participant selection, data collection, and analysis for Study 1 and Study 2. Last, I detail the epistemological framework guiding this research, and my reflexivity as a researcher.

Study 1 Methods

This study explored the diversity of characteristics and pedagogical objectives– intellectual, emotional and physical of emerging campus agriculture projects through a nationwide compilation of campus agriculture projects in higher education and a survey of

campus agriculture project managers and educators. In a closed and open-ended survey submitted to all known higher education institutions with campus agriculture projects, participants were questioned about the projects' background information, model type, agriculture-based curriculum offered, pedagogy, accessibility to all students regardless of course of study, and level of overlap between campus agriculture projects' objectives and college mission.

Study 1: Participants

A list of 302 colleges and universities with a total of 353 separate campus agriculture projects was formed through compiling higher education institutions who self-reported on the Association for the Advancement of Sustainability in Higher Education's (AASHE) Sustainability Tracking, Assessment and Rating System (STARS), the Sustainable Endowments Institute's College Sustainability Report Card (Sustainable Endowments Institute, 2011a) as well as colleges and universities identified in *Fields of Learning: The Student Farm Movement in North America* (Sayre & Clark, 2011), "Rodale's Farming for Credit Directory" (Rodale Institute, 2011), "Student Farms in the US and Canada" (Parr, 2011), and through word of mouth to the researcher. Each campus agriculture project was then verified online through institutional websites, departmental websites, campus agriculture project social media sites, blogs or websites. Descriptions, year established and contact information was also collected. Dates and in some cases dates established for all but twenty-two campus agriculture projects were found. The sampling may not represent all college and university campus agriculture projects nationwide as the large majority was collected through green college rating systems.

Study 1: National Survey of Pedagogical Objectives

Mangers and educators of each campus agriculture projects were then invited to participate in a twelve-item closed and open-ended online survey of pedagogical objectives with the exception of two, in which no contact information was found. In many cases survey invitations were sent to multiple contacts to aid connection and response rate. The study was conducted from September 14 to December 24, 2013. Each participant initially received an invitation to the study by email followed by two rounds of invites on September 17th and October 29th. If they chose participants could on the online link, read about their rights, and respond to survey questions until the survey closing date. Of the 351 campus agriculture projects surveyed, 166 campus agriculture projects responded with a response rate of 47.29%. A majority of participants were faculty or staff. In 26 cases out of 166 (15.67%) student campus agriculture project managers responded. Eleven responses were omitted from analysis due to admission of campus agriculture projects closed or in transition at the time of the study, or responses too incomplete to work with. An additional five responses were omitted as multiple responses received from a campus agriculture project. In these cases responses were chosen based on level of response completion and positions held within the campus agriculture project, with the assumption that a director had greater knowledge than an assistant of the projects workings. In the cases of multiple responses only one case was a staff response chosen over the place of a student response in representing the campus agriculture project.

Participating campus agriculture project educators or managers answered twelve questions asking identifying information: name; title; staff, faculty, or student; contact information; acres or feet in crop production; and date established (see Appendix A). The researcher also questioned participants which model or models best describes their campus agriculture project: academic, community, student community, residence, dining, demonstration,

collaboration, integrated work, or participants could provide their own model. The survey included questions as to agriculture-based curriculum offered by their institution, required participation in the campus agriculture project by academic curriculum offerings, accessibility and availability of all students regardless of course of study, the degree that campus agriculture projects objectives and college mission overlap, and the level of importance of listed intellectual, physical and emotional pedagogical objectives on a 4-point Likert scale (see Appendix A). Pedagogical objectives listed were influenced and adapted by possible pedagogical outcomes theorized by Orr (1991), Sayre and Clark (2011), and the Center for Agroecology and Sustainable Food Systems (Miles & Brown, 2005). Upon review of compiled pedagogical objectives and outcomes three categories emerged, intellectual, physical, and emotional as a means to describe the goals (see Table 1). Responses were given corresponding scores with 1 being "not important", 2 being "somewhat important", 3 being "important", and 4 being "very important". Participants were also given the option to provide their own objectives. Responses were analyzed using SPSS, Excel and self-reported pedagogical objectives were coded in NVivo qualitative software.

Table 1
Surveyed Intellectual, Emotional & Physical Pedagogical Objectives

Type	Pedagogical Objectives
Intellectual	Teach healthy eating habits
	Offer practical skills in growing food
	Establish interdisciplinary learning
	Teach sustainability through agriculture
	Introduce local, national and global agriculture concepts
	Explain history of agriculture and its relationship with the development of society
	Teach agricultural technologies and techniques
	Establish sustainable agriculture practices
	Make connections between agriculture systems, the environmental & human health
	Teach farm management skills
	Introduce vegetable crop production and management

	Other Important Intellectual Goals
Emotional	Instill work ethic in students Raise awareness of environmental issues Teach environmental attitudes Establish attachment to place Increase students' connection with nature Foster sense of belonging Cultivate interest in learning Deepen perceptions of nature Raise self-concept and self-esteem Other Important Emotional Goals (please specify)
Physical	Increase food access for students and/ or staff Donate produce to local food banks or kitchens Increase healthy eating habits Encourage physical activity Reduce food miles Provide food to dining services or on-campus venue Reduce on-campus food waste Protect biodiversity Provide time outdoors Ranking on green college rating system (AASHE's STARS, Princeton Green Review, The College Sustainability Report Card) Other Important Physical Goals (please specify)

Study 2 Methods

This study utilized a mixed methods research design exploring the impact of enrollment in summer internships at two campus agriculture projects, Yale Farm and University of Montana P.E.A.S. Farm on undergraduate student perceptions of and connection to nature. Qualitative and quantitative methods were employed, including student interviews, photo-elicitation, field observations, and use of the Mayer and Frantz's (2004) 14-item Connectedness to Nature Scale (CNS) and the one item Inclusion of Self in Nature Scale (INS) (Schultz, 2001), a 7-point Venn diagram representing connections between nature and self with incrementally overlapping circles. The CNS and INS scales were analyzed for reliability, internal consistency and statistically significant differences in the distribution between the pre- and post-experience

responses. Explanations provided in open-end boxes were coded and analyzed in NVivo qualitative software. Qualitative data, including student interviews, photo-elicitation, and field observations were analyzed, descriptively coded and interpreted for indications of environmental perceptions, connections, attitudes, beliefs, and behaviors.

Study 2: Study Sites Selection

Two study sites of study were chosen to research, Yale University and the University of Montana for several reasons: each offered internships for undergraduates in which students work five or more days a week at the campus agriculture project; both campus agriculture projects are associated with environmental studies programs as opposed to traditional agriculture degrees; students take active leadership roles in each project; and most importantly, each in essays written for *Fields of Learning: The Student Farm Movement in North America* (Sayre & Clark, 2011) posited student perceptions of and connections to nature are affected by experiences on their campus agriculture projects. There were a number of factors I could have looked at: urban campuses versus rural, east coast versus west coast, single sex versus coed education, traditionally African American campuses versus traditionally white, signatory schools of the Real Food Challenge or not, and so forth. Although these factors offer much to learn from, there were too many for the scope of this study. Neither research site perfectly represents the various campus agriculture projects I explore in study one's national survey of campus agriculture projects, they each have components that help situate and explain how campus agriculture projects function in relation to the growth of projects and agriculture-based pedagogy occurring outside land grant colleges of agriculture.

Although farm directors at both Yale University and the University of Montana have attested to witnessing changes in students involved at each campus agriculture project, both farms differ greatly in land size, geographic area, food sheds and agricultural and food histories. Yale University's one-acre farm started in 2003, sits on the edge of the urban campus in New Haven, Connecticut. Yale University and the urban area of New Haven, Connecticut are tantamount. Densely populated, close to 7,000 persons inhabit per square mile with 26% of residents live below the poverty level (United States Census Bureau, 2013, New Haven (city), Connecticut). Periods of economic hardship and stratification between the haves and have-nots have frequently incited fierce town-gown debates over the tax relationship since Yale moved its campus to New Haven in 1716 (Collins, 2001; Shannon-DiPietro, 2011). Yale University as a highly selective Ivy League school and associated with "academic rigor and social elitism" (Shannon-DiPietro, 2011, p. 307) accentuates social and economic stratification between the town and gown population.

Although known better for educating civic-minded students, future U.S. presidents and politicians, Yale University's roots in agriculture grow much deeper. The school instituted the nation's first professorship of agriculture in 1846 and briefly became one in U.S. initial group of land grant colleges of agriculture under the 1862 Morrill Land Grant Colleges Act until Connecticut's General Assembly established Storrs Agricultural College in 1893 (Schiff, 2009). In spite of its early association, agriculture has on whole been disregarded for a century. The seeds on Yale Sustainable Food Project originated with advocacy work of students enrolled in an environmental health and policy course in 2000, who then began to meet with Yale's dining services to discuss their concern over the health effects of pesticides and the possibility of increasing organic food served. Their advocacy led to dining services decision to procure several

organic foods when cost-neutral and readied the ground for the interest and involvement of Alice Waters, the mother of America's sustainable food and school garden movement.

The 9.75-acre University of Montana P.E.A.S. Farm lies in the valley at the convergence of five mountain ranges and is split by the Clark Fork River. Missoula gained the title "Garden City" for producing fruits and vegetables for the surrounding region for much of its history. More than 90% of produce eaten in the region now comes from outside of Montana (Garden City Harvest, 2013). As agriculture pushed further away from Missoula the Program in Ecological Agriculture and Society (P.E.A.S.) Farm began as collaboration between the University of Montana, Garden City Harvest, and the Missoula Food Bank in 1997 to help alleviate food insecurity in the area, and offer agricultural experiences to environmental studies students. The story and workings of the P.E.A.S. Farm is hard to separate from the community and Missoula. Each growing season, P.E.A.S. Farm donates tens of thousands of pounds of produce for the Missoula Food Bank (Slotnick, 2010). P.E.A.S. Farm also has a strong farm to school program, 3,500 children and adults visited the farm in 2012 on field trips, and an additional 50 youth took part in Little P.E.A.S. Summer Camps (Garden City Harvest, n.d.). This means that almost every school student of the 8,466 enrolled K-12 in Missoula Public School District has visited the farm (field notes). The result of the collaboration was the formation of a student/community agriculture project with the support and involvement of different population segments of Missoula.

The two farms also differ greatly in positioning of economic class. Yale University and the University of Montana represent the spectrum of economic class. Yale University's tuition is set at $44,000 for undergraduates (Yale University, 2013), while the University of Montana is

$5,985 for in-state undergraduate residents (University of Montana, 2013). Privilege and stature underlies all of higher education especially within the Ivy League even with consideration of financial assistance in the forms of grants and scholarships. Privilege and race cannot be separated. Fifty-nine percent of Yale University students identify with being white. A majority (80%) of University of Montana undergraduate students identify with being white (University of Montana, 2013).

Study 2: Participants

Twenty-three undergraduate participants ranging age from 18 to 24 in two separate samples participated in this study. Females accounted for 34.78% (n=5) of all participating undergraduates. The difference between females and males was mainly due to a greater proportion of males in the University of Montana sample. Males and females were evenly split in the Yale University sample. Twenty-two students out of 23 were Caucasian. One student was Asian. Fifty-seven percent (n=13) of participating students were or were planning on declaring environmental studies majors. Other majors included Geology, English, French, Psychology/Anthropology, Physiology/Biology, Community Health, Sociology, Resource Conservation in Forestry, and Economics. Participating students at both Yale University and the University of Montana came from a wide diversity of states including Hawaii, Illinois, Wisconsin, California, Mississippi, Minnesota, South Dakota, Vermont, Massachusetts, South Carolina, New Hampshire, Montana, and Florida. Only six of the 17 (35%) University of Montana students came from Montana and none of the Yale University students were from Connecticut.

The first sample was composed of undergraduate students enrolled in internships at the Program in Ecological Agriculture and Society (P.E.A.S.) Farm (n=17) at the University of Montana. Of the seventeen undergraduates eleven participated in both the pre- and post-experience questionnaires. Three additional students took the pre-questionnaire, and another three took part in the post-experience questionnaire due to being enrolled for only part of the summer or absences during site visits. Additionally, photographs were elicited from 12 of the 17 participating undergraduates. As with the questionnaire, five students did not participate in taking pictures due to being enrolled for only part of the summer or returning a camera without any pictures of the farm. Interviews were conducted with 7 of the 17 undergraduates chosen at random. Field notes include observations and conversations with all participating students. The second sample comprised undergraduates interning at The Yale Farm (n=6). All six students at Yale University participated in both pre- and post- experience questionnaires, photo-elicitation, interviews and field notes.

Study 2: Student Connectedness to Nature Questionnaire

For this exploratory study (see Appendix B), two scales were employed to measure participants' feelings of connection to nature, Mayer and Frantz's (2004) 14-item Connectedness to Nature Scale (CNS) (see Appendix E) and the one item Inclusion of Self in Nature Scale (INS) (Schultz, 2001), which employs a 7-point Venn diagram to represent connections between nature and self incrementally overlapping (see Appendix F). Each item on the CNS was scored using a 5-point Likert scale of agreement with 1 being "strongly disagree," 2 being "disagree," 3 being "neutral," 4 being "agree," and 5 being "strongly agree." The scores on Items 4, 12, and 14 were reversed coded (5 became 1, 4 became 2, etc.). These items have statements that reflect a

disconnection from nature. Students who agree with feeling connected to nature should answer 4 or 5. In the analysis, a score of 5 always corresponds with a strong agreement and a score of 1 always corresponds to a strong disagreement. Participating students were encouraged to explain their thoughts and feelings about each item in an open text box. The INS was developed from the Inclusion of Other in Self Scale, Venn diagrams to measure closeness and predict relationship-maintaining behavior (Aron et al., 1992).

The reliability of the initial CNS scale was relatively high for both pre-experience data ($\alpha = 0.74$) and post-experience data ($\alpha = 0.82$) and above the conventionally accepted lower bound for Cronbach's α of $\alpha = 0.70$, consistent with the assumption that CNS scale is a reliable instrument. A Varimax orthogonal rotation solution principal component analysis was utilized to determine the structure of the CNS scale for both sets of data. Mayer and Frantz (2004), Olivos et al. (2011), and Brügger et al. (2011) identified a single component in CNS as the best solution. Considering the precedent, the sample size, and eigenvalues and scree plot in the post-experience data, I forced the extraction of a single component. In the pre-experience data set, all items positively loaded on the first component between .296 and .820 with the exception of two items: (1) "I often feel a sense of oneness with the natural world around me"; and (5) "When I think of my life, I imagine myself to be part of a larger cyclical process of living." The first component was 3.711 explaining 26.5% of the variance. In the post-experience data all CNS items loaded positively on one component from .165 to .890 using a Varimax orthogonal rotation solution principal component analysis again. The first factor was 4.290, explaining 34% of the variance.

Of the 23 participating students, six (26%) did not fill out either the pre- or post-experience questionnaire due to extended absence or enrollment for only part of the summer semester. Several items on the CNS scale were also not completed (see Table 2).

Table 2
Pre- & Post-experience Factor Loading for Individual Items of the CNS

Item	*n*=	Pre-experience	*n*=	Post-experience
1	20	-.091	20	.551
2	20	.814	20	.792
3	20	.542	20	.165
4	20	.365	20	.494
5	20	-.053	20	.437
6	20	.683	19	.516
7	20	.457	19	.636
8	20	.425	19	.623
9	20	.556	18	.890
10	20	.406	19	.314
11	20	.820	18	.837
12	20	.296	19	.670
13	20	.584	19	.465
14	20	.422	19	.238
Eigenvalue		3.711		4.291
% Exp. Variance		26.50%		47.67%
α		0.74		0.82

The INS, as a one-item scale with a series of seven differentially overlapping circles (labeled ‘‘self’’ and ‘‘nature’’) that participants could choose the one that best described how interconnected they felt with nature was not tested for reliability. Since this measure is a single-item measure, its reliability could not be estimated from my data.

To determine if there was statistically significant median increase between the pre- and post-experience responses to the CNS and INS, I applied a Wilcoxon Signed-rank test. Six students did not complete both pre- and post-experience questionnaires. Incomplete responses

were missing completely at random, involving participants not filling out backsides of printed questionnaires, or missing individual items as a result of overfilling an open text box above. Due to the limited sample number, I employed pairwise deletion approaching the data (Allison, 2001). If any case had a missing value that person's data was excluded from the total score and scale analysis. When looking at individual scale items, only existing responses were considered. I also compared medians of items in both samples, number of increase or decreased scores in paired responses, and percentages of participant responses of how many strongly agreed or disagreed etc. to better understand the data.

Study 2: Reliability and Limitations of Questionnaire

The pre and post surveys used tested scales—Inclusion of Nature in Self Scale (INS) and Connectiveness to Nature Scale (CNS)—to measure students' perceptions and connection to nature (see Appendix B). Adapted originally from Inclusion of Other in the Self (Aron et al., 1992), INS comprises a one-item measure that participants chose from a series of seven overlapping circles (labeled "self" and "nature") to describe their feelings of interconnectedness with nature. Aron et al. (1992) found that close relationships are demonstrated by the inclusion of self with others. Shultz's (2001) adaption of the Inclusion of Other in Self (IOS) similarly demonstrates an inclusion between self and nature. Schultz (2001) found a positive correlation between INS and the New Ecological Paradigm Revised Scale ($r= .20$, $p< .01$), as well as the subscales of the Environmental Motives Scale, Biospheric concern ($r = .31$, $p < .01$), and Altruistic concern ($r = .18$, $p < .05$). Additionally, Schultz, Shriver, Tabanico, and Khazian (2004) found the INS test-retest reliability to be $r_{tt}= .84$. In a study examining connection to

nature measures, Brügger et al. (2011) found INS "surprisingly accurate in capturing individual differences in people's connection with nature" (p. 331).

The Connectedness to Nature Scale, a self-reported fourteen 5-point measure assesses participants' "affective experiential connection to nature" (Mayer & Frantz, 2004, p. 504). Results are summed and range from 14 to 70. Higher scores account a higher level of feelings of connectedness to nature. The original research tested reliability and validity in five separate studies. In study one, Mayer and Frantz (2004) found positive correlation with New Ecological Paradigm Revised (NEP: Dunlap et al., 2000) $r = .52$, $p < .01$, and all three Lifestyle scales developed to assess degree of participants' contact with nature on a typical day, work day and free day (*Lifestyle A*: $r = .55$, $p < .01$; *Lifestyle B*: $r = .37$, $p < .05$; and *Lifestyle C*: $r = .43$, $p < .01$). In addition, the correlations between the CNS and Lifestyle indices remained significant when controlling for the NEP (*Lifestyle A*: $r = .46$, $p < .01$; *Lifestyle B*: $r = .30$, $p < .05$; and *Lifestyle C*: $r = .36$, $p < .05$). Study two further demonstrates evidence for internal consistency r= .82, and the correlation of CNS with ecological behavior. When researchers controlled for NEP scores, CNS and ecological behavior positively correlated, while the relationship between ecological behavior and NEP significantly receded when controlling for CNS. These results provide support that it is our emotional connection to nature as opposed to just our cognitive thoughts that form how we behave towards nature. CNS significantly correlated with both general and ecological perspective taking measured in the perspective subscale of the Davis Interpersonal Reactivity Index. Study three found higher CNS scores in undergraduate students studying environmental studies as opposed to psychology, math and chemistry. In study four, CNS scores did not correlate with any level of income, but did differ with levels of education. Those with college or graduate degrees scored higher levels of connectedness to nature than high

school or college students. CNS positively correlated with NEP, the biospheric concern subscale of the Environmental Motives scale (Schultz, 2000) $r = .45$, $p < .05$, and environmental behaviors $r = .45$, $p < .05$. CNS negatively correlated with consumerism behavior $r = -.36$, $p < .01$. In study five, CNS moderately correlated with INS ($r = .55$, $p < .01$), and marginally with Implicit Association Test (IAT: Schultz et al., 2004; Schultz & Tabanico, 2007) ($r = .27$, $p = .07$). In a separate study by Olivos et al. (2011), CNS positively correlated with NR, INS, and EID scales.

Certainly the Connectedness to Nature Scale and Inclusion of Nature in Self Scale have limitations. Since the inception of empirical research on the motivations of environmentally responsible behavior over forty years ago, nearly sixty possibly more different measures have been developed. I compiled a list with a range of focuses including environmental attitudes, affinity, worldviews, concern, knowledge, perceptions, identity, beliefs, connectedness, and behaviors. Although these measures have offered insight into motivations behind environmentally responsible behavior, none of them are perfect and offer only a glimpse of what factors into pro environmental action. There are several challenges to all of these measures. First, the concept of environmentally responsible behavior is a western one involving countries or people living apart from nature with the ability to afford to make individual and national level choices based on convenience or capitalist economics. Any measure or model developed at this moment in western history in many ways can only speak to that place of privilege. These psychological measures are specifically designed to consider western concepts of duality between nature and humans. For that reason many of these measures are developed and tested predominantly in the United States, some in Canada, Europe, or Australia. Second and most important, no model exists that definitively explains the factors and motivations for

environmentally responsible behavior. Without a definitive model all measures are inadequate to assess. As research furthers understanding of environmental action new measures will develop. Last, reflecting the gradual development of conceptualizing pro environmental behavior the focus, methodology and wording of scales have changed since the earliest I have listed, the Measurement of Ecological Attitudes and Knowledge Scale in 1973. Many of the measures in my compiled list I discarded as being too anthropocentric, focused on indirect human environmental behavior or attitudes like voting or donating money to environmental causes, or did not serve to understand connectedness to nature, a significant factor in environmentally responsible behavior. Connectedness to Nature and Inclusion of Self in Nature Scales both ask participants to actualize their relationship to nature in an ecocentric tenor.

Although there is no gold standard measure of connectedness to nature, explicit measures such as INS and CNS show strong validity and reliability. There are however limitations to these specific measurements. Each of these scales presumes participants can reflect on their connection to nature. Brügger et al. (2011) pointed to the fact, self-reflection can be vulnerable to recollection and bias. However, the implicit measure of the IAT, which avoids self-reflection has demonstrated only moderate correlation with explicit measures and almost no link with either ecological concern or behaviors (Brügger et al., 2011; Mayer & Frantz, 2004).

Study 2: Photo-elicitation

Photo-elicitation was utilized to study the perceptions of participating students regarding nature, agriculture, food, and their relationship with the campus agriculture project. Participating students were asked to take three photographs (although many took much more than three photos) of a place(s) or subject(s) within the campus agriculture project that they felt connected

to with provided disposable cameras. Cameras were distributed at the start of the summer semester in June then collected in August. Students were instructed that photographs should exemplify their relationship to the campus agriculture project (See Appendix C). The 160 photographs taken by 17 students who returned cameras that contained developable photographs were coded first by content. Data was first organized by image content, including farm spaces and structures, people, plants, animals, foods, and activities. Initial codes were compared back to student interviews, initial interview coding, field notes and memos. After second and subsequent coding phases in interviews, field notes, and memos, photos then were coded with the developed codes to construct and confirm meaning.

This method was chosen to understand more of students' lenses of sight, their perceptions, and their lived experience at the farm. By immersing themselves in the photographs, researchers to look beyond the immediate construction of the image to see all parts and implied meaning (Harper, 2001; Loeffler, 2005; Van Auken, Frisvoll, & Stewart, 2010). I am using participatory visual research as descriptive data, and meaning making. Image-based research is utilized in a multitude of fields and disciplines, often ethnographically or anthropologically informed (Pink, 2011). Still a relatively recent field, the sheer diversity of visual research offers a variety of approaches, methods and projects. Photographs as an expression of meaning, represent an individual's experiences, knowledge, values, and perceptions. The images are examples of ultimately how individual photographers see the world. The meaning, whether intended or unintended, also rests with the viewer (Harper, 2001). Rose (2007) states photographs "can carry or evoke three things—information, affect, and reflection—particularly well" (p. 238) for social science research.

By utilizing students' photographs as prompts for interviews with a sample of students as discussed below, the intention was to deeper into understanding the meaning laden within both the images and interviews. Rose (2007) described photo-elicitation as method for researchers to construct a "visual narrative" that can prompt more discussion. Asking students to discuss their own photographs will provide a more complete story and data set, especially for more visually inclined students. Van Auken et al. (2010) found interpretation by the photographer produced thick data as well as meanings different than then those assumed by researcher.

Two primary variations of photo-elicitation exist, external driven or images selected by researchers, and participant-driven in which subjects choose the images. External driven photo-elicitation tends to be top-down and closed-ended, producing questionable validity in data (Crisman, 2006). Harper (2002) explains in this method of photo-elicitation the images have to "break the frame…of normal views" (p. 20) in order to produce reflective and useful interviews. There are several advantages in participant driven photo-elicitation. This method de-centers the authority of the researcher and creates opportunities for participants to engage more meaningfully in data (Van Auken et al., 2010). Participant driven photo-elicitation also can "capture aspects of lived experience in ways that would not be possible with other methods" (Stewart & Floyd, 2004, p.450), reaching even reticent participants (Van Auken et al., 2010).

Study 2: Interviews

Data for this exploratory study is driven from 13 in-depth semi-standardized interviews with 13 participating students, 6 Yale Farm students and 7 P.E.A.S. Farm students done at the end of the summer semester. Within the University of Montana sample, interview participants were chosen at random and with the option to decline. A loose set of questions was developed

based on a review of connectedness to nature and agriculture-based learning literature, discussions with staff, field notes and elicited photographs (see Table 3).

Using photographs as prompts and a means to produce a deeper conversation, questions evaluated photographic choices, participants' connection and attachment to the farm, community, crops, and nature, perceptions of agriculture and nature, past experiences and eating habits. According to Collier (1957), compared to traditional interviews, photo-based interviews are often more focused, produce deeper discussion, longer, and can tap responses lying beneath the surface. Photographs can help participants explain their experiences and perspectives (Loeffler, 2005). As noted by Van Auken et al. (2010) participant photographs are subjects of their choosing and therefore have personal meaning that they generally want to talk about. Indeed most of the students wanted to talk in-depth about each photograph and its meaning.

Semi-standardized interviews set field marks for my research but also allowed me to pursue more detailed student views if and when needed to be able to continue a line of questions or rephrase as well as having some capacity for dialogue. Interviews averaged 56 minutes in length although ranged from 24 minutes to 103 minutes. Interviews were conducted until data collection no longer produced new information or understanding. Over 12 hours of interviews with the 13 participants was recorded and transcribed.

Coding was performed through listening and reading through each transcript and applying a values, pattern, focused, and theoretical coding frameworks reflecting participants values, attitudes and beliefs along with behavior patterns (Salañda, 2013). Utilizing qualitative data analysis software, NVivo qualitative software the interviews were coded in several cycles in conjunction with participant photographs and field notes for themes, patterns and meaning.

Table 3
Selected Questions From Interviews

Attitude	Which photograph or photographs speak more about your connection to the farm? What do you feel more connected to at the farm? Is it the people, farm, plants, land, etc.? Can you tell me more about that? How has the summer been for you? Has this internship at the farm what you expected? Why do you spend time beyond required hours at the farm? What have been your favorite moments at the farm? How has it been to see the growing process from seed to plate? What was your favorite fieldtrip? Why? Have you had much interaction with outside community visiting the farm? How does this experience fit into life and career goals? If you were telling the narrative of this experience what would the theme be? Is there anything else I should be asking about your experience?
Beliefs	How do you define nature? How do you define agriculture? How do you define wild? What is the relationship between nature and agriculture? Has this experience changed what you thought agriculture is or could be? What is a weed? How do you think agriculture fits into education?
Behaviors (Current & Intentions)	Have your eating habits or food choices shifted? Why? How has lunches been on the farm? What are your feelings about cooking, serving and eating vegan food? Do you cook at home? What are your food buying habits? Do you have any plans or desire to stay involved at the farm? Do you have any plans or desire to garden? Do you have any plans or desire to farm full or part-time? Do you think through this experience you see plants and land differently? Do you see when a plant is doing well versus when it is not? What past experiences do you have gardening or farming? Do you have experience with farm animals?

Study 2: Field Notes

Over 80 hours were spent in observation and discussion on University of Montana and Yale Farms during the summer of 2013. Field notes were taken on the farms and then transcribed

digitally and filled out at the end of each day. Interacting with the students, staff, and community members provided rich context about students' experiences and the farms themselves to frame results from questionnaires, photo-elicitation, and interviews. Spending substantial amount of time with each group also allow a measure of familiarity needed to first understand each student's personal experience and allow deeper conversation during interviews. The field notes were coded in several cycles along side the interviews and photographs employing values, pattern, focused, and theoretical coding frameworks on qualitative data analysis software, NVivo qualitative software.

Methodologies

The epistemological framework to address and guide my research, methods, and tools has been shaped by a range of methodologies and ways of knowing. Phenomenology as a means to study the lived experience is closely aligned with my descriptive research of the affects of farming. I also draw from constructivism as structure to study the formation of multiple perspectives. Bentz and Shapiro's (1998) mindful inquiry offers a holistic approach for inquiring with reflective awareness as I embark on my own reflexive path. And perhaps most significant, my own lived experience in teaching gardening at a small liberal arts college has significantly influenced my research question, study system and even enrollment in this doctoral program. I will situate each of these traditions and my own lived experience, observation through a mixed method study.

Mixed Methods

Mixed methods design is “multiple ways of seeing and hearing” (Greene, 2008). Mixed methods generally allow more creative research design with opportunities instead of limitations. Johnson and Onwuegbuzie (2004) asserted mixed methods design is “an expansive and creative form of research, not a limiting form of research. It is inclusive, pluralistic, and complementary, and it suggests that researchers take an eclectic approach to method selection and the thinking about and conduct of research” (p. 17). From the ontological perspective, mixing of methods is often done to fulfill a broader conceptualization of meaning within the research. Diversity is considered beneficial to the development of a more *valid* result. As Poteete, Janssen, and Ostrom (2010) have noted, "all methodologies have limitations...To overcome the limits of any one method, one needs to draw on multiple methods" (p.5). From a practical perspective, mixing of methods can offer multiple pathways to a more *useful* result (Creswell & Plano Clark, 2011).

I chose a mixed methods research design to both narrate statistical trends in campus agriculture projects and explore the personal stories of participants. Mixed methods appeals to me as a more creative and holistic method of doing research. Under the framework of mixed method research design, I hold quantitative and qualitative inquiry in the same space using phenomenology, social constructivism and mindful inquiry as tools and philosophical guides rather than dogma. Utilizing a mixed methods design in this research developed a more comprehensive account of campus agriculture projects.

Social Constructivism

The philosophy of constructivism developed in sharp reaction and contrast to prevalent theories of knowledge, specifically to objectivist epistemology and positivism. Constructivism proposes knowledge is not discovered as in the case of positivism, but constructed based on

individual and cultural experiences (Yilamaz, 2008). Constructivism replaces the traditional and absolute concept of truth with to what Glasersfeld (1981) called "the concept of viability" (p. 87). This means knowledge survives as long as it is serves its purposes and is relative to its observer. Although mean-making and knowledge construction is the foundation of constructivism, many approaches exist. "Constructivism is not a single or unified theory; rather, it is characterized by plurality and multiple perspectives" (Yilamaz, 2008, p. 163). Among approaches in cognitive development, epistemological, methodological, philosophical, and social, etc., researchers distinguish three categories of constructivism (Richardson 2003; Yilamaz, 2008). Social constructivism focuses on the function of environment or social context in constructing knowledge. This approach stresses how knowledge is determined by "politics, ideologies, values, the exertion of power and the preservation of status, religious beliefs, and economic self-interest" (Phillips, 2000, p. 6). Psychological constructivism gives emphasis on knowledge as constructed by the individual's prior knowledge and experiences and relates to learning theory. It recognizes formal knowledge is created by agreement of individuals in a group. Radical constructivism assumes external reality and truth cannot be known beyond one's self. Within the context of the proposed research I draw heavily from social constructivism.

The social constructivist approach sees the constructed reality, which people live, believe, and accept as different than the physical reality. While the physical reality does exist and is connected to our constructed reality, our beliefs, perspectives, and experiences shape the world we see and accept. Constructivist research seeks to describe how the subject group has constructed reality, both individually and collectively and how their perceptions, beliefs, and worldviews shape their reality. Constructivists recognize differences in experiences, culture, class, race, gender, age, and other divisions that can affect life worlds and perspectives. In

constructivist frameworks, humans assign subjective meaning based on context, and often these meanings are navigated socially and historically (Creswell, 2007; Neuman, 2006). While the relativism that sometimes underpins constructivism has been challenged and followed into nihilism, constructivism does acknowledge a physical reality does exist (Meyer, 2009).

Social constructivism along with phenomenology rests within the larger framework of interpretivism; approaches that emphasize socially constructed meaning and interactions. Both phenomenology and constructivism are sensitive to context and different worldviews, seeking to understand rather than test (Neuman, 2006). As a result, constructionist worldviews often manifest in phenomenological research (Creswell, 2007). Social constructivism fits well into my philosophical framework and research study. I recognize the existence of multiple points of view and the possible validity of all of them or none of them based on limits of each. Reality is constructed by the perception of the individual and the dominant culture. Individuals, in essence choose to "see" their constructed reality, often missing or capturing only some aspects. As a constructionist researcher I am interested in exploring how providing different experiences—specifically in agriculture—affects perceptions and in turn values and actions. Although I am very interested in creating change, I want to observe if with these experiences students do in fact construct their realities differently and, if so, how?

Phenomenology

Distinct from other forms of qualitative research, phenomenology is closely linked to philosophy, focusing on questions of meaning and being. Kant, Husserl, Heidegger and Merleau-Ponty defined it as a mode of philosophical inquiry as well as a methodology (Randles, 2012). Phenomenon and phenomenology concerns itself with the essences or nature of an experience

rather than appearances of the human experience. “Phenomenology is viewing the world through our consciousness,” (Bentz & Shapiro, 1998, p. 104) and it is through our consciousness the real or objective world can be accessed. Phenomenologists believe we can only see and understand the world through the lenses of our perceptions and experiences. Similarly, Dilthey (1985) argued the reality or objectiveness of the lived experience comes only through awareness and thought. For this reason, phenomenologists understand that only through thoughtful awareness of our experiences can we transform and take on new perspectives (Van Manen, 1990).

As a framework for research, phenomenology asks what is the lived experience of both the subject group and researcher. To perform phenomenological research is to question how humans, individually and collectively experience the world. Phenomenological researchers want to understand and know the world in which we live and describe it with as much rich detail as possible. Phenomenological approaches place an emphasis on description over explanation (Moustakas, 1994). These descriptions contribute to our understanding of meaning (Husserl, 1964; Van Manen, 1990).

It is important to note that phenomenology does not separate the research from the researcher. Although many philosophical modes of inquiry recognize the researcher is never fully removed from the study or its results, phenomenology acknowledges the proximity of the phenomenon to the researcher. The researcher “stands in the fullness of life, in the midst of the worlds of living relations and shared situation” (Van Manen, 1990, p. 32). The fingerprint of the researcher correlates with the immediacy of involvement. Some strategies of phenomenological research even begin with the personal experience of the researcher to understand her experiences and perspectives on the phenomenon (Randles, 2012).

The philosophical framework and modes of inquiry that we as researchers take on have important consequences on not only for research results, but also in how we frame knowledge for a larger audience, influencing perspectives and practices. Western society's placement of nature as an object to be measured has ultimately changed our relationship to it. Nature becomes just a human construct to divide and elevate human civilization instead of a seamless community. Heidegger challenged the subject-object construction in western thinking and offers another way of addressing the dualistic thought prevalent in dealing with environment issues (Harvey, 2009). Heidegger (1962) wrote:

> "Nature" itself can be discovered and defined simply in the pure presence-at-hand. But when this happens, the Nature that "stirs and strives," which assails us and enthralls us as landscape, remains hidden. The botanist's plants are not the flowers of the hedgerow; the "source" which the geographer establishes for a river is not the "springhead in the dale." (p. 100)

Phenomenology recognizes the larger overlay of intersection of life rejecting abstraction and reductionism prevalent in science. Phenomenological research always starts in the life world (Van Manen, 1990).

Reflexivity

According to Goethe (1963), "One learns to know only what one loves, and the deeper and fuller the knowledge is to be, the more powerful and vivid must be the love, indeed the passion" (p. 83). Goethe's argument can be experienced at all levels of human development from a young child to mature adulthood. We learn, remember, and pursue what we love. The path to

knowledge is a path of love (Levinas, 1997). For this reason, E.O. Wilson and proponents of ecoliteracy understand the extent we understand other life reflects the value we place on them, and that we, as a society cannot come to a place of love without interaction (Wilson, 2003). While Van Manen (1990) refuted that love itself is a method of knowing, he argued knowing is not simply a cognitive act, a concept only occasionally acknowledged within the ivory tower. Instead, ways of knowing are embodied and felt as learned through the senses.

For this reason, I have followed my own passion to explore how education has failed to connect students both to the body and to nature. Sterling (2001), Orr (1994), and many others believe human society is at the brink of a great paradigm shift in both education and our relationship with the more-than-human world. The call is to create new ways of knowing that embrace human dependence and responsibility towards nature, not through doom and gloom stories but through sensorial and embodied connection. If we fail to accomplish new ways of seeing, we may fail at meeting the greatest challenge placed before humankind. In turning to technology to solve problems of education and climate change, we in western society illuminate the objects of our affections- in many cases technology. Wendell Berry (1981) pointed that solutions come only from within a pattern without destroying the larger pattern. Educational problems require educational solutions not technological or economical, just as problems with human actions on the environment needs human behavior solutions.

It is my aspiration that entering into a working relationship with nature will spark perspectives leading to new ways of seeing, communicating, and engaging with the more-than-human world around us. By connecting to the life within and above a patch of soil, however large or small, we as individuals can attempt to take on broader perspectives beyond our

egocentric and human-centric beliefs. Having taught undergraduate general education and environmental studies electives in farming at a small liberal arts university, my own Goethian passion is to better understand the relationships between humans, nature, and agriculture. What is the lived experience of farming in respects to nature? What do students experience at the campus agriculture project? How do they experience it? Is there a common or shared experience? These heart swirlings have become the focus of my research.

Bentz and Shapiro (1998) advised, "Good research should contribute to your development as a mindful person, and your development as an aware and reflective person should be embodied in your research" (p. 5). I am mindful that we do not know the full impact of human actions on the environment. It is foolish not to recognize the role agriculture has had on altering the land and its life from pollution to spurring population growth. Shepard (1998) and Glendinning (1994) may indeed be right in thinking agriculture is the foundation of human separation and domination of nature. However, like Berry (1981) I believe communing with the Earth in the form of agriculture is not inherently flawed, but there exist flaws within our form of agriculture. The existence of many of organisms (micro and macro) that engage in forms of agriculture indicates to me agriculture can exist in harmony with nature (Mueller et al., 2005). Humans may have to abandon our current concept and practice of farming entirely to pursue one that works in harmony with nature whether that is based on the principles of Mollison's (2011) permaculture, Foley's terraculture (Overland, 2012), Jackson's (2011) perennial polyculture cropping systems, or yet un-conceived theories. But it is with mindfulness and reflection of the tenuous relationship between humans, nature and agriculture I set off into this research. I recognize at this point in history, a balance between human needs and the needs of nature may not be possible or that engaging students into a working relationship with the earth may not

produce changes in perceptions or connections to nature. If my beliefs, hopes, and hypothesis that I base on theorists and researchers before me have validity or none at all, I can only take one step with all the knowledge I currently have. Murie (1997) wrote, "With all the knowledge you have there is usually just enough light shining to show you the next step" (p.14). With mindfulness and awareness I take the next step. I hope this research is an exploration in a full sense.

Summary

In this chapter I detailed epistemological framework guiding this research, my reflexivity as a researcher, and the methodological components and process of this exploratory, mixed methods research. To holistically understand agriculture-based learning and campus agriculture projects and its impact on students' perceptions of connectedness to nature through experiencing agriculture's role in establishing a new worldview, my research involves two study systems: the faculty or staff managing over three hundred campus agriculture projects existing in the United States, and undergraduate students at two campus agriculture projects that identify connection to nature as a pedagogical goal. Study 1 data collection comprised of a closed and open-ended survey submitted to all known higher education institutions with campus agriculture projects and questioning the pedagogical goals, intellectual, physical and emotional of campus agriculture projects. Study 2 research methods encompassed field observations, pre and post questionnaires and interviews prompted by elicited student photographs of their campus agriculture project. While this research included two methodological components, this research studies one phenomenon—whether and how campus agriculture projects impact students' perceptions of and connection to nature. The layers add depth and a more holistic understanding of factors and

effects involved, including students' perceptions of connectedness to nature, deeper connection to place, and anthropocentric beliefs and behaviors.

CHAPTER 4: FINDINGS AND INTERPRETATION

> *We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect.*
>
> (Leopold, 1949)

Through studying pedagogical objectives of US campus agriculture projects, and student experiences at Yale Farm and University of Montana P.E.A.S. Farm, I set out to explore and understand:

- What are the prevailing models, types, characteristics, and pedagogical objectives (intellectual, emotional, and physical) of campus agriculture projects?
- How pervasive is connection to nature and sustainability as pedagogical objectives of these campus agriculture projects?
- In what ways do academic courses connected to campus agriculture projects at US colleges impact participating students' perceptions of and connection to nature?

Data collected in both studies gives empirical evidence supporting claims that agriculture is taking on a different identity in higher education. Issues in sustainability, food and agriculture are not only influencing the physical workings of colleges and universities, but pedagogy on departmental and institutional scales. Findings illustrate a re-visioning of how higher education is interfacing with agriculture and agriculture-based education beyond traditional land grant colleges of agriculture, focusing on sustainability at physical, emotional, and intellectual levels. Events and Outreach Coordinator at Yale Sustainable Food Project, Jacqueline Lewin (field notes, 2013) described farming outside land grant colleges of agriculture, especially in the Ivy Leagues as "radical movement." Campus agriculture projects studied in this research focus on teaching sustainability and sustainable agriculture practices. Much of the campus agriculture

projects compiled and surveyed operate even outside of agriculture degrees, including the two chosen for in-depth, exploratory study of student experiences. Participating students at Yale Farm and University of Montana P.E.A.S. Farm in turn experienced changes in pro-environmental and social behaviors, alongside developing strong connections to the farm as a place.

The following chapter outlines findings from both Study 1 and Study 2. Findings presented in this chapter contain descriptions, quotes from participant interviews, photographs when appropriate, and analysis.

Study 1 Findings

Findings from the national survey of campus agriculture projects managers and educators describe campus agriculture projects' characteristics, including acreage, ascribed model, curriculum offerings, and degree of inclusion, as well as, pedagogical objectives that depart from traditional land grant college of agriculture offerings. Each is explained below under campus agriculture project characteristics and pedagogical objectives.

Campus Agriculture Project Characteristics

The first objective was to identify characteristics of current campus agriculture projects in higher education. Findings reveal an image of emerging campus agriculture projects determined by date established, size, model, curriculum offerings, participation, and accessibility. Of the 353-campus agriculture projects in the US compiled and reviewed, 166 were established between the years 2005 and 2010. Figure 1 illustrates the 158.1% increase between these years and the continued growth occurring at a slower rate (21.4%) between 2010 and 2013. In size, over 44%

of survey participants reported their campus agriculture projects were under a half acre, followed by 16.1% between a half-acre and an acre, and 24.2% between one and five acres with significantly less reporting above 6 acres into the thousands (see Table 4). Of the participating campus agriculture projects analyzed, 27 were at land grant universities and colleges, however important to this study nine of these campus agriculture projects were not associated with the land grant colleges of agriculture. The 18 campus agriculture projects associated with land grant colleges of agriculture did meet criteria of campus agriculture projects, including student initiative or leadership at some level, and sustainability must be an objective either pedagogically or physically. For example, Clemson Student Organic Farm Project at Clemson University describes their farm project:

> The Clemson Student Organic Farm Project (SOF) was established in 2001 and currently occupies approximately 15 acres of the Calhoun Field Laboratory, an area dedicated for agricultural research, teaching and public outreach programs, on the Clemson University Campus…It offers research opportunities for graduate students, and also provides undergraduate students of any discipline with hands-on experience in organic production systems, with opportunities for creative inquiry research projects. Students and faculty involved in the CFL Project come from a variety of disciplines, but all are dedicated to exploring more profitable and environmentally-friendly farming enterprises through research, education and public service. (Clemson University, n.d.)

Clemson Student Organic Farm exemplifies the relationship campus agriculture projects have with colleges of agriculture research counterparts.

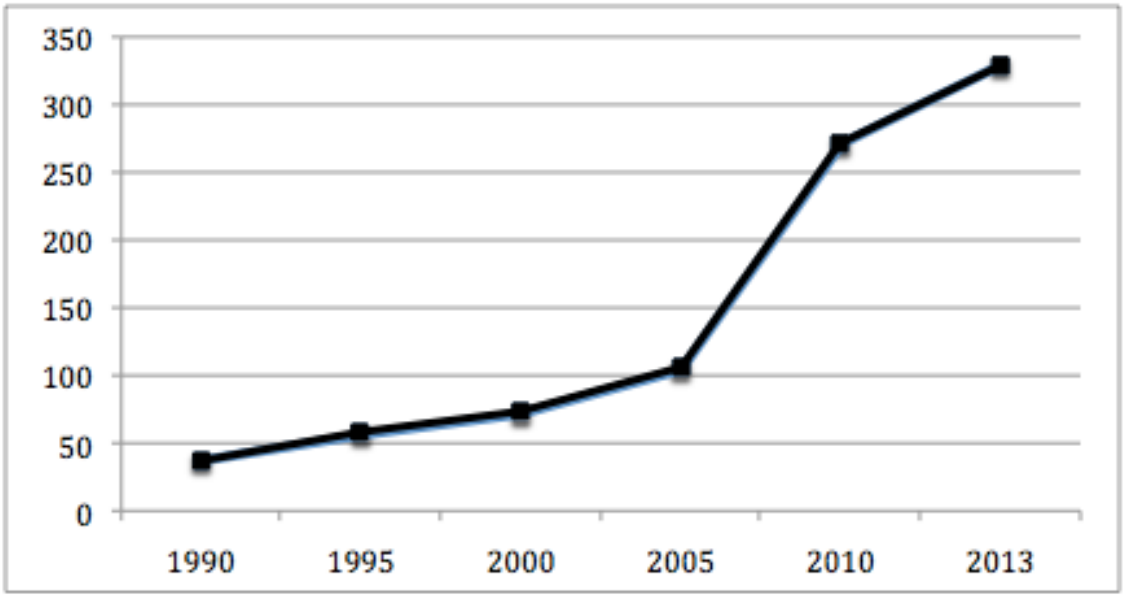

Figure 1. Number of Campus Agriculture Projects

Survey participants reported their campus agriculture projects followed the full diversity of models offered from academic to demonstration with the average identifying 3.2 *(SD=1.78)* separate models to characterize their campus agriculture projects. As noted in Table 5, 111 (74.5%) participants characterized their farm as a student community model, 105 (70.5%) as a community model, 89 (59.7%) as an academic model, 45 (30.2%) as a dining model, 34 (22.8%) as collaboration, 28 (18.8%) as integrated work, and 25 (16.8%) as a residence model (see Table 5). Five participants offered further explanation in the open-ended space for other. Two noted their campus agriculture project was an undertaking of the Office of Sustainability. An additional two participants described their campus agriculture project as a nonprofit organization or foundation dedicating land for research and/or faculty, staff and student use. One campus agriculture project described their process of expansion, physically, academically, and into the community. Nearly all participants (95.3%) answered their campus agriculture project were open and accessible to students regardless of course of study through volunteering, classes, research or

employment. Eleven positively responded with stipulations or further explanation. One participant responded, "With initial training yes." Two positive responses described also waitlists. One campus agriculture project responded, "Yes, but few undergraduates participate in the garden because it is located at the School of Public Health, which mainly houses graduate programs." One described challenges with relying on students, "This was the original intent, however, the garden died on the vine…because of lack of available student help." Another wrote about the challenge of campus agriculture project located thirty miles from the main campus. Other responses included needing federal financial aid for employment at the campus agriculture project, availability to non-student community members as well, being "entirely volunteer supported", and access being limited to those "living in our apartment complex." Lastly, one participant explained plots also available for research.

Table 4
Campus Agriculture Projects in Acres

	Study Participants (n=149)	Percentage
< 0.5 acre	66	44.3%
0.5 - 1 acre	24	16.1%
1 - 5 acres	36	24.2%
6 – 10 acres	8	5.4%
11 – 15 acres	2	1.3%
16 – 50 acres	2	1.3%
51 – 100 acres	1	0.7%
101 – 500 acres	2	1.3%
501- 1,000 acres	2	1.3%
> 1,000 acres	4	2.7%
Unknown	2	1.3%

When questioned about agriculture-based education their institution provides, 78 (52.3%) campus agriculture project educators and managers responded undergraduate electives, followed by 34 (22.8%) undergraduate major, 33 (22.1%) undergraduate core curriculum, 32 (21.5%)

undergraduate minor, 27 (18.1%) graduate degree, 23 (15.4%) undergraduate major emphasis, 11 (7.4%) certificate, 12 (8.1%) undergraduate minor emphasis and 48 (32.2%) responded none/not applicable (see Table 5). On average participants identified 1.7 (*SD=1.9*) types of agriculture-based curriculum offered by their institutions. Several participants responded with specifics of various curriculum offered in the open-ended other box. Three survey participants wrote their institutions offered courses in food systems. One institution reported offering a sustainable foods certificate and another described providing a certificate in permaculture design on-demand. Six participants accounted courses or degrees in environmental studies or sustainability. One participant replied their institution offered only theoretical agriculture-based education. One participant reported students could enroll in independent studies at their institution. Similarly, another responded students could focus on agriculture in their senior independent project or undergraduate thesis. Two survey participants reported degrees beginning in 2014 or under review by their institution. Additionally, two participants reported students could informally focus on agriculture. One institution reported not having majors. Another survey participant responded uncertainty of academic agricultural offerings.

Table 5
Characteristics of Campus Agriculture Projects

	Study Participants (n=149)	Percentage
Type		
Student Community	111	74.5%
Community	105	70.5%
Academic	89	59.7%
Demonstration	45	30.2%
Dining	41	27.5%
Collaboration	34	22.8%
Integrated work	28	18.8%
Residence	25	16.8%

Offerings		
Undergraduate Electives	78	52.3%
Undergraduate Major	34	22.8%
Undergraduate Core	33	22.1%
Undergraduate Minor	32	21.5%
Graduate Degree	27	18.1%
Undergraduate Major Emphasis	23	15.4%
Certificate	11	7.4%
Undergraduate Minor Emphasis	12	8.1%
None/ Not Applicable	48	32.2%
Required Participation		
Undergraduate Electives	29	19.5%
Undergraduate Core	13	8.7%
Undergraduate Minor	13	8.7%
Undergraduate Major	11	7.4%
Certificate	9	6%
Undergraduate Major Emphasis	9	6%
Undergraduate Minor Emphasis	4	2.7%
Graduate Degree	3	2%
None/ Not Applicable	99	66.4%

On whole, participants responded agriculture-based degrees, certificates, courses, etc. offered by their affiliated institutions did not require participation at their campus agriculture projects. Noted in Table 5, 29 (19.3%) of survey participants reported required participation for undergraduate electives. Numbers dropped significantly in all other subsequent categories; 13 (8.7%) undergraduate core, 13 (8.7%) undergraduate minor, 11 (7.3%) undergraduate major, 9 (6%) certificate, 9 (6%) undergraduate major emphasis, 4 (2.7%) undergraduate minor emphasis, and 3 (2%) graduate degree with the exception of 100 (66.7%) responded none or not applicable. Four participants described required participation varied per semester depending on specific course offerings. One survey participant reported, “The farm is an option to meet a requirement for the major.” One participant wrote that required participation varied, “depending on the type of agricultural degree and electives chosen.” Two participants reported participation would be

required for the major and certificate currently in development. Another participant described the garden meeting service learning course requirements.

Campus Agriculture Projects Pedagogical Objectives

The second objective was to determine the pedagogical objectives of the emerging campus agriculture projects. The greatest agreement of importance occurred on pedagogical objectives pertaining to issues within sustainability and sustainable agriculture. As noted in Table 6, participants considered intellectual and emotional learning objectives important to the campus agriculture project mission, governance and activities. Intellectual and emotional pedagogical objectives received grand means of 3.02 and 3.08 respectively, however the three highest individual means were all intellectual goals: offer practical skills in growing food (M=3.66), teach sustainability through agriculture (M=3.56), and establish sustainable agriculture practices (M=3.50). Between 72.5% and 61.1% of participating educators and managers identified the above objectives as "very important." The lowest mean scores for intellectual objectives dealt farm management and agricultural history: teach farm management skills (M=2.40), and explain history of agriculture and its relationship with the development of society (M=2.14). Over twenty percent of campus agriculture project managers and educators deemed these objectives "not important at all" to their mission, governance and activities, percentages among the highest in the study in this scale category.

Table 6
Pedagogical Objectives Scored "Very Important" by 50% or More of Participants

Pedagogical Objectives	"Very Important" (%)
Offer practical skills in growing food	72.5%
Teach sustainability through agriculture	67.0%
Establish sustainable agriculture practices	61.1%

Raise awareness of environmental issues	57.0%
Make connections between agriculture systems, the environment & human health	52.3%

Overall, participants rated emotional pedagogical objectives higher in importance than intellectual and physical objectives with a grand mean of 3.08. However, this is a result of the two low rated intellectual goals considered only "somewhat important." The combined percentages of "very important" and "important" were similar across both intellectual and emotional objectives. In fact, above 60% of campus agriculture project managers and educators deemed all intellectual and emotional pedagogical objectives either "very important" or "important" with the exception of the two intellectual objectives dealing with farm management (41.6%) and agricultural history (30.9%). Only a single emotional pedagogical goal was considered "very important" by over fifty percent of survey participants (57%), raise awareness of environmental issues (see Table 6).

Table 7
Grand Means of Pedagogical Objectives

Pedagogical Objectives	Grand Mean
Intellectual Objectives	3.02
Emotional Objectives	3.08
Physical Objectives	2.70

Survey participants rated physical pedagogical objectives lower in importance (GM=2.70). As noted in Table 7, three of the five lowest scores of importance occurred in physical pedagogical objective category: and provide food to dining services or on-campus venue (M=2.39), reduce on-campus food waste (M=2.39), and ranking in green college ratings (M=2.05). The other two being the ones previously mentioned in intellectual objectives. Responses differed greatly within physical pedagogical objectives. Seven of the ten objectives scored standard deviations higher than one. The largest standard deviation occurred in the

physical objective, provide food for dining services or on-campus venue (M=1.21). Deviations in the data represent differences between models of campus agriculture projects especially manifested in the physical objectives category.

Table 8
Highest Percentages of Objectives Deemed "Not Important At All"

Pedagogical Objectives	"Not Important At All" (%)
Ranking on green college rating system	31.5%
Provide food to dining services or on-campus venue	30.2%
Reduce on campus food waste	29.5%
Explain history of agriculture and its relationship with the development of history	28.5%
Teach farm management skills	22.8%

Campus agriculture project educators and managers wrote in a number of pedagogical objectives in each category. A large number of possible learning objectives exist beyond the 29 listed within the survey. Several outcomes came up repeatedly in the self-reported objectives. Fourteen responses provided further explanation of their campus agriculture project in the open space. Three participants reported beautifying the campus and community as a physical learning objective. Single participants identified five other physical learning objectives that included developing urban green spaces, establishing connections with the community, demonstrating an adaptive and holistic system, grow a lot of gorgeous food, and "reinforce use of campus landscape for food production as central to the university's core academic mission." One participant reported food access for the local surrounding community. Another participant wrote in a response that was coded as an established objective already offered on the survey.

Build community (n=8), develop leadership skills (n=6), offer a setting for stress relief (n=3), teach teamwork skills (n=2), teach nature appreciation (n=2), and encourage sense of

empowerment (n=2) were emotional learning objectives reported by more than one participant. One participant offered an objective not always considered in academia worth consideration, fun and enjoyment. Another reported teaching ethics, an objective advocated by both Leopold (1968) and Bailey (1905). Two participants reported objectives coded as established objectives on the survey: increase students' connection to nature, and instill work ethic in students.

Participants reported several intellectual pedagogical objectives. Research has been an important outcome of land grant colleges of agriculture since its inception that influenced agricultural practices. One land grant institution campus agriculture project educator responded, "Generally, support research, teaching and outreach." Five additional participants responded research skills were an objective of their campus agriculture project. Additionally, the following objectives were each reported by five survey participants: understanding of food security, access, and sovereignty; increase understanding of sustainable and local food systems; and teach business and marketing skills. Multiple participants also wrote in the following intellectual learning objectives: experience different iterations of local agriculture (n=3); teach ecology, biology and natural sciences (n=3); teach ecoliteracy (n=2); establish ecological design practices and systems in agriculture and across human civilization (n=2); offer community outreach and education in agriculture (n=2); and teach communication skills specific to writing, film, and social media (n=2). Five intellectual learning objectives were offered by a single participant each: establish place-based learning, food as essential knowledge, teach interdependence of humans and the environment, teach critical thinking, teach nutrition, and understanding of sustainable agriculture in the context of traditional agriculture. Several survey participants expanded on offered learning objectives: establish interdisciplinary learning (n=1), explain history of agriculture and its relationship with the development of society (n=1), and establish

sustainable agricultural practices (n=3). Participants wrote about experimentation, and growing conditions in specific climates in the latter objective.

Last, when asked about the relationship between the campus agriculture project objectives and the college's mission, 67 (45%) of participating campus agriculture project managers and educators identified their institution's mission and the campus agriculture project objectives "overlaps some" followed by 47 (31.5%) who identified the college mission and campus agriculture project objectives "overlaps a lot" (see Table 9).

Table 9
Relationships Between Institution Mission & Campus Agriculture Project Objectives

	Study Participants (n=149)	Percentage
Overlaps a Lot	47	31.5%
Overlaps Some	67	45%
Mostly Separate	32	21.5%
Does Not Overlap At All	2	2%

Study 1 Summary

In Study 1, a survey of national campus agriculture project educators and managers findings revealed:

(1) An increase in campus agriculture projects between 2005 and 2010, and continued growth into 2013,

(2) A majority of campus agriculture projects reporting acreage under a half acre,

(3) A majority occurring outside land grant colleges of agriculture,

(4) A majority self-characterized by community and academic models,

(5) Nearly all participating institutions reported their campus agriculture project as open and accessible to all students regardless of course of study,

(6) A majority offered agriculture-based electives associated with the campus agriculture project as opposed to degrees,

(7) Campus agriculture project educators and managers placed higher importance on pedagogical objectives related to issues within sustainability and sustainable agriculture,

(8) Emotional pedagogical objectives were reported narrowly higher in importance than intellectual objectives of campus agriculture project, and lastly

(9) 45% of campus agriculture project educators and managers identified their institution's mission and the campus agriculture project's objectives as "overlaps some."

Study 2 Findings

Qualitative and quantitative data from questionnaires, field observations, photo-elicitation, and interviews showed the summer internship experiences at Yale Farm and University of Montana P.E.A.S. Farm did not significantly affect participating students' *cognitive* perceptions of or connections to nature during the time frame—as an abstract concept, meaning a thought or idea existing in the mind rather than a concrete existence. Students' beliefs of nature and their cognitive connection to nature were theoretical. Participants described ideals and broader conceptualizations. For example, students often used terms such as "think" or "believe" in questionnaire open responses. In response to items on the CNS scale students explained, "I think I belong to the Earth," and "I am a product of the earth and its resources so I

believe I just belong to it. I don't own any of it." During interviews similarly used terms and phrases denoting their cognitive belief system. A University of Montana student when asked about her connection to nature said, "We are a little bit more detached because…we kind of have our own thing going on around an intelligence scale that is way above and beyond anything else that is living on the Earth." Another student stated, "I am still thinking of this [the farm] as nature even though we are changing the land."

However, all participating students did express developing strong feelings of connection to the farm as a place. More specifically, participants felt connected to the farm—as a physical place in nature (therefore not an abstract concept) as illustrated through their attachment to plants, engagement with domesticated farm animals, and especially awe of nature's beauty, diversity, and capabilities. Throughout the exploratory study it became evident students' *emotional connection to the farm*, as a place was comprised of students' community attachments, personal and functional attachments, and natural attachments. Further, in combination with students' concerns and beliefs, including their cognitive beliefs of nature affected students' pro-environmental and social behavioral intentions and behaviors. Data collected from interviews, photo-elicitation, field notes, and open-ended responses suggest participating students increased pro-environmental and social behaviors and behavioral intentions, as well as emotional attachments to place, plants, and community. To understand students' connection to farm as a place in nature, a comprehensive framework was constructed to map out the relationships of students' behaviors, beliefs, concerns, and attachments (see Figure 2). Within this framework, students' emotional connections, beliefs, and concerns underlie and support pro-environmental and social behaviors as explained below.

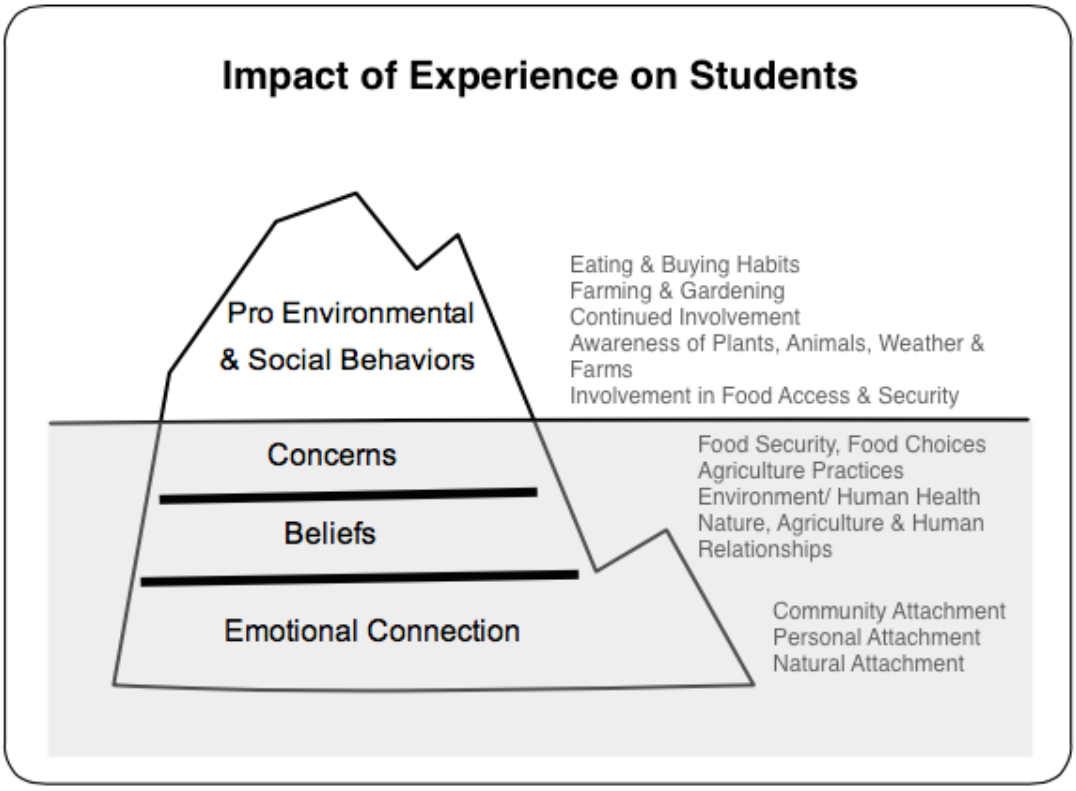

Figure 2. Iceberg Diagram of Impact of Experience on Students

Cognitive Connection to Nature as an Abstraction

Participating students at both Yale Farm and the University of Montana P.E.A.S. Farm during the summer of 2013 scored high on both the Connection to Nature Scale pretest on a 5-point Likert scale (M= 3.92) and posttest (m= 3.93), and Inclusion of Nature in Self Scale pretest (M= 4.90) and posttest (M= 5.05) with a 7-point Venn diagram (see Table 10). There were small, non-significant differences in changes in medians between the pretest and posttest totals and individual item scores on the Connectedness to Nature and Inclusion of Self in Nature scales using a Wilcoxon signed-rank test. Although statistical significance was not found, a couple important statements lay in the data. First, when comparing results from each school, Yale

University students' scores *increased* 3.17 points, while University of Montana students' total CNS score mean *decreased* 0.90 (see Table 11). However in light of the small sample size, the questionnaire results are to be interpreted only in relationship with results of the entire study and not in isolation.

Table 10
Total Undergraduate CNS & INS Scores

	Pre-experience		**Post-experience**				**Effect size**
Item	**Avg.**	**SD**	**Avg.**	**SD**	**Δ Avg.**	***p*-value**	**Z**
1	4.25	0.70	4.40	0.66	0.15	0.279	1.081
2	4.20	0.98	4.35	0.91	0.15	0.587	0.543
3	4.60	0.66	4.55	0.67	-0.05	1.000	0.000
4	3.60	0.92	3.55	1.07	-0.05	1.000	0.000
5	4.25	0.77	4.45	0.67	0.20	0.070	1.811
6	4.15	0.79	3.95	0.76	-0.20	0.739	0.333
7	**3.45**	**1.24**	**4.05**	**1.10**	**0.60**	0.084	1.725
8	3.50	0.59	3.63	0.81	0.13	0.660	0.440
9	**4.20**	**0.75**	**3.78**	**0.85**	**-0.42**	0.190	-1.311
10	3.95	0.97	3.74	0.96	-0.21	1.000	0.000
11	3.75	0.89	3.89	1.10	0.14	0.803	0.250
12	3.45	1.16	3.47	1.14	0.02	0.794	-0.262
13	3.15	1.24	3.26	1.02	0.11	0.399	0.844
14	4.30	1.00	3.95	1.19	-0.35	0.131	-1.511
CNS Total	54.81	5.19	55.00	7.24	0.20	0.825	0.221
15/ INS	4.90	1.04	5.05	1.07	0.15	0.132	1.508

Note: Δ Avg. = post-instruction average – pre-instruction average

Table 11
Yale University and University of Montana CNS & INS Scores

		Pre-experience		**Post-experience**		
	Item	**Avg.**	**SD**	**Avg.**	**SD**	**Δ Avg.**
Yale	CNS Total	50.33	6.45	53.50	7.16	**3.17**
	INS	4.50	0.96	5.00	0.82	0.50
UMontana	CNS Total	56.71	4.96	55.82	7.15	**-0.90**
	15/ INS	5.07	1.03	5.07	1.16	0.00

Note: Δ Avg. = post-instruction average – pre-instruction average

Second, participants' responses in corresponding open text boxes to items on the CNS questionnaire suggest the scale may measure participating students' belief systems or cognitive

connection to nature as opposed to emotional connections. Participating students repeatedly used terms such as “think” or “believe,” nearly twenty times (n=19) in responding to items on the CNS scale (see Table 12). One University of Montana student stated in reference to item seven stated, “I think I belong to the earth.” Another University of Montana participant asserted, “Yes, I believe in the Gaia Hypothesis. We are all one large organism that needs to work together.” Students utilized the word “feeling” or “feel” only slightly less, 17 times, however, participants often used these terms to describe cognitive perceptions. For example, a Yale University student explained, “I feel I have an obligation to the natural world.” In this statement, she describes her relationship with nature not as an emotion but as a perception. Similarly, a University of Montana student explained, “I feel like my actions have a greater impact than grass.” Again, his assertion is situated in his belief system. Statements made by participants reflecting emotions or affective connections were few and included, “I feel fairly removed from the nature world, living in a city, in a house with a grocery store and running water,” made by a University of Montana participant. Another University of Montana student explained, “Everything is connected. I get a special feeling in nature.” While few in number, each of these statements does suggest true affective connections, though vague.

Table 12
Examples of Students’ Cognitive Connection to Nature

Yale Student 1	“We are definitely part of a system…”; “My urban environment keeps me from **feeling** a connection to the "natural world" but my experience with natural biological systems and food makes me feel more of one.”
UMontana Student 1	“Animals have cognitive capacity that we couldn't fully understand.”; “I **feel** we're all made of star stuff, but I'm not always aware of a special kinship.”
Yale Student 3	“We are all interconnected.”; “I **feel** I have an obligation to the natural world.”

UMontana Student 2	"Yes, I **believe** in the Gaia hypothesis. We are all one large organism that needs to work together."; "Nature makes me **feel** connected to something."
UMontana Student 7	"I am a product of the earth and its resources so I believe I just belong to it. I don't own any of it."; "Everything is connected, I get a special **feeling** in nature."
UMontana Student 4	"I am a product of the earth and its resources so I **believe** I just belong to it. I don't own any of it."
UMontana Student 8	"Humans are a part of the community. We **think** we're more important than others in the community but that's false."
UMontana Student 9	"We are only one small part of a much larger and more important part of the environment."
UMontana Student 11	"Belonging to a community is necessary for a fulfilled life."; I **feel** I belong to the Earth more."
UMontana Student 14	"I **think** I belong to the earth. It doesn't belong to me, much bigger than me."; "I hope to one day **feel** more embedded. I still live a pretty disconnected life."
UMontana Student 17	"I **think** I belong to it more."; "I **feel** that they are often the same."

Qualitative data showed deeper insight into students' connection to nature and use of the Connectedness to Nature and Inclusion of Self in Nature Scales. During field observations, interviews and through photos participants described feeling awe for the beauty, diversity, and capability of nature, attachment to plants, and engagement with farm animals, as well as their cognitive perceptions and beliefs of the human/nature relationship. Talking about nature, as an abstract concept was just that for them—an abstract concept—while feelings towards the farm as a place in nature was palpable, evoking emotional attachments. One Yale University participant expressed not feeling that the farm changed how she felt about nature. Yet, the participant expressed strong attachment to the farm stating, "it is very silly and selfish, but I don't want to come back [to the farm] when it is not my space any more." A University of Montana student similarly responded, "I don't feel like that the farm changes how I felt about nature." However, she reported feelings of attachment to the farm, and the growth season, as well as, expressing awe of nature's beauty and capability. In an interview she explains, "as far as working the land and planting some of these plants myself, I don't feel necessarily a link to them myself. But I feel

like I am part of this cyclical process." Other University of Montana students described the experience on the campus agriculture project as way to "connect with the earth." A University of Montana participant said, "it's offered me a glimpse of a possible deeper connective in life." Another stated, "seeing the ground as not just something we like walk over but something we actually like focusing on, and its not just a surrounding its like the thing at hand. It's a different perspective then any of my life." For participants connecting to nature as a whole was possible through specific interactions with the farms and lay within context of the campus agriculture projects.

Connection to Farm as a Place

Attachment to the campus agriculture projects as a place was significant and overwhelmingly evident in all participants. Students at both Yale Farm and University of Montana P.E.A.S. Farm described becoming "super-connected to the farm here," in the words of one University of Montana participant (see Table 13). She characterized her experience and connection as feeling "much differently" than spending time working or WOOFing (World Wide Opportunities on Organic Farms) on other farms previously. Another University of Montana student described time at P.E.A.S. Farm as "the best part of the summer." He goes on to say, "when I get up in the morning, there is nothing else that I want to do but be here." Two participants used the term "home" to describe feelings of connection, belonging, and integration into their identity. Other participants spoke of incorporating the farm into their identity. A student from Yale Farm described her relationship with the farm as if, "it has almost just become a part of me." According to another Yale University participant, "my experience here at the farm has really made me." A University of Montana student talked about wanting to intentionally

"make this [the farm] a significant part of who I am." One Yale University student felt so connected to say, "If some part of it [the farm] were to get damaged, I feel like a part of myself would get damaged." Another Yale University student spoke at length about feelings of hurt and defensiveness after a farm manager from a New Haven high school "referred to the Yale Farm as a market garden," not a real farm.

Table 13
Examples of Students' Connection to Farm

Yale Student 1	"I definitely think just spending the summer here I know have like memories and people, and experiences related to it and it could be considered... Or like when I come here in the Fall I'll get nostalgic and I'll definitely have a connection to like this one-acre."; "I think that just the investment of time, but it's not even my investment. It is what I am getting out of it too. Like I am not going to brag and say I've given so much to the farm."; "But like, just those, just yeah, my experience here at the farm has really made me. I have just really gotten a lot out of it."; "It has given me this experience that I will cherish, as corny as that sounds."
UMontana Student 1	"I think everyone gets really invested. You start from the very beginning planting seeds and then go to the end where you having the CSA shares and it's just cool to be part of this whole process."
Yale Student 2	"I can't really source it to any one thing. It definitely involves ideas that extend beyond this one specific acre, although um you know working here most days for three months, I really feel connected to this big acre."; "And that is the way I feel about this farm, like if some part of it were to get damaged, I feel like a part of myself would get damaged."; "And like, a large part of the reason I am doing this job is the connection to this place."
UMontana Student 9	"Yeah, the people and just the plants, because I feel like they have all kind of grown together."
Yale Student 4	"Because it kind of feels like, especially when you are like a student and like you are always in a place that is not yours, you don't really have a place in the city that is necessarily yours, but it's cool for the summer to have a very intense study of like what it means to have an acre plot. Not like yours but it's not mine personally, but to have like a connection to it."; "It's kind of how you have a connection to like home."
UMontana Student 14	"I have a busy semester ahead. I have school again, which is going to be rough and kind of an extreme sudden transition. I kind have been living the dream life for the past few months."
Yale Student 5	"I feel like having been here for so long, even if I didn't want to stay involved, I feel like I kind of need to. Like it has almost just become a part of me."; "I definitely know that like a few weeks from now if I am not doing stuff with the farm I am going to feel like something is missing. It is so engrained in me now."

UMontana Student 15	"I feel really connected to this place in that way because I feel like when I am here that this is the right place for me to be learning."; "I do feel like a much greater sense of belonging than I have in the past."; "And like I want to come up, I want to be here every day and hang out with these guys. When I get up in the morning I can never think of anything better to do than to come up here."
UMontana Student 16	"Its been really weird for me these last couple weeks because I am about to leave and I feel like I've become super connected to the farm here."; "I feel much differently leaving here than I worked I woofed for a little bit on a farm."; "But yeah its been great to just feel like this a space where I like just feel like I can come here and like have a home here."
UMontana Student 17	"And I feel invested in the project that I want to finish."; "I signed up to take this class a couple of days ago continuing it in the fall and it has nothing to do with nursing. You know. This has nothing to do with nursing."; "I do, probably 70/30 maybe 60/40. Attachment to the land compared to the people. You know?"

In exploring participants' connection to the campus agriculture projects three contributing factors emerged: (1) *community attachment*, (2) *personal attachment*, and (3) *natural attachment* (see Figure 3). Students described feelings of belonging and attachment to student, staff, and outside communities through interactions during meals and work, and farm's community objectives. Participants took photographs of students, staff, and outside community members working together, taking time to have fun, and eating meals together (see Appendix I). The two campus agriculture projects also met students' personal and functional needs in life contributing to their connection to the farm as a place, including good nourishing food, being outside, performing physical work to produce tangible products, escaping from school and city, and having fun. Participants photographed images reflecting students' personal and functional attachments, such as of tools, trucks, compost piles, and foods (see Appendix J). Participants described natural attachment to the farm deriving from feelings of ownership, awe, and engagement with plants and animals. Students captured images of natural connections with seedlings, fields, insects, trees, flowers, and chickens (see Appendix K). Community, personal and natural attachments met three distinct dimensions of students' needs and identity forming

their connection to the two farms. Community, personal, and natural attachment categories and their subcategories are discussed below.

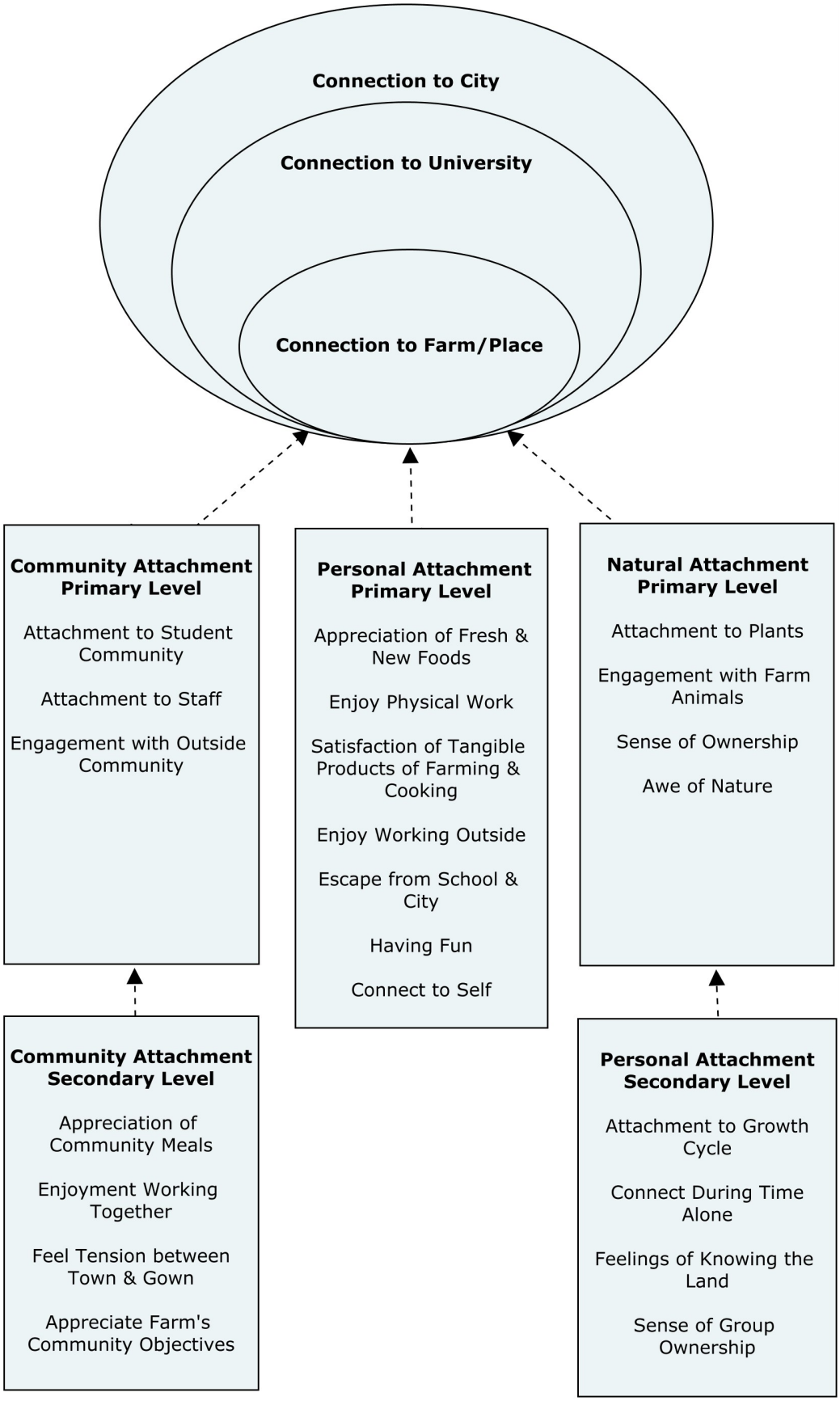

Figure 3. Conceptual Diagram of Connection to Farm

Moreover, data from interviews and field observations parallel photo-elicitation findings (see Figure 4). Although each set of data was coded differently (interviews and field observations codable moments that were aggregated into subcategories and categories, and photos subsequently coded just under categories) and consists of differing numbers of participants and numbers of coding references, frequency of coding in both photos, and interviews and field observations parallel each other confirming validity. Seventeen participating students from Yale University (n=6) and the University of Montana (n=11) took a total of 160 photos. Thirty and a half percent (n=48) of photos featuring students, staff, and outside community were coded community attachment. Over nineteen percent (19.10%) of photographs taken of tools, compost piles, work structures, harvested produce, and food were coded as personal attachment (n=30). Seventy-nine photographs indicating natural attachment to or sense of awe of cultivated plants, flowers, weeds, domesticated animals, and larger landscape to plants were coded, equaling 50.31%. Interviews done with thirteen participants and over 80 hours of field observations of all 23 participants created 458 coding references within community, personal, and natural attachment categories. Of the coding references created, 106 references were coded as community attachment (34.06%), 88 as personal attachment (19.21%), and 214 as natural attachment (46.72%). The corresponding levels between community, personal, and natural attachments suggest a relationship in the formation of connection to farm as a place. The largest difference in percentages between coding references in interviews and field observations, and photographs occurred in community attachment with only 3.49%.

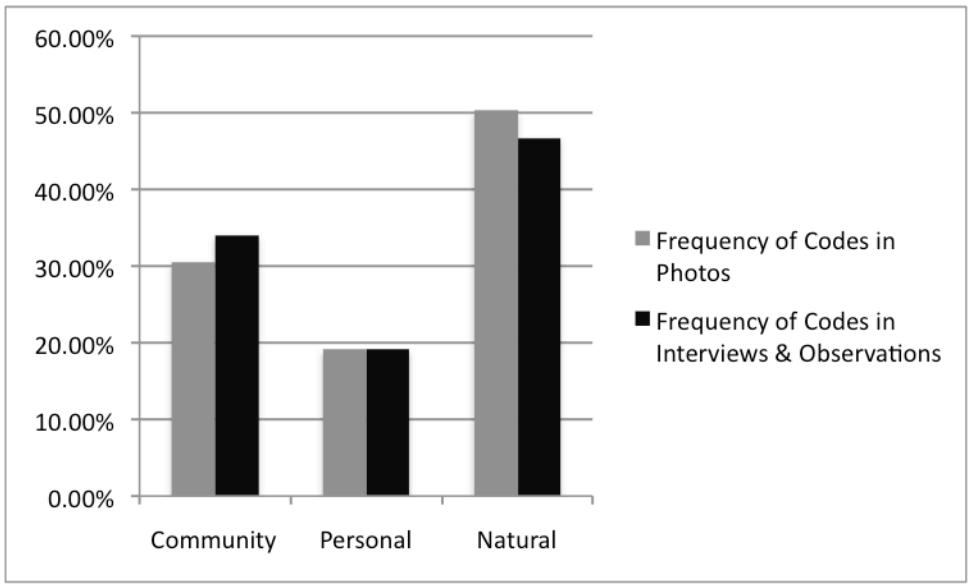

Figure 4. Frequency of Code References Between Photos, & Interviews & Observations

The degree that participating students expressed community, personal, and natural attachments differed between universities (see Figure 5). Together participating students at both universities expressed higher levels of natural attachments, followed by community and personal attachments. Separately, Yale University participants described significantly higher levels of natural attachments and substantially lower attachment to community than University of Montana students. Frequency of coding references in photographs, and interviews and field observations mirrored at each campus agriculture project. Differences in coding references between photos, and interviews and field observations ranged from 0.74% to 9.34% with an average difference of 3.70%.

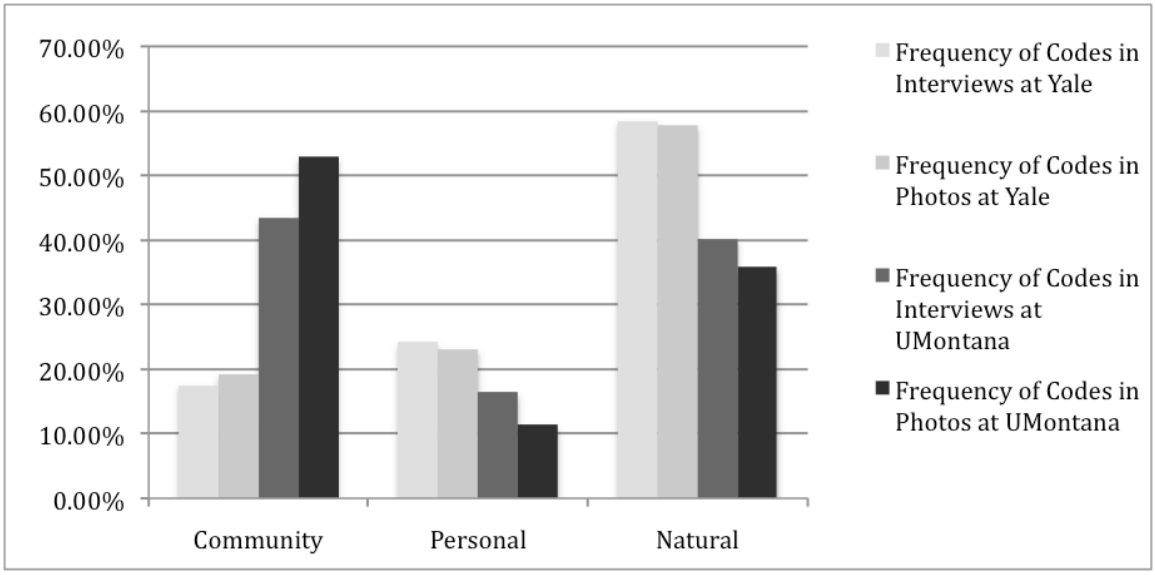

Figure 5. Frequency of Code References Between Schools

Possible Correlation with Degree of Introversion and Extroversion

Although all participants expressed community, personal and natural attachments, the degree of attachment in each category for individuals differed. Findings suggest the degree of community and natural attachment may *correlate with the degree of introversion and extroversion* students' identify with. Although interview questions did not include questions pertaining to students' degree of introversion and extroversion, two students at University of Montana identified themselves as extroverts or highly social with high social needs, one University of Montana participant self-identified as an introvert, and another that while "really love people" was "drawn to isolation." This introverted individual when asked what they felt more connected to, replied, "I think it's the place…probably 70/30 maybe 60/40, attachment to the land compared to the people."

The two introverts described seeking alone time on the farm and conveyed high levels of connecting with the farm as a place and nature. One introverted participant states, "being up here

on the weekends when there is nobody is so great, oh man." The self-identified introvert spent time camping at the farm for a short time, spending nights "right over there, where the garlic used to be…the soil still smelled like garlic." He described that time as "living the dream" and as,

> It is just nice...spending, connecting, I don't know, I don't have the right words for it. Just spending all the time up here, it's good just to like get to know the place a little better even like visually seeing, it's like having an image in your mind of what it looks like when the sun is coming up over the mountain over there and it's going down over there and the sounds and smells

The participant also explained feelings of attachment to the farm allowed him to connect to the community. He expressed:

> I think that being in a place like this helps like talking more…when there is not very many people up here, you get a lot of time to yourself. Where you don't have to have outward shit going on, which is good. But then the people that are up here that you know well and see all the time

The two extroverted individuals expressed high levels of community attachment and enjoyment of working and eating together as a group. One extrovert identified her favorite moments of the summer as everyone including the Farm Manger, Josh Slotnick working all together on a single project. She states, "whenever everyone finishes [their individual tasks] we are descending on this area, you know, and so it would be like ten or twelve of us all in mass doing one thing." The other extrovert stated that he appreciated,

> Just how much everybody cares and like not only how much everybody cares about the things that we are studying and the things that we are learning but…how much everybody cares about each other and how much everybody wants to be here with each other and that is huge for me.

As interviews did not include questions pertaining to students' degree of introversion and extroversion only four students self-identified as either extrovert or introvert, or with characteristics of each. Due to the limited study sample and data, this finding indicates an area of further research and possible significance.

Community Attachment

Participants exhibited *attachment to the community*. This included attachment to students, staff, and outside community at primary and secondary levels. Secondary levels such as appreciation of community meals, enjoyment of working together, having fun, feeling tension between the city and college, and appreciation of the community's objectives and openness led to deeper feelings of attachment to community, identified in primary levels. Higher or primary levels of attachment to community and connection to farm as a place included stronger and explicit connections to student community, staff, and outside community. Participants also described meaning and purpose felt through being part of the farm community and work.

Participants' attachment to the student community contributed heavily to their connection to farms especially for University of Montana students (see Table 14). The majority of pictures taken of community were that of participants' fellow students. Photographs taken at both schools illustrate students' connection to each other and enjoyment in working, learning and eating

together (see Appendix I). Community attachment photographs 1, 2, 3, and 5 (see Appendix I) illustrate fellow students working individually or in groups. A University of Montana student photographed the class meeting as a group in the morning (see Appendix I: Photograph 2). She later explained, "I love how we have just grown closer over the summer and how we really have gotten to know each other, and how we are kind of a big group." According to two University of Montana students, "As the summer grew, relationships did," and "they [the people and the plants] have all kind of grown together." Yale University participant photograph 7 (See Appendix I) shows a student happy, giving a thumbs up to the growing eggplant she and the photographer have been tending. A Yale University participant during an interview explained, "these five other people are important to my experience on the farm." Yale University participant photograph 8 captures his connection to a fellow student in a selfie with her (see Appendix I). Participants spoke of feeling a sense of belonging on the farm and especially within their group of co-workers/students. A University of Montana considered:

> I think it is the power of what bringing twenty people together onto a farm and making them work together on stuff all summer, no matter. You don't have to love everybody but you have to work together, and I think there is a lot of bonding that happens through that.

All the University of Montana participants and many of the Yale University students interviewed profusely appreciated the social aspect created at the campus agriculture projects. One Yale University student discussed that it was the strength of the student community that drew him to become involved and apply for the summer internship. He says:

> This is a real social place, like one thing that really got me interested in the Yale Farm last year when I first came to volunteer. I noticed that all the people that worked here

> were so cool and they, it's like the farm is its own little social club for all these, for all the crunchy, hippie type people at Yale. And I kind of wanted to be a part of that.

Many of the University of Montana spoke of the bonds that they made over the summer and the effect of the student community on their campus agriculture project experience. Comments included: "the people really made the experience," "loved it, love you all," and that they had "made some friends forever." Several University of Montana students described spending additional time at the farm or off-farm with members of the student community, "for whatever reason." Another University of Montana student stated, "I just really like having that sense of belonging and community, we all in this together."

The Yale Farm and P.E.A.S. Farm brought together students across a diverse range of majors and in the case of the University of Montana, a diverse range of ages. The campus agriculture projects provided space for students from various backgrounds and majors to meet and bond over a common experience. "Some of us I'm sure would never have met otherwise and I am sure we will be friends after this." Within the diverse group, everyone brings different expertise and knowledge to the group according to a Yale University student. Diversity across interests and majors fosters interdisciplinary learning. As a University of Montana student remarked, "The farm facilitates the most amazing conversations." He goes on to say, "Hands doing humble work…equalizes the playing field."

Table 14
Examples of Students' Attachment to Student Community

UMontana Student 1	"I love how we have just grown closer over the summer and how we really have gotten to know each other, and how we are kind of a big group. I just really treasure the moments we have been able to spend."; "What I would really emphasize is the community. That is something that keeps me going on a daily I think, when things

	get monotonous."
Yale Student 1	"These 5 other people are important to my experience, um, on the farm, and like I don't know, I sort of like with them I am excited to see where they will like go from it too."
UMontana Student 4	"Yeah, most of my sites, I mean, I'll take a picture of Steve, because he's the only 39 year old, everyone else is you know mid 20's and young 20's and Steve is almost 40. You know, I took a picture of Steve because he is I don't know, because he fits in so well, you know, but it doesn't really make sense for him to fit in because he's just like…He is twice as old as some of the people up here, he's gone and fought, fought in, I think Iraq, and been through that and he's got all this stuff going on and everybody else is just a student pretty much. And so I took a picture of him, he's an example there is no like cliques or anything."; "I mean I found myself hanging out with a lot of people from up here outside of this for whatever reason I think."; "I think it is the power of what bringing 20 people together onto a farm and making them work together on stuff all summer, no matter. You don't have to love everybody but you have to work together, and I think there is a lot of bonding that happens through that."
UMontana Student 5	"Made really great relationships and never would have gotten to know ENST students without working with you all outside."
Yale Student 2	"This is a real social place, like one thing that really got me interested in the Yale Farm last year when I first came to volunteer. I noticed that all the people that worked here were so cool and they, it's like the farm is its own little social club for all these, for all the crunchy, hippie type people at Yale. And I kind of wanted to be a part of that."
UMontana Student 9	"I mean everyone's shared experiences. We've all told funny stories; some are not so funny at times. I think everyone has really just kind of connected"; "So, and I mean, I think it kind of forces you to like some of us I'm sure would never have met otherwise and I am sure we will be friends after this."; "I would say yeah, the people and just the plants, because I feel like they have all kind of grown together."
Yale Student 3	"But also to create a diverse group that allowed each person to bring something different to the table."
UMontana Student 10	"As the summer grew, relationships did."
UMontana Student 14	"Loved it, love you all."
UMontana Student 15	"There is so much more than an academic experience here and I guess what that is, is the experience of community and being around other people who all really, really like genuinely want to be there. And have really intentional goals and interests that are cohesive."; "It is such a strong community."

Participants' *feelings of attachment to staff* also fed into students' community attachment and connection to the campus agriculture projects. Participating students reported feeling supported by staff. A Yale University student accounted:

> They care about each one of the interns, always want to teach us about things, having cool activities and classes and field trips lined up for us, always wanting to talk about things. And even just like in the broader sense, Jacquie, the past two days has really been helping with edit my resume, which you know has been fabulous. And she was just talking to me. I am going to forward her all of my cover letters, and then she is going to proof read them, and help me along with that; so in many ways that is just another example of how this internship is going to like carry me on. It is so much more than just working on a farm. It is very much like a program rather than just like a farm apprenticeship. The fact that Jacquie has got my back now for the next year she is going to help me with finding a job, whether that be related to food or not related to food.

A University of Montana student enrolled for the summer from another institution described the lengths the Farm Director and instructor went to give her a sense of belonging and community. Accessibility and development of relationships with staff and faculty was significant in students' attachment to the farms and participants' learning. The campus agriculture projects allowed participating students to spend much more time with faculty and staff than afforded in traditional classroom settings. Photograph 1 (see Appendix I) shows farm director, Josh Slotnick working along students and teaching in the field. More personal relationships took place as a result. Participating students talked to faculty and staff "like he is one of the other folks." Time also spent together also did not consist of just lectures and discussions, but of co-learning and experiences. In these case studies of Yale Farm and P.E.A.S. Farm, farm staff and faculty took on mentor roles, lecturing, leading discussions, and modeling behaviors. A University of Montana student describes his process of observing and modeling behaviors:

> I watch Josh [Slotnick, farm director and instructor] a lot while we are up here. Because that is one of the best parts about this for me, is being around Josh every day. And its like, if you watch him as he goes about his business it is really easy to see that he is constantly mulling things over and like learning.

Several participating students spoke about *engaging with the outside community* as part of their experiences and connection to the Yale and P.E.A.S. farms (see Table 15). Participants enjoyed connecting with the larger community, whether it was giving tours to volunteers and visitors and sharing the joy of tasting "a husk cherry here or a Sun Gold there," at Yale Farm; "explaining for people who had no idea what a squash plant looked like" the growth cycle; or interacting with individuals at a farmers market in New Haven. University of Montana students spoke of appreciating range of demographics involved in the P.E.A.S. Farm, "Little P.E.A.S., Youth Harvest, etc., that is really what farming is about for me–community." For example photograph 2 captures a Youth Harvest participant having fun in the midst of harvesting beans at the P.E.A.S. Farm alongside University of Montana students. She has stuck bush beans to her shirtfront like Velcro and stands pointing at them, while others are bent over harvesting in the background (see Appendix I). One Yale University participant took photographs of a fellow student exploring a compost pile with a young boy at Yale Farm, there to volunteer with his mother (see Appendix I: Photo 4). Coming and working together to feed themselves, the larger community, and food insecure peoples created community for students around a purpose. Another University of Montana student described the connection food grown made, "something to connect that gap because we are university students but everyone that eats this food is not a university student." For participating students and college students in general, connecting with the outside community is largely unavailable.

Data suggests connecting with the community outside the ivory towers increased students' connection to farm, connection to city, and met participants' larger need for sense of community. Several participating students also spoke of the sense of purpose and meaning growing food for disadvantaged individuals gave them. A University of Montana student explained working at the farm, "is something meaningful to do with your time, instead of just sitting at home on the couch or something why not. You can go and come up here and do something." These students' concepts of community were inclusive of all members, even if they had limited personal interactions. Another University of Montana student described, "feeling that your work is meaningful because of the bigger picture because you are growing food for people who wouldn't be eating this kind of food otherwise."

Table 15
Examples of Students' Engagement with Outside Community

UMontana Student 9	"It is something meaningful to do with your time, instead of just sitting at home on the couch or something why not. You can go and come up here and do something."
Yale Student 3	"As farm interns have been liaisons between the Yale Sustainable Food Project and the community and really giving them an insider's perspective on what all this means to us."
Yale Student 4	"I feel this is what I am supposed to be doing, not necessarily harvesting a massive amount of squash but like talking to people about why I like to harvest squash."; "I like explaining for people who had no idea what a Squash plant looked like, and they just come by 'What are you doing?' 'Squash.' They are here today. They were just babies and now they produce this wonderful squash and they'll bloom for another few weeks and then squash season will be over and then we won't have squash. And that is how food works."; " I love that I like can go to like most restaurants, and pizza places now and say hi to someone behind the counter and like they know that I work at the farm. Because I may have brought them something from the farm or I have given them a flower when they walk by."
UMontana Student 14	"So this is maybe yeah at least something to connect that gap because we are university students but everyone that eats this food is not a university student."
UMontana Student 15	"Garden City Harvest with all the demographics- little P.E.A.S., youth harvest, etc. That is really what farming is about for me- community."

UMontana Student 16	"Think just like um feeling that your work is meaningful because of the bigger picture because you are growing food for people who wouldn't be eating this kind of food otherwise but um also feel like your presence here like on a day to day basis is meaningful."
Yale Student 6	"I like it when families come through the farm and if they just want to walk through that is fine if they want to chat that is fine too. Like one time this lady came in she didn't speak a word of English she came in and pointed down to this weed and if she could pick some of it. Of course it's just a weed. Later I learned it was purslane, which is one of the most amazing plants on the planet like super nutritious with omega-3s."; "I enjoy it when my friends come and I can give them tours of the farm and have them taste a husk cherry here or a Sun Gold there."

Several common experiences and feelings contribute to students' primary community attachments and are categorized as secondary attachments. Sharing a common mid-day meal was a significant part of participating students' experience. Several University of Montana students photographed students sitting at the picnic tables in the heavily shaded barn. Participating students spoke of how much they appreciated common meals, especially with produce freshly harvested at the P.E.A.S. Farm. Cooking and eating together provided space for students to converse. As one University of Montana student explained lunch, "was just one of the times you really got to talk to everyone, and two people actually cooked for you. And I think for a lot of us this is their first time cooking for that many people." Sharing meals also opened students' perceptions towards other ways to eating, being, and knowing. One University of Montana student having now eaten and cooked vegan meals said the experience, "really kind of opened my eyes to a new perspective of someone."

Participating students discussed their *enjoyment working together.* Talking, sharing, playing, verbal word games, etc. not only made the farm work more enjoyable, time and the work go faster. A number of participant photographs showed students working together. Photographs 1, 2, and 5 (see Appendix I) show examples of University of Montana students

weeding and harvesting in groups. Students bonded together as a group over the common experiences and interest. As one University of Montana student detailed:

> I feel like, you know doing the farm work, it's not really back breaking labor, but it's just kind of monotonous after a while. But the thing that I look forward to everyday, and the thing that I am sad about leaving after the summer is just how much fun we have together.

The time spent working together fed into students' attachment to community and the farm.

Three students from Yale University and the University of Montana spoke of *feeling tension between town and gown.* These students understood the complexity and impact of having large portions of a municipality's population consist of temporary residents. A University of Montana student said, "I feel like tension between the university community and the rest of the community." He described himself and the rest of the student body of the University of Montana as "a bunch of kids with a bunch of money," as opposed to many in the community without. A Yale University student questioned, "being a four-year resident…what does it mean to be a community member in four years." Another Yale University student planned to address the issue of temporary student residents in his final project. He explains, "Like how do we keep Yale students basically, not for purposes of gentrification?" The Yale University student notes the lack of opportunities in New Haven and the irony of the city hosting an Ivy League school.

Several participating students spoke of their *appreciation of the campus agriculture projects' community objectives.* Participants talked about each farm's openness, accessibility, and community engagement. A University of Montana student described, "it's just, it's so cool to

see what, like how deep into the community this organization wants to be." A Yale University student explained, "one of the striking things about the farm is that it is very, like, low key, in terms of who is allowed to come on it." He goes on to say,

> I was kind of taken aback that it was, and at first I was like, I am surprised that people don't steal. I am surprised that people don't vandalize and stuff like that. You know it kind of works out, like if I were a teenager with nothing better than do than to ride my bike around the city and look for…things to do. I don't think I would want to. Like this space looks like it is so invested it is something really anyone can appreciate, like literally anyone…I feel like everyone kind of senses a relationship to the farm when they are on it.

Each campus agriculture project's objectives to engage the larger community factored into participants' appreciation and attachments.

Personal Attachment

Through interviews, field observations, and photo-elicitation students described a number of *personal attachments* existing only at a primary level that contributed to students' connection to the farm as a place including: appreciation of fresh and new foods, enjoyment of physical work, satisfaction of tangible products of farming and cooking, enjoyment of working outside, and escape from school and city. Participant photographs reflected students' personal and functional attachments, such as of tools, trucks, compost piles, and foods (see Appendix J). Personal attachments met physical and fundamental human needs of participating students.

Participants spoke frequently about the joy tasting, cooking and growing new foods (see Table 16). Vegetables like kohlrabi, ground cherries, chard, turnips, garlic scapes, and even varieties of tomatoes proved new and exciting foods for participants. A University of Montana student noted, "just the shear variety of vegetables I have come to know over the summer, I feel like I can cook a lot more with them now." She went on to remark, "Kohlrabi was a new one for me. I loved it. It was the best, " and:

> Yeah, just a lot of like leafy greens that I have never cooked with for myself, like chard. I definitely knew kale, but all these crazy things that I didn't even put two and two together. I just thought it was all salad.

A Yale University student expressed, "the salad turnips, oh my God. They are amazing." While another Yale University student described his new affection for tomatoes:

> I've had some tomatoes surprises this summer. I discovered husk cherries [ground cherries], those little ones that taste like pineapples. I really didn't know about those before. In terms of others, I don't think that we are fully in the harvesting mode of a lot of weirder tomatoes we have. Like the [San] Marzano tomatoes we have, the ones that taste like peppers. They are not spherical. So, I haven't tasted one of those yet.

Participating students appreciated the introduction and access to new foods. They discussed cooking these foods and even growing them in their gardens. As one University of Montana student reported:

> Like some of this stuff I had no idea what to do with, like kohlrabi. Kohlrabi was foreign to me before and then now I have been growing it at a friend of mines and eating it and I love it.

For those even with prior backgrounds in eating and cooking with fresh, organic, whole foods, the experience at the campus agriculture projects reaffirmed their attachments and expanded even their palettes and familiarities. Students commented about having "a greater appreciation of just the concept of food itself." A University of Montana student similarly expressed, "I always loved food- eating and cooking but I never knew I could love food this much."

Participating students also *appreciated eating fresh fruits and vegetables picked right from the fields.* Many participating students from both farms photographed freshly harvested tomatoes, raspberries, blackberries, ground cherries or husk cherries, apples, and eggs (see Appendix J: Photographs 9, 11 & 13). As part of the summer program, University of Montana students shared mid-day meals created mostly from produce and eggs harvested each morning by students. A University of Montana student stated that that she had "never eaten better in my life than this summer, basically for free." One University of Montana participant captured three fresh laid eggs pulled from the hen house for lunch in photograph 9 (see Appendix J). Another University of Montana participant photographed his lunch prepared from beets, tomatoes, cucumbers, and other vegetables picked fresh that day (see Appendix J: Photograph 10). According to a University of Montana student:

> One of the things that I am really, really excited about is that I had never picked my lunch out of the ground and gone to cook it before. That is fresh food to a whole new level. So I

> did that for the first time up here, and I've done it several times and that is just the best feeling in the whole world.

Another University of Montana student talked about the joy of "weeding and then you can just grab it out of the ground and eat it, you know." This student also jokingly talked about starting a restaurant that would operate out of a field, where patrons would sit, harvest and eat produce right out of the ground. He wanted a larger population to share in the pleasure of eating freshly harvested foods. Snacking on freshly picked foods at Yale Farm was equivalent to the P.E.A.S. Farm lunches, as their mid-day meals comprised of potluck foods from students' homes and a shared salad with only lettuce from the farm. For Yale Farm students, snacking on strawberries, ground cherries, cherry tomatoes, beans, and blackberries was a significant part of their experience. Many took close up photographs of freshly picked cherry tomatoes, blackberries, raspberries, and ground cherries. Photograph 11 features the favorite snack of one Yale Farm student, Sun Gold cherry tomatoes. He holds up a Sun Gold cherry tomato in front of the tomatoes growing in the high tunnel (See Appendix J). Students at Yale Farm spoke at length about the sheer joy of picking and eating cherry tomatoes and other snack-able produce.

Table 16
Examples of Students' Appreciation of Fresh & New Foods

UMontana Student 1	"And just the shear variety of vegetables I have come to know over the summer. I feel like I can cook a lot more with them now."; "Kohlrabi was a new one for me. I loved it. It was the best."; "Yeah, just a lot of like leafy greens that I have never cooked with for myself like chard. I definitely knew Kale but all these crazy things that I didn't even put two and two together. I just though it was all salad."; "Yeah, like garlic scapes…is that what they are called? Yeah, I never realized that you could cook with those."
Yale Student 1	"And I am pretty sure this is the first time I've had turnips…the salad turnips oh my god. They are amazing."; "A greater appreciation of just the concept of food itself I guess."
UMontana	"I always loved food- eating and cooking but I never knew I could love food this

Student 5	much."; "I am pickling and learning more than I've ever learned."
UMontana Student 4	"I like, I volunteer my time, I'm, I mean, I didn't have to come up this weekend. I wanted to do watering duty because it is pleasant to be up here and get food from the field."
Yale Student 2	"I would say I've had some tomatoes surprises this summer. I discovered husk cherries, those little ones that taste like pineapples. I really didn't know about those before. In terms of others, I don't think that we are fully in the harvesting mode of a lot of weirder tomatoes we have. Like the [San] Marzano tomatoes we have, the ones that taste like peppers. They are not spherical. So, I haven't tasted one of those yet."
UMontana Student 9	"Like some of this stuff I had no idea what to do with like kohlrabi. Kohlrabi was foreign to me before and then now I have been growing it at a friend of mines and eating it and I love it."
Yale Student 3	"Because I have always thought of cherry tomatoes as very unexciting vegetables- they are tomatoes but they are teeny! But we grow pretty delicious cherry tomatoes and now I have higher standards for them."
UMontana Student 15	"The weekend I watered was the first time I ever picked my lunch"; one of the things that I am really, really excited about is that I had never picked my lunch out of the ground and gone to cook it before. That is fresh food to a whole new level. So I did that for the first time up here, and I've done it several times and that is just the best feeling in the whole world."; "And like, you have those tomatoes that we had here, those are the best tomatoes I have ever had bar none."
UMontana Student 16	"I've never eaten better in my life than this summer, basically for free."
UMontana Student 17	"Those heirloom tomatoes, when they weigh like three pounds you know? I am so impressed and hungry, and I ate some yesterday. I ate so many tomatoes. Yeah, I reek of tomatoes."; "And the produce is so good."; "And I definitely feel blessed as hell to be able to take a few vegetables here and there and eat the food from here."

Participating students spoke about *enjoying the physicality of farm work*. Several students from both Yale Farm and the P.E.A.S. Farm took pictures symbolic of the physicality of farm work—the tools they utilized. Photographs 10-12 feature images of the farm truck, hoes, and a pitchfork (see Appendix J). One Yale University student stated:

> A large part of the reason I am doing this job is the connection to this place, and learning about different things. A lot of it is that I enjoy this work. I enjoy being outdoors and doing physical labor.

Several students reported "you can go lose yourself in work." A Yale University student found it "very therapeutic to a mow the farm, just put on, put my ear buds in, put the sound blocker earmuffs over those…and just take care of the grass just for an hour or so." For another Yale University student, enjoying the physicality of labor required at the campus agriculture project was new to him. It was "not something that I would have wanted to do before this internship." A University of Montana student commented, "you almost don't get really tired." These comments indicate participating students enjoyed using their bodies and not just their minds as part of their college academic experience and that time at the campus agriculture projects met a personal and functional need. Two students making these comments also qualified that while they enjoyed much of the physical work at the farm, also did not love all farm work, including trellising raspberries or throwing hail bails. Both also described hand weeding as "very tedious, repetitive, boring" and, "definitely time consuming."

At the same time participating students *felt a strong sense of satisfaction with the tangible products of both farming and cooking* (see Table 17). Participants saw the benefits of all their hard work at the campus agriculture projects. To the morning of "heavy lifting of [hay] bails" to mulch onions, a University of Montana student said,

> At the end of it you realize you don't have to weed these [rows of onions], except maybe one more time because now it is all blocking weeds, and it is done. Yeah, so you get to see the benefits of your work right away, just like weeding too.

Unlike cerebral academic work, participants could immediately see a tangible product and feel satisfaction. To this effect, students at both farms even took photographs of the day's to-do lists (see Appendix J: Photographs 10 & 12). Talking to a participating student while weeding at Yale

Farm, she responded that it was "nice to get hands dirt after looking at problem sets." Students could take a bed "messy with weeds," clear it, and witness cultivated plants growing. Satisfaction of getting tasks done was one of three "highs" identified and discussed during an observed student check-in at Yale Farm, along with the joy of picking and eating strawberries and working with each other. According to a Yale University student:

> There is sort of this like raw productivity that I really enjoy about the farm. That so much, like you give, you have to give credit to the plants for growing. But, when I, or when anyone who really puts a seed in a soil block, then plants that soil block, then that soil block turns into a plant, and then fruits and then we are rewarded with labor and all of the inputs that go into it...there is something like so tangible about, you know, work put in, and there is such a tangible reward.

He goes on later to say:

> At Yale, and like academia in general…people always say that they are busy, and people always say that like you know they are not being productive, or that they need to be more productive or whatever, when they are writing a paper or something like that. But when I am like finished with a paper and I get a grade on it or whatever, I don't necessarily feel as rewarded as I do when I have something like sort of viscerally there, something that can bring so much joy as a pint of Sun Gold tomatoes.

Similarly, a University of Montana student offered his enjoyment of cooking stemmed in part "because you immediately can see what you have made." The data suggests for students enrolled

in higher education institutions farming and cooking offer an outlet and a visceral sense of accomplishment that traditional academic work does not afford.

Table 17
Examples of Students' Satisfaction of Tangible Products of Farming & Cooking

Yale Student 1	"There is a certain sort of, and there is sort of this like raw productivity that I really enjoy about the farm. That so much, like you give, you have to give credit to the plants for growing. But, when I, or when anyone who really puts a seed in a soil block, then plants that soil block, then that soil block turns into a plant, and then fruits and then we are rewarded with labor and all of the inputs that go into it. And that, that, there is something very, there is something like so tangible about you know work put in, and there is such a tangible reward, I guess."; "At Yale and like academia in general, a certain, like people always say that they are busy, and people always so that like you know they are not being productive, or that they need to be more productive or whatever. When they are writing a paper or something like that. Um, but when I am like finished with a paper and I get a grade on it or whatever; I don't necessarily feel as rewarded as I do when I have something like sort of viscerally there, something that can bring so much joy as a pint of Sun Gold tomatoes."
Yale Student 2	"I would say satisfaction with the task. Like, when you are weeding it can be very tedious, repetitive, boring. This is not news. But it's really satisfying to just have at the end of the task to have a big bucket of things that shouldn't have been in that field. They were in that field and now they are not."
UMontana Student 9	"When we mulched our onions, its all this heavy lifting of bails, and walking down rows, and then at the end of it you realize you don't have to weed these, except maybe one more time because now it is all blocking weeds, and it is done. Yeah, so you get to see the benefits of your work right away, just like weeding too you know."; "The weeding, it's tedious, but when you get done with it you feel great about it at the same time."; "I mean I kind of, I mean it's nice, like that is always a rewarding thing when you have invested a bunch of time into something and you get to see the gains you made in it."
UMontana Student 11	"Farming is satisfying to transform a spot into nice rows is satisfying to my mind."
Yale Student 5	"Nice to get hands dirty after looking at problem sets."
Yale Student 6	"It's been extremely satisfying to work on this farm and like seeing change and seeing things grow."; "But it is very tangible."; "There is something satisfying about having a bed that is messy with weeds and clearing it all and prepping it for new things. Planting things and seeing it grow."
UMontana Student 17	"And cooking is cool because you immediately can see what you have made."

Feelings the campus agriculture projects offered *escape from school and the city* factored into participants attachment to the farms (see Table 18). For participants, the farms offered a place of respite in opposition to the stress and demands of college and urban life. One University of Montana participant said, "I couldn't find this little oasis more, it couldn't be more attractive to me." A Yale University student described the farm as "an oasis in an urban landscape" and, "a sort of a haven from, I guess the culture of school." Likewise, another Yale University participant called the farm "other-worldly when compared to a place like Yale University where people live in castles." Both campus agriculture projects being located outside of main campus might foster the feelings of escape and oasis. Participants noted that the short walk (Yale Farm) and short bike or car trip (P.E.A.S. Farm) helped to create the sense of escape the campus agriculture projects offered. A Yale University stated:

> I think that the fact that you have to walk, that it takes a certain amount of time to travel to the Yale Farm, that it's near enough to campus that its reasonable, but its far enough that it's a trek to get there. I think that helps a lot of students during the year feel like it is more of a um, like an escape, or, as a real reprieve from what they are doing because it takes a while to just to get started here.

Comments from participants at both Yale University and the University of Montana suggest the campus agriculture projects fill students' personal need for stress release and enjoyment.

Table 18
Examples of Students' Feelings of Escaping from School & City

Yale Student 1	"But like the fact that it is sort of an oasis in an urban landscape. While I hope that it becomes commonplace that things like this exist or that green spaces in urban areas exist. But, like this is a really nice, this is something that is totally unrelated to that, well not totally unrelated, but just sort of a haven from I guess

	the culture of school."
Yale Student 2	"It is the Yale Farm…is like other-worldly when compared to a place like Yale University where people live in castles."; "This is a place where coming here one or two times a week for work wouldn't be a chore. It would be a break from the normal routine of like classes, studying, etc."
UMontana Student 9	"You know, it's sort of a getaway and you know everyone there and you can go lose yourself in work if that's what you want to do. Or you could just go walk around and go enjoy the place, because there is a big park. I feel like its got just little bit of everything that you could want to do."
Yale Student 3	"And um, I think that the fact that you have to walk, that it takes a certain amount of time to travel to the Yale farm, that it's near enough to campus that its reasonable, but its far enough that it's a trek to get there. I think that helps a lot of students during the year feel like it is more of a um, like an escape, or, as a real reprieve from what they are doing because it takes a while to just to get started here."
UMontana Student 17	"I couldn't find this little oasis more."

Having fun was directly discussed or photographed by participants. Moments chosen to depict participants' relationship to the farm contained subject matter of either students having fun or the physical evidence left of students' enjoyment. A University of Montana student photographed students, "being silly, taping beans to ourselves," with smiles on their faces (see Appendix I: Photograph 1). Another University of Montana student similarly photographed a fellow student acting silly by running and skipping with a net through the field. According to a University of Montana student:

> For the summer at least you can take 5 min and enjoy yourself in between doing tasks. That is just one thing that I have really liked about it. It is the slowing down and having the chance to see something and go for it.

Several students spoke of *connecting to self at the campus agriculture projects.* The experience on the farms allowed participants the physical and mental space to go inward and consider what makes them happy in life and future career. Participants commented the campus

agriculture projects offered, “a constructive way to kind of figure myself out a little bit,” and “getting a little more in tune with myself.” A University of Montana student explained her campus agriculture projects experience as:

> So part of it is been me sort of like collecting data on what makes me happy. And like what kind of work do I want to do you know when I like start looking for a job; what are the pieces that I know will make it be a good thing?

According to another University of Montana student, “This, I think is as good as place that I have found to do that. And that is my favorite part.” For these participating students the campus agriculture projects provided unexampled space to connect to their inner authentic self.

Three participating students also brought up *feelings of enjoyment from working outside*. To a Yale University student, “I mean it is manual labor, but I get to be outside all day.” Similarly, a University of Montana student “just spending so much time outside is pretty awesome.” Another stated, “I really love working outside.” She discussed her experience at P.E.A.S. Farm aided her in deciding that she would like to explore jobs after graduation that could allow her to work outside.

Natural Attachment

Last, participants identified *natural attachments* that contributed to students’ connection to the farm at secondary and primary levels. On a secondary level attachment to farm’s growth cycle, connection the farm and nature during time alone, feelings of knowing the land, and sense of group ownership deepened participants’ natural attachment and connection to the farm. Primary levels of natural attachment included: attachment to plants, engagement with farm

animals, ability to connect to self, natural sense of ownership, awe of beauty, diversity and capability in nature. Students captured images of natural connections with seedlings, fields, insects, trees, flowers, and chickens (see Appendix K).

Participants expressed feelings of *attachment to cultivated plants* (see Table 19). Students took photographs of lettuce, kale, tomato, beans, soybeans, eggplants, and chamomile plants growing. Participant photograph 17 of rows of chard and kale, and image 19 of a kale plant close up are examples (see Appendix K). Seeing plants "go from start to finish" allowed students not only to learn farming practices during multiple stages of growth, but encouraged feelings of attachment. Several participants used terms like "babies" or "tiny little things" to describe seedlings they personally planted and tended over the course of the summer. Participant photograph 7 (see Appendix I) shows a student with an eggplant seedling students tended. Two University of Montana students spoke of not wanting to leave the pumpkins that they had planted and cared for at the end of the summer semester. According to one:

> We've planted the pumpkins. For like a week we worked on that bed. And now they are like doing so great and I am never going to get to see them harvested. And I feel like I am leaving my babies here

The other University of Montana student described:

> The pumpkin patch over there, they are finally starting to get big…I remember the first time we weeded those, and planted them. They were tiny little things, and I've been slowly watching them grow. You kind of want to speed them along. You're like come on. But I think that it would be hard not to see it [pumpkins fully grown].

Participants felt similarly with carrots and broccoli they had tended from seed to harvest. Feelings of attachment grew with hours spent weeding ant watering. Through tending to cultivated plants, participants related to plants as life forms. A Yale University student explained, "I feel like I am sort of ripping off a tight collar and the plant can finally have room to breathe."

Table 19
Examples of Students' Attachment to Plants

UMontana Student 9	"I mean, the plants themselves, just seeing them grow. We planted a bed of carrots, then weed them, and finally harvest them and all that."; "Well, the thing like the pumpkin patch over there, they are finally starting to get big…I remember the first time we weeded those, and planted them. They were tiny little things, and I've been slowly watching them grow. You kind of want to speed them along. You're like come on. But I think that it would be hard not to see it."
Yale Student 3	"I feel a lot more about the plants, I think."; "I just love plants. I think that they are awesome. I always have. And I love the fact that I can remember what they used to look like and what they look like in the various stages of growth. I love the feeling of being really careful to just get all weeds in all sizes away from the water supply of the plant, which is next to our drip line. I feel like I am sort of ripping off a tight collar and the plant can finally have room to breathe."; "I think that I partially go slower because or more slowly because I enjoy looking at the plants more, I like to touch them, and stuff like that."; "I mean, I love the plants even if they can't love me back."; "We were tasked with removing those flowers from the eggplants. But this one had already left the flower stage and entered into the fruit stage, and we couldn't bear to get rid of it but then later I got rid of it because it was obvious the plant wasn't performing to maximum standard."
Yale Student 5	"They were just babies and now they produce this wonderful squash."
UMontana Student 16	"We've planted the pumpkins for like a week we worked on that bed And now they are like doing so great and I am never going to get to see them harvested. And I feel like I am leaving my babies here just taking off."

Participating students spent less time and had less responsibility with the domesticated animals on the farm. For these reasons, many participants expressed not feeling "super connected to them." A University of Montana student stated, "I feel like we don't really interact with the animals here very much other than chuck feed at them every now and then." Participating students who spent more time feeding or caring for the domestic farm animals expressed *feelings*

of engagement, if not attachment. One University of Montana student was observed saying, "I love you, I love you buddy" while feeding hens. Another University of Montana student took several pictures of the barn cats. Kale, the farm cat is seen walking outside the barn entrance in photograph 18 (see Appendix K). Another University of Montana student described not feeling connected to the hens or pigs, but felt concerned when one pig got an eye infection during her turn in feeding. She said:

> Although one got sick the week that I was feeding them and I like felt very responsible. Not responsible in a bad way, but very concerned. But I hadn't even been over to the pigs before. We like trade off weeks.

Yale University students spoke of spending more time observing and caring for hens on the Yale Farm overall. The hens also grew into their first laying season during the summer of 2013, being quite young at the start. Several Yale University participants tossed tomatoes, worms, or other treats for the chickens throughout the day. Four of the six Yale University students photographed the hens. Photograph 20 shows four chickens eating and picking through greens recently fed to the hens (see Appendix K). One Yale University described, "I feel like whenever you are bored you can go just watch them, it's like watching a fire. They just are always amusing." Another Yale University participant explained:

> I have gained an appreciation for like the living habits of the chicken since I've been on the farm because I've been able to observe them. And also regarding the specific animals themselves I have sort of noticed a few quarks about this one and that one.

Attachment or engagement with the domesticated farm animals seem to depend on time spent, feelings of responsibility, and also caring for an animal from a young age.

Participants' *personal sense of ownership* was overtly evident in interviews and field observations. Two students' sense of ownership was so high as to work through pain as opposed to not finishing a task or come to the farm. According to Yale Farm manager, a student worked in a high tunnel during a summer heat wave in spite of misgivings. She "wanted to finish the task" and developed heat stroke, needing intravenous fluids. Likewise, a University of Montana student shredded his hand during an off-farm bike accident needing stitches but came to the farm the next day determined to work.

Participants from both campus agriculture projects initiated and discussed in detail their sense of ownership (see Table 20). For this participant, sense of ownership and work behavior are tied to connection to plants and witnessing stages of growth. To one University of Montana student this sense of ownership meant, "I feel I am like thinking for another person." To a Yale University participant sense of ownership felt like, "Being a group of people protecting a place." Other participants described feeling responsible for caring for the plants, animals, and farm. By the end of the summer, participants had the knowledge and felt responsibility to notice if there was an issue in the irrigation, a chicken loose, or basil getting sun burned. A Yale University student described her sense of ownership as, "It is like that balance between total openness but with like freedom and responsibility, with the freedom comes the responsibility to really take care of the things around the place." A Yale University student repeatedly used the term "my" to talk about the plants, the fields, and the farm. When working she describes, "the plants are like mine for the moment." She also explained during midsummer evaluations, the Farm Manager

believed she spent time more effectively when "more of the tasks that I was doing were then direct results of things that we had planted, or that we had done."

Participants talked with pride of all the food they harvested, plants grown, and farm maintenance accomplished. Sharing their accomplishments was also meaningful for participants. A Yale University student spoke with pride that students would eat sauerkraut made on the farm by the interns through the winter. Many University of Montana participants talked about the pride they felt in hosting the annual Garden City Harvest Farm Party. When asked about his sense of ownership, a University of Montana student replied, "you really do as walk around because you see all these people looking at stuff and wondering what is going on here, and what is this, and you know you've seen it all."

Table 20
Examples of Students' Sense of Ownership

UMontana Student 4	"Pretty much everybody that was working the farm that day; you walk around with such a sense of ownership."; "Look at all this food we grew, look at all this stuff that we have done, and all of that."; "Definitely there is a big sense of ownership in belonging up here."
Yale Student 2	"This is the kim chi and the sauerkraut that they are going to be eating at the Yale Farm for like the next few months. Like people in January they are going to getting their briefings on what they need to do during the farm work day and they will be just munching on kim chi."; "Being a group of people protecting a place."; "Like I, there are a couple of things I saw today where I thought okay maybe that I am the only person that noticed this. I should probably tell Jeremy. Like when I first got here early in the afternoon, I saw a chicken had gotten loose. It is not really a big deal, and like when I walked up to it came running toward me and squatted down, picked her up and put her in the fence. Um, I walked by the basil and I saw it was getting a little sun burnt. So I told Jeremy okay maybe we should harvest soon while some of it is still good at least."
Yale Student 3	"I say loyalty because I feel like if I've been a part of making a seed bloom in this place it is my responsibility to know work as hard as I can to make it flourish. For example we had a midsummer evaluations and Jeremy said, well in the beginning you were the kind of worker it seemed who would stretch out a task a little bit longer than it needed it be but as the weeks went on, you sort of stopped doing that. His opinion was that I did that because more of the tasks that I was doing were then

	direct results of things that we had planted, or that we had done. However true that is, I think that certainly has a good degree of influence on it. It is like pride for the quality of my work, pride for the quality of the plant growth. Which I know is pretty linked, even though it is pretty silly."; "I love working on my own because I get to feel like the project is mine and like the space is mine. And the plants are like mine for the moment."
Yale Student 4	"So like you can't go in, not even if you've been smoking and even if you've been around it you can't go in. So I was like I want a picture of the tomatoes- 'I can't go into the tomatoes house.'"; "But it is those that sort of like, I don't know, it is like that balance between total openness but with like freedom and responsibility, with the freedom comes the responsibility to really take care of the things around the place."; "Take care of things. But like if we do it just keeps on giving."
Yale Student 5	"I feel like, I am sure others have talked about this, in a sense I kind of have an ownership over this place."
UMontana Student 15	"It is just easier to look at all of this and see it standing alone for like the great accomplishment that it is."
UMontana Student 16	"I think its been a very deliberate thing that they've made us really feel a lot of ownership for it but I really do."; "I feel I am like thinking for another person."

A significant number of participating students reported *feelings of awe for beauty, diversity and capability in nature* (see Table 21). Awe, amazement, beauty, reverence, power, capabilities, diversity, curiosity and appreciation of plants, crops, and nature came up frequently in the interviews, discussions, observations and photos. A student from both Yale University and the University of Montana without being questioned along this line, utilized the word awe to describe, "Watching a seed grow into a really huge plant" and the "wonder of growth and process of how plants grow." Witnessing and taking part in plants' life cycles proved to be a significant part of their connection to the farm as a natural place, and nature in whole. Awe of nature came up 77 times during interviews and field observations. Whether participants used the term awe, reverence, amazing, powerful, devotion, awesome, or another expression, they spoke of acknowledging and revering the more-than-human-world.

Participating students reveled in *the beauty in flowers, cultivated plants, farm, agriculture, and nature*. Participants took many photos of the farms, overall landscapes,

cultivated plants, and flowers. Students at both campus agriculture projects spoke of "lustrous" kale (see Appendix K: Photograph 19), the "aesthetics" of flowers (see Appendix K: Photograph 21), and "the sweetness of a tomato or just the vibrant color of a tomato" (see Appendix K: Photograph 17). Participants appreciated the beauty and aesthetic appeal of plants that existed outside of human control. Participants discussed the functions beauty and aesthetics play in agriculture and nature. A University of Montana described flowers and vegetables as, "I feel like…all vegetables are sexual organs growing out of the ground too and they all look like it too." Many students photographed and spoke of the beauty of cultivated flowers, and blooms on plants such as beans (see Appendix K: Photographs 21 & 23). Students also reported appreciating the beauty of plants and nature within the confines of agriculture. Students frequently photographed broader landscapes of the fields and farms. For example, photograph 20 (see Appendix K) captures the straight lines of beds of corn, carrots, chard, and high tunnel against hills and mountains in the distant. A Yale University student similarly photographed the terraces of the farm, lush with crops, weeds, and flowers with the observatory looming above (see Appendix K: Photograph 24). A University of Montana student explains:

> This makes me really appreciate the, like, the astonishing beauty of manmade agriculture. Yeah, I don't know what else to say about it. I have never appreciated it in that way before…I come up here and when it is really quiet you look out and if you go stand on that row, at the first row out there and look in the middle of it at the red kale. That is like so tall and just like, I don't even know how those colors exist in real life…it is really easy for a lot of people to get caught up in the beauty of nature, which is awesome, but there is no reason to not to think that this is not equally as incredible.

Other participating students found beauty in an arugula bed, or harvested garlic hanging from barn rafters, or graining waving with the wind. University of Montana students captured harvested garlic hanging above the picnic tables in the P.E.A.S Farm barn in several photographs while fellow students worked or ate below.

Participants spoke of *awe for the sheer diversity of species, variations, and colors* that exist on the farms. One University of Montana student stated, "I knew there were different varieties of things. I didn't realize necessarily how many." Students not only repeatedly expressed surprise for the number of varieties of tomatoes, apples, kale, bok choy, and broccoli, but the variation that also existed in within a variety. According to another University of Montana student:

> I guess it is kind of similar to working at the bakery you know, there is a variation in how much all the bread looks. When you see one by itself you say, oh, this looks like a baguette, but when you see five hundred next to each other, you notice, oh, not one of these looks remotely similar. And the same thing up here you know you can see so much variation. It is so cool.

Through summer internships, participating students gained first hand experience with the extent of biodiversity within sustainable farm ecosystems.

Data suggests participating students' summer internships significantly impacted their *sense of awe for the capabilities and power of nature* (see Table 21). The campus agriculture projects gave participants witness to seeds germinating, and plant growth as a result from harnessing the sun's energy. For example, one University of Montana student photographed the

height sunflowers reach for set against the big blue sky of Montana (see Appendix K: Photograph 21). Some students used the word amazement to describe their wonder of nature's capabilities. Others ranged on their descriptors and sense of awe. One University of Montana student described experiencing plants' life cycle as weird. He explains, "it was weird to have been here and then we grow something, and then be done with it, and then be surrounded by everything else." A Yale University student saw and detailed her sense of awe through the lens of Judaism. "Agriculture is man asking God we are here," according to her. She details the humbling experience of farming:

> In my opinion, it is good to remind yourself what the limits are of being human especially because we devote so much of our energy and interest to other pursuits besides food. Well, give back some of that glory where it is deserved.

She goes on to say:

> It is good to understand on a farm that there are definite limits to human ingenuity and productivity. Just because we like clipped of cucumbers, and weeded the area, and strung them up, and kept to our list of best practices, doesn't mean that they are going to grow. And reminding you the occasional futility of your efforts I think is important in keeping everyone humble.

A University of Montana student also described farming and nature as humbling. He states, "Our brains could never…make like a plant grow." Participants throughout the experience recognized farmers and humans cannot completely determine outcomes, no matter the amount of work and knowledge they put into cultivation. A Yale University student details, "you just come to

appreciate the fractals that exist in you know a head of broccoli. I don't know. And it is something that is totally out of our power." Participating students' expanding sense of awe of nature's capabilities increased their appreciation of both nature and farming. According to another Yale University student, "When I think about the farm I think have a greater appreciation of like nature working with the land."

Table 21
Examples of Students' Awe of Nature

UMontana Student 2	"It has been amazing seeing everything grow."
UMontana Student 1	"I love flowers they are awesome."; "How much beauty I find in everything in the wild."
Yale Student 1	"Those things that aren't really in human control. You know, the sweetness of a tomato, or just the vibrant color of a tomato."; "There is a certain reverence that you have to have for just the gestalt psychology that is being activated by it."
UMontana Student 4	"Before I started coming I didn't realize how many, there are 40 different kind of apples just in our orchard, 5 different kinds of kale, things called bok choy I had never even eaten before, and kohlrabi I had never even seen before."
Yale Student 2	"I see devotion."
UMontana Student 9	"How much you can truly grow, and the diversity, in a small place. Because I mean, 10 acres doesn't sound like a lot."; "I guess the more and more you learn about different plants and bugs and all that you realize how much biodiversity there really is up here. And how it's its own little sort of like mini ecosystem."; "I knew there were different varieties of things. I didn't realize necessarily how many."
Yale Student 3	"It is good to understand on a farm that there are definite limits to human ingenuity and productivity."; "Just because we like clipped of cucumbers, and weeded the area, and strung them up, and kept to our list of best practices, doesn't mean that they are going to grow. And reminding you the occasional futility of your efforts I think is important in keeping everyone humble."; "It is a miracle every time a plant makes a fruit. That is how I see it."
UMontana Student 11	"Watching things grow is amazing."
UMontana Student 14	"Watching a seed grow into a really huge plant. And I don't know just respecting that nature is more powerful than we could ever be I guess and that we will never know everything that is going on with it and we can never comprehend everything that is going on out here. I don't know. And yeah, I think we were talking about something like respecting the everyday things that seem normal that are really extraordinary."; "It is a miracle that we can pee"; "Just respecting all the little crazy things that make up this world that you don't even really think about. I don't know.

	So yeah, I don't know, respecting what's the word giving credit it to all the little stuff. I don't know. Our brains could never develop everything that, we could never make like a plant grow"; "I don't know much of any of it. Maybe that is why I am in awe of it. Maybe if I went and studied every little part of a plant under a microscope."
UMontana Student 15	"This makes me really appreciate the, like, the astonishing beauty of, of manmade agriculture. Yeah, I don't know what else to say about it. I have never appreciated it in that way before. But that is one of the things that is like, I come up here and when it is really quiet you look out and if you go stand on that row, at the first row out there and look in the middle of it at the red kale. That is like so tall and just like, I don't even know how those colors exist in real life. It's like we, I don't know, we put that there and like a lot of people, I don't know it is really easy for a lot of people to get caught up in the beauty of nature, which is awesome, but there is no reason to not to think that this is not equally as incredible."
UMontana Student 16	"The reverence that a lot of these farmers have for their land is pretty powerful."; "I think plants are incredible things."
Yale Student 6	"When I think about the farm I think have a greater appreciation or like nature working with the land."
UMontana Student 17	"I feel like I, this summer working up here instilled a tremendous amount of curiosity…Just with my own potential, the potential of the earth, and what I expect and how that has changed. You know? Like with the baby lettuce. You know? I didn't know you could do that. That you could cut lettuce and it would just grow right back. And you could just keep cutting it throughout the summer."; "I think being around them that much seeing the amount of variation in all these plants."; "I guess it is kind of similar to working at the bakery you know, there is a variation in how much all the bread looks. When you see one by itself you say."; "Oh, this looks like a baguette."; "But when you see five hundred next to each other, you notice, oh, not one of these looks remotely similar. And the same thing up here you know you can see so much variation. It is so cool."

Four secondary affects emerged as contributing natural attachments, including connection to farm during time alone. Although only five students spoke of *connecting to farm when alone,* these feelings were a significant component of their experience and feelings of connection to the farms. Coupled with time and circumstances of when participants felt more connection to the farm and nature was not a standardized question, this finding may suggest a greater number of students and responses in agreement. Participants speaking of their time alone at the farm considered it "my favorite moments" or "a really incredible time to be up here." During time alone on the farm, students felt more "connected to this place." According to a Yale University

student time alone allowed "moment[s] where you get to interact with this place." A University of Montana student described his experience alone on the P.E.A.S. Farm as, "you see it in a different kind of light. You get a little taste of that isolation and its raw. I love that feeling of being, of yeah, that not having any barriers between you and nature." Another University of Montana participant said, "it is just nice…connecting, I don't know, I don't have the right words for it. Just spending all the time up here it's good just to like get to know the place a little better." Moments alone at the farm stripped distracting human interactions for these participating students, allowing their senses to read into landscape and glimpse the more-than-human life on the farm.

Participants spoke about *feelings of knowing the land* as related to their sense of personal ownership and connection to the farm as a place. Spending the summer at the farm allowed students to "feel confident" about what is going on with plants, plots, animals, and animals. One Yale University student stated, "now, I can tell when the chickens are agitated, because like there is a certain cluck that they do when they are getting a little bit agitated." Over the summer participating students developed "a mental map" or, "a sense of holistic understanding" through experiencing "the miniscule details when I am weeding." However, students recognized they lack deeper cyclical knowledge from witnessing the farms through multiple seasons and years.

Two students expressed a *sense of group ownership* rather than primary natural attachment of feelings of personal ownership. A University of Montana student expressed a broader view of the P.E.A.S. Farm. She explains, "I was a part of it for a while, and I experienced, and it will go on without me, and you know? I just like the idea that I helped out and was part of it for a while." Similarly, a Yale University student felt, "it's not my farm, and

part of it is like then you hand off the reins to someone else. This place is just constantly getting handed." This individual also was anticipating not continuing involvement in the Yale Farm due to participation in collegiate sports. Whether level of attachment was a result of inability to stay involved is unknown, though, not taking on feelings of personal ownership and responsibility could allow this and other students to "have other things going on in my life and I mean trust…the organization" as opposed feeling duress over not meeting responsibilities taken on.

Data suggests students may feel *attachment to the farm's growth cycle* as a secondary level leading to attachment to plants and connection to farm as a place. One University of Montana student described:

> I don't feel necessarily a link to them [plants] myself. But I feel like I am part of this cyclical process. But I was a part of it for a while, and I experienced, and it will go on without me, and you know? I just like the idea that I helped out and was part of it for a while.

Although only one student reported feelings of being a part of the farm's season, this participant also expressed a sense of group ownership as opposed to personal ownership or responsibility and may suggest a lesser connection to the farm as a place.

Attachment to School and City

Feelings of connection and belonging to the farms spurred attachment to each school, Yale University and the University of Montana and the cities they resided in, New Haven, Connecticut and Missoula, Montana in some students. One Yale University student believed his experience and involvement at the campus agriculture project was, "going to be a positive force."

A University of Montana student expressed that he didn't have "this relationship with anybody or anything" in his department, "I really like what I study…but its not there in this way...there is no forum for me to see those people and discuss the things to discuss our similar interests like there is here." His experience on the P.E.A.S. Farm "makes me really love this school." He goes on to say, "this is one of the first places where I have felt at home in an academic environment." Although only one student from each school brought up their connection to the campus agriculture project increased their attachment to their prospective schools, this was not a standardized question and was initiated by these students. These participant responses especially viewed with the seven students expressing attachment to the city of Missoula and New Haven, may suggest increased attachment and sense of belonging to both school and city for students.

Several participating students reported their experiences on the campus agriculture projects increased their connections and attachments to the cities of New Haven and Missoula. According to a University of Montana student the experience on the P.E.A.S. Farm, "it's going to make me miss Missoula, if I move after school." Participating students' experiences increased interactions with individuals and groups in the larger municipality resulting in a greater understanding of social, cultural, and economic issues within the cities. One student from Yale University stated, "It is just so interesting to learn about and become more involved with New Haven." A University of Montana student accounted discussing their connection to Missoula with others after hosting and interacting with over 900 people from Missoula in attendance at the annual Farm Party. The Yale Farm and P.E.A.S. Farm enable students to interact with members of the larger community around commons interests like food and sustainable agriculture. A Yale University student reported:

> In evaluating what makes me feel that way about this summer. I think, not just the farm, but also the interactions I've had people here…I love that I like can go to like most restaurants, and pizza places now and say hi to someone behind the counter and like they know that I work at the farm. Because I may have brought them something from the farm or I have given them a flower when they walk by.

One student although not expressing either feeling connected or not to the city of New Haven, did state wanting to live and work outside the city next summer, indicating a possible lack of attachment.

Beliefs

Participating students described beliefs impacted by the campus agriculture project experience during interviews and field observations, including relationships between *nature and humans; nature and agriculture; benefits of immersion, experiential learning*, and *campus agriculture project practices*; and *campus agriculture project business practices*. Again these beliefs were coded and noted by number of statements made and number of students making these statements. Numbers were utilized as general reference, but do not express the significance of each statement and its relationship with behaviors or behavioral intentions as interviews were semi-standardized, some statements were initiated by students and were not asked of each student. Any opposing or non-changing belief is also noted throughout findings.

Qualitative data revealed students developed and confirmed *a complex belief system of the relationship between nature and humans* (see Table 22). I questioned all interviewees from both schools and many other University of Montana students about their beliefs about their

perceived separation or lack of separation of humans and nature, as well as how students defined nature and wild. Many students from both University of Montana and Yale University repeatedly used words like “untouched”, “Open spaces, no fences”, “a definite sort of break”, “un-trampled by man”, or “Something that hasn’t been touched by man” to describe nature. Students spoke to a separation of humans and nature based humans’ ability to “change the environment.” However, student belief systems for the most part were not black and white. Within belief systems students seem span a wide breadth of beliefs recognizing a gradient of separation, intelligence, and interconnection. For example, some students made statements saying, “I think many of us drastically underestimate the intelligence and emotional capabilities of animals” while also stating, “We kind of have our own thing going on around an intelligence scale that is way above and beyond anything else that is living on the Earth.” A University of Montana student mentioned, “Everything is kind of nature, you know,” then later qualifying, “I think that generally we would define it as everything that isn’t man made more or less.” Later in the interview this student goes back to say, “I mean, you build a city and its still becomes what nature is for better or worse, so it’s kind of everything.”

Table 22
Examples of Students’ Beliefs of Humans & Nature

UMontana Student 1	“Yeah, but then when I went back and I kind of realized now we are a little bit more detached because we are just kind of. We kind of have our own thing going on around an intelligence scale that is way above and beyond anything else that is living on the Earth.”; “I think many of us drastically underestimate the intelligence and emotional capabilities of animals.”; “Humans affect nature much as it affects us.”; “Nature is something we have to work with, that it is not entirely separate.”
Yale Student 4	“I think that I have a hard time with the word nature. Because it is really, really ambiguous”; “I just don’t think that there is any border or any distinction.”
UMontana Student 9	“Open spaces, no fences, like most of the west is fenced up and once you get into the mountains and in public land and there are no fences there are trails that you can only access by horse or bike. That starts getting out there. Someplace you can actually get lost. That to me is kind of wild”; “I think that we are a part of nature

	but we have the ability more than anything to change the natural world around us by a long shot. So, I guess that sort of sets us apart in a way. I mean, I don't know anything else that can build a refrigerator"; "I don't think we can escape it, we are not better than it and I don't think that we can outsmart it or anything like that. But to say that we were a higher being like that would be crazy to me. But, at the same time I just think that we have the ability to have such big impact. I mean one guy with a bulldozer could do a lot in a day."
Yale Student 5	"Something that hasn't been touched by man."
UMontana Student 14	"I would say un-trampled by man, or whatever."; "And they are definitely like I don't know, animals are on a different level than plants at least in my mind as far as respect that they need to be given. You can put a thousand beets into a tiny little bed. I don't think they really mind. But with a live animal that has a brain and nerves and whatever."; "Un-trampled by man but in some sense we are wild as well."
UMontana Student 15	"I feel like they are living. They are happy and sad, I guess…Yeah, I mean it's hard to use those words because obviously it's not exactly the same. Like they are not self-aware. I don't think that they have emotions in the sense that we have emotions, but yeah, they, yeah. I think that for lack of better words, in terms of people understanding it's not necessarily totally unfair to describe plants that way, or other living things that aren't us."; "Yeah so in that sense, that, a, what should and can survive and thrive, and sustain itself here. I guess. If you want to say that is what nature is I guess you can."
UMontana Student 17	"I think of nature is everything on earth that I don't need to be a part of for it to continue."; "I feel like Missoula is like a floating island in nature"; "And nature is under Missoula. It's everywhere. I mean you may not be able to see it under the asphalt over there. But, nature is all organic things. You know, all things that grow."

This gradient of beliefs on humans and nature is exemplified in students' beliefs and perceptions of agriculture and its relationship to nature. Many students believed *the relationship of agriculture and nature depended on type and methods of cultivation*. A Yale University student believed a division occurs between "chemical farming" and "biological farming." Similarly a University of Montana student stated, "Industrial AG makes a product while sustainable AG considers the needs of the plants and soil." For another University of Montana student, the division also occurred along scale, "I definitely feel like this scale of farming is more a part of nature than like you know a farm that uses, that grows all mono-crops and use

pesticides and such." A University of Montana student purported, "There is nothing wrong with agriculture itself" going on to say, "there is no reason that we can't, like work with nature, or use, or harness nature to a certain extent to like an appropriate and considerate extent to sustain ourselves and sustain it."

The *importance of working with nature*, or "not forcing a system to work", was a concept that came up recurrently during interviews and field observations. Students from both Yale University and University of Montana described working with nature as the difference between sustainable and industrial farming, an ideal model of farming, and a means to develop a different relationship with nature. A Yale University student describes a shift in thinking about agriculture and nature that occurred over the course of the summer:

> I think I mentioned to you that this was very like a farm, in an essence an economic venture that is for you know basically for humans dominating nature. I don't really think it is, because when we plant, you know when you see something as beautiful as a Salanova lettuce head that is advantageous to the Salanova that we want to plant it too. You know it is the species had a or were a conscious being they would be saying thank you for planting them… We are definitely a part of this crazy arena of living beings

For this student being and working at the campus agriculture project broadened his perceptions of nature to include humans and agriculture.

Many of University of Montana students described that they *felt in nature on the farm*. Comments included, "I feel like it could not be more natural," or "I don't think you cannot call that [the farm] nature." However, half of the six Yale University students admitted they did not

feel in nature while on the farm. In an interview a Yale University student said, “I don’t really think of farms as natural places” and does not believe she is “in nature” while on the farm. She goes on to describe the landscaped park bordering the farm as “more natural I guess,” by means of being on the “outskirts of the farm.” Similarly, she perceived the plantings of thorn-less blackberries were more natural, as a plant “that you find in the wild a lot unlike, you know, Sun Gold tomatoes.” Two factors appear to affect these beliefs for students at both schools. First, location and aesthetics dramatically differ between University of Montana P.E.A.S. Farm and Yale Farm. The P.E.A.S. Farm is open, bordering Rattlesnake Creek, Rattlesnake Creek Wilderness Area, a horse farm, a soccer field, and few residences across the street. The surrounding mountains and Montana big blue skies loom from all vantage points. To this argument, a University of Montana student suggested his feelings of being in nature could be attributed to “the aesthetic.” Yale Farm, however, is located in a more urban area, in the heart of Yale’s extensive campus with buildings on two sides. Second, beliefs of farm staff and educators affect students through teachings and interactions. According to a Yale student, the Field Education Coordinator, Jeremy Oldfield said, “cultivation isn’t about keeping things alive, and it is about killing off the things you don’t want.” Contrasting, Josh Slotnick in a lecture on soil, asks students to consider “Nature nurtures us and we need to nurture it.” These statements may not fully or adequately describe differing philosophies, but do suggest possible differences in beliefs in nature, humans and agriculture. This could be an area of further research.

Students at the end of the summer from both Yale University and the University of Montana (see Table 23) spoke in earnest of *how much they learned over the course of the summer*, the *benefits of immersion, experiential agriculture-based learning*, and the *importance of learning how to grow food*. When questioned about the experience of the campus agriculture

project summer internship, students of both institutions gushed of the significance of experience academically and emotionally. Students commented during interviews, “I am kind of surprised at how much I have learned over a single summer,” “I’ve learned way more up here in this couple of months than a couple of years down there [on campus]” and, “I just couldn’t be more thrilled that this is where I go to school and that this is where I am learning.” Three students went on to discuss how they believed all children should have access to similar experiences and connection to nature. Students said the campus agriculture projects brought concepts closer to those learned in other classes, including economics of farming, and environmental studies. Students talked about how it was easier, more accessible and more engaging “learning about something that is actually in front of your face that you can touch and feel and look at, like physically study and not just read it out of a book where you can’t,” especially for select, self-identified students that described themselves as one that struggles in traditional academic settings. According to students, the experience benefited them beyond academic knowledge as well. One University of Montana student expressed:

> This is so much more than school. Like this is really academic, what we are doing here is what I really want my academic focus to be, but what I experience here is the academic part of it is important but small. There is so much more than an academic experience here and I guess what that is, is the experience of community

Yale University and University of Montana students also spoke about the importance of “learn what goes into making food and what stages of the food there is.” For these students understanding food, the basis of life is important knowledge. A Yale University student believed:

> I really think there is sort of a deficit in connection to food, to food knowledge among Yalies themselves. Like this one girl I know, she describes a lot of Yale graduates as adults with training wheels. They can write a 10-page paper about the economics of the Philippines but they can't really prepare a meal for themselves.

To this student and other participating students having knowledge of growing and cooking food was as important as traditional academic knowledge.

Table 23
Examples of Students' Beliefs in Benefits of Agriculture-based Education

UMontana Student 1	"I am kind of surprised at how much I have learned over a single summer."; "I kind of feel like after this a little more involved with um instead of just buying food, that people should grow food, and have their own garden, and learn what goes into making food and what stages of the food there is."
Yale Student 2	"Yeah, and I really think there is sort of a deficit in connection to food, to food knowledge among Yalies themselves. Um, like this one girl I know, she describes a lot of Yale graduates as adults with training wheels. They can write a 10-page paper about the economics of the Philippines but they can't really prepare a meal for themselves."
UMontana Student 13	"Learned so much more than I've ever learned…it is so different being here."
Yale Student 3	"That is one of the funny thing about farming, that often the things that take up the time are so hard to understand why they do that if you are not intimately involved with things on the farm."; "I took that picture because I love seeing little kids involved in this stuff because like everything else the earlier you get them, the easier it is. It excites me to think that he is getting such an open hands on look food production from such a young age."
UMontana Student 14	"I've learned way more up here in this couple of months than a couple of years down there, you know."; "I just don't do well like in a classroom."; "Learning about something that is actually in front of your face that you can touch and feel and look at like physically study and not just read it out of a book where you can't …I think it's import to get your hands onto things; Like yeah, I don't know, the same, the connection that I may feel being out here and like watching something grow and like eating food that I just pulled from the ground is probably like exponentially more powerful for a little baby's mind, you know? I don't know."
UMontana Student 15	"This is so much more than school. Like this is really academic, what we are doing here is what I really want my academic focus to be, but what I experience here is the academic part of it is important but small. There is so much more than an academic experience here and I guess what that is, is the experience of

	community"; "And it is so hard for me to say specifically, and this goes back to, in the academic sense, this is a good place for me to be because I have always had a really hard time in school. I have never been a really serious student, I really like knowledge and I like learning, but just academia has always been really challenging for me."; "I just couldn't be more thrilled that this is where I go to school and that this is where I am learning."
UMontana Student 17	"And this is so cool here because I feel like it has made it accessible, in my own mind of what farming can be, you know."

Students formed and confirmed beliefs about farming practices working on the farms. Each campus agriculture project adheres to sustainable growing practices. Yale University and University of Montana students for the most part *strongly believed in each of the campus agriculture project's growing methods* on ethical and environmental levels. They made comments like "everything we do here is more or less organic and entirely earth-friendly," "we are respecting our plants by not spraying them with chemicals and stuff"" and "I think they have a really good system here. And it is smart how they do it to maintain as little as possible to pests." Several students also acknowledged shortcomings of each of the campus agriculture projects practices. A student from Yale mentioned, "If we had animal husbandry as a larger part, or more realistic part of this farm, then our approach to pest management and even weed management could be modified." A student from the University of Montana also believed incorporating animals into more of the fertility and pest management would benefit the farms. During an interview he states, "I feel like they [chicken and pigs] could may be integrated into the rest of the farm a little bit more than they are. Right now, they both are kind of like tucked into their corners." Other University of Montana students disliked the use of black plastic to mulch the field tomatoes, although understood the reasoning for the choice after discussions with Farm Manager, Josh Slotnick. One University of Montana student believed strongly in the

P.E.A.S. Farm sustainable growing practices, but believed the farm could do better to conserve water.

Students from the University of Montana and Yale University also recognized each farm's *unique access to physical labor*. Students from both universities remarked that the campus agriculture projects were "not a real farm" due to its access to labor and lack of pressure to raise all profits from sales. One student at the University of Montana, although, through the course of the summer semester came to realize the importance of providing high quality produce to CSA members who help provide the means for the P.E.A.S. Farm to continue running:

> I came to sort of came to realize that like Josh is running a business…I mean the CSA is not the number one goal but its how we like can make the other goals possible because there has to be some money in the picture. And so he is running a business, going up against a lot of other CSAs from farms nearby and so like keeping the customer happy like really is a thing.

Concerns

Interviews and field observations data revealed participating students' concerns in four areas: (1) *agriculture practices*; (2) *environmental and human health*; (3) *how and what is eaten in the United States*; and (4) *food access, justice and security*. These four areas of concern represent a wide variety of interwoven concerns and issues developed and confirmed in students surrounding nature, agriculture, humans, and food.

Students from both Yale University and University of Montana expressed *concern for a variety of non-sustainable agriculture practices*, including usage of chemical fertilizers,

chemical pesticides, antibiotics in farm animals, genetically modified organisms, water exploitation, black plastic mulching, as well as working conditions for farm workers. Students used words from "not a good thing" to "evil" to "fucked up" to describe perceived concerns with industrial and conventional agriculture. Several students spoke of issues within agriculture as a cause or contributor to environmental issues such as fish kills, ocean dead zones, waste products, and human health issues.

For students, environmental issues, human health problems, and issues with industrial and conventional agriculture intertwined. Students expressed concern for the "dire consequences" of "consumer cultures," and corporate "powers," that created a culture and agriculture producing nitrogen runoff in the oceans, waste products, wasted food, water overuse and misappropriation, energy exploitation, wasted space of lawns, and disease. Students *made multiple connections between environmental health, physical health and social health*. They understood issues to be multifaceted and expansive in their impact. A University of Montana student stated, "I don't feel like you can really like ever separate it [human health] out of the environment…sustainable means for community and for the earth and person you know." Another University of Montana student described "nature as a big beautiful woven rug and everything that we do that degrades it is like just pulling one thread out. You know, making it a little bit less beautiful, a little bit less useful." Interesting, a Yale University student while believing corporate "powers" to be responsible for existing environmental and human health issues, also believed "the same powers that made it so messed up can fix it too." Similarly, a University of Montana student blamed "huge, big corporations that control the entire food industry" for "the environmental problems that we have today," *not agriculture in general*.

How and what is eaten in the US concerned students at both institutions. This area of concern was most initiated and discussed by students. Students used the term *disconnected to describe either their relationship or others' relationship with food and the farms that grow it*. As a University of Montana student asserted, "There has to be a shift because the way that we eat is not healthy or sustainable." A Yale University student cited the controversy that instilled after the launch of Meatless Mondays on campus. She took offense that "parents demand that their children should have access to meat at all times."

Students across both institutions believed, "you should know what you eat, what is in your food, and how it was raised" and expressed concern for existing confusion over foods and diets. A Yale University student held, "There is so much conflicting information out there…it's like so many different diets out there, so many different ways to go about eating." Another Yale University student similarly questioned:

> I mean like, what are we supposed to be eating? Just the fact that some people think that sugar is toxic I mean like, what are we supposed to be eating? Just the fact that some people think that sugar is toxic and that we shouldn't be eating grain, and stuff like that, that kind of brings me back to the concept of like who defines what food, who somewhere down the line decides that rice should be the staple of a diet or something?

The student goes on to ask, "how do we define what philosophies do we have about what makes it ok to like eat something or makes it okay to not." Through experiences on the campus agriculture projects in combination with prior knowledge and experience, students questioned the status quo of how and what is eaten, including policy. For example, several students worried about loopholes or lack of meaning within organic labeling and certification.

> Even like somewhat small farms in and around Missoula might not be organic. Some of them may be spraying pesticides. There are some that exist like that. I mean you go to a farmers market you don't really. I don't know if that is a lot of stuff, or? You know, you don't always know what you are getting unless you know, unless you really know the story.

Participating students over the course of the summer were given the space and time to consider and discuss the very root of food choices. These concerns over food drove many of the students' involvement in the campus agriculture projects, intention of working within food sector, and ways of living. A University of Montana student spoke about her desire to "make everyone feel this way [about food and vegetables]… I feel like we are pretty fringe caring about vegetables." Another University of Montana student felt, "this is the right thing for me to be learning and be able to teach other people."

Students circle of care broadened to include individuals and places without stable access to nutrient dense, appropriate, and culturally sensitive foods. A University of Montana student asserted, "people need good nutritious food, most don't get it." This student described the amount of money going into military and space exploration as "a waste" when "homeless people on the street that are hungry as hell and food literary grows right out of the ground." For some Yale University students, food justice was a new acquisition of concern and knowledge. According to one, "I had never before really thought about food justice." Either at market or through donations to the local food bank, students experienced first hand cultural preferences of foods. Concern for food access, security and justice also included awareness of privilege that students experienced. For a Yale University student,

> Working the farmers market and having someone hand me an EBT check or whatever was like, wow, this is a reality for some people that I, like it was unfortunate, but like I was never exposed to that growing up.

This individual also expressed understanding of not only privilege of access but abundance. He states:

> I also sort of recognize the privilege that comes with of being able to decide what you eat. And with, like, dieting itself, is kind of like, you have to be pretty well off and have really good access to food to be able to say that you don't want to eat something.

Pro-Environmental and Social Behaviors

Based on self-reported behavior and behavioral intentions during interviews and observations, students who participated in the campus agriculture projects at Yale University and the University of Montana saw changes in:

(1) *buying and eating habits*;

(2) *behavioral intentions and behaviors of farming and gardening*;

(3) *staying involved in the campus agriculture project*;

(4) *awareness of plants, animals, weather, and farms*; and

(5) *involvement in food access and security*.

Through the coding process, behaviors were noted by number of statements made and number of students making these statements. These numbers were utilized for general reference, but do not express the significance of each statement. As interviews were semi-standardized, some statements were initiated by students and were not asked of each student. Any opposing or non-changing behavior is also noted throughout findings.

Qualitative data suggests the campus agriculture project experience may have had an impact on students' buying and eating behaviors and behavioral intentions (see Table 24). One University of Montana student stated, "Being up here [at the farm] dictates what I want to eat… and what tastes good." Another said he had "changed eating habits by eating lunch here together." During interviews several statements came up repeatedly. Students professed to *eat more vegetables through eating lunch at the farm*, even with reporting interest in eating healthy prior to the experience. Students also spoke of *trying new foods and vegetables,* such as kohlrabi, kimchi, and vegan meals. Sharing foods and cooking for each other seems to factor heavily into this. Participating students mentioned their *standards for taste and quality increased* as a result of tasting field ripened produce as opposed to industrial grown produce most often available. One University of Montana described losing a lot of weight over the summer from not eating breakfast or dinner off the farm as a result of his rising standards for food and meals. According to him, "I feel like subconsciously, why would I eat anything else when I can, this is like the best meal you could ever have harvested you know, 15 ft away." Several students from both institutions mentioned their unwillingness to eat or buy tomatoes from "anywhere else" after eating varieties grown at the campus agriculture project. Through cooking meals together on the farm and for themselves, often being responsible for their meals for the first time in their lives, students accounted being *more comfortable cooking and cooking for groups*. A Yale University

student talked of incorporating sauerkraut, kimchi and other fermented foods into his diet after a lacto fermentation workshop.

Table 24
Examples of Students' Eating Habits

UMontana Student 1	"Because before this I was like yeah, organic is good and ideal but also sort of expensive. But I feel then I started to learn the things that you are putting in your body when you don't know where it is coming from is actually..."; " I mean I probably I have never eaten more vegetables in my life."
Yale Student 1	"I will certainly buy food that is grown a certain way or from a CSA or whatever, where I have a personal relationship to it, or the farmer that grew it. Stuff like that, and that is kind of hard if I am in an urban setting. But there are ways of making that happen."
UMontana Student 4	"I think the things that I have experienced have increased and made me realize it's always good to try new things and new foods."
Yale Student 2	"I have been eating a lot more like fresh produce this summer."; "And yeah, and one other way that I think that my diet is going to change in the future is that Jeremy has just showed us the wonder that is Lacto fermentation this summer"; "But yeah, I feel like in terms of tomatoes and in terms of other types of food, you never really are done exploring. I can never say, ok, I am confident I have tried all the varieties of tomatoes there are that are worth eating. So, yeah, that is one thing that I continually need to work on. There was this one-day when we were at this farm/summer camp called New Pond and one of the councilors there kept saying TNT kids, TNT. Apparently that meant 'Try New Things."; "Apparently that was that guy's motto. So, I like to try new things."
UMontana Student 7	"[I] changed eating habits by eating lunch together."
Yale Student 3	"Because I have always thought of cherry tomatoes as very unexciting vegetables- They are tomatoes but they are teeny! But we grow pretty delicious cherry tomatoes and now I have higher standards for them"
UMontana Student 9	"Like some of this stuff I had no idea what to do with like Kohlrabi. Kohlrabi was foreign to me before and then now I have been growing it at a friend of mine and eating it and I love it"; "And I find myself looking to on the sides of produce boxes, you know to see where it has come from. And I definitely like the co-op and the farmers market"; "And, I think just seeing the work and stuff that goes into it. I think it makes you understand a little bit more why you are paying more for it. When you go to like the Good Food Store you understand why some of that stuff is more expensive. Like the salad mix that Josh's wife grows. They are actually cutting it by hand. It makes a lot more sense then having one person driving a tractor over stuff. It explains why it's cheap."
Yale Student 6	"I'll probably buy organic foods more often than not. Probably because there is this greater appreciation for the process of growing organic. You know if there is the USDA sticker on it that there is quite of bit of work behind that."

UMontana Student 15	"But I will say on that note that being up here dictates what I want to eat"; "But I think that the first thing to do with this is to really pound it into myself, to like really make it a part of my own habits."
UMontana Student 17	"Yes, I haven't eaten this many vegetables ever in my life"; "And I feel like subconsciously, why would I eat anything else when I can, this is like the best meal you could ever have harvested you know, 15 ft away, whatever."

Students from both Yale University and the University of Montana also reported *valuing produce and especially organically grown produce* after witnessing and participating the amount of labor involved in growing vegetables organically. A Yale University student said, "You just become very skewed. I will go to market and see squash being sold and start to calculate how much time and energy I put into our squash, and like was it really worth it?" This statement is more significant with four students (two students from each school) expressing frustration and dismay of the expense of organic foods available in stores and their inability and the inability of everyone to afford fresh, organic foods. For example a Yale student expressed:

> Because I am around food all the time, so there is this access of like tomatoes, and amazing food, and I also don't have any money. So, I also don't feel like I don't have access to food because I can't buy groceries, so there is like this weird, I am here around all of this food, and I don't really take a lot of it home because it's like my job. I have also eaten some great food from the farm don't get me wrong.

Students interning at the campus agriculture projects seem to be caught between the dichotomy of valuing and purchasing organic produce and the perceived costs associated with buying organic foods while on a fixed or non-existent income.

Not all students believed their eating, buying or cooking habits changed. Two students experienced changes in eating preferences but no significant changes cooking skills. Both also

avoided cooking either for shared lunches or at home. A Yale University student purported she is "unwilling to change my habits and spend more money" with so much conflicting information on what is healthy or sustainable. One University of Montana student expressed high levels of prior cooking, eating and buying habits and preferences. " I already buy things in bulk, and I cook a lot of my own food and eat a lot of veggies and things." He saw minor changes in cooking skills, such as making salad dressing.

An emergent theme from interviews and observations was the high level of behaviors and behavioral intention to farm or garden, especially by University of Montana students. Eleven of seventeen undergraduate students at the University of Montana expressed desire to farm or work in agriculture after graduation either fulltime or part time. Half of the six Yale University students expressed intention to farm or work in agriculture. The experience on the campus agriculture project in conjunction with field trips to area farms, "totally changed where I want to go with my life." The same student admitted they believed farming is hard, but that the life and the work were worth the challenges. Seeing farmers that students could identify with successfully farm allowed students to view *farming as a "feasible option*" or the "quality of life is wonderful." Although farming was described as "my fantasy dream" by a University of Montana student and considered an aspiration by two Yale University students, students from both universities seem to *grasp the financial and physical difficulties of farming*. A Yale student described farming as, "you get really intimately familiar with how much your physical body can produce in a day, which is pretty cool. One the other hand it is totally exhausting and leaves no other room for anything else in your life." According to a University of Montana student:

> So it…in an indirect way gives a perspective on how difficult it would maybe be to run a farm because it is going to be you and a couple of people not you and 20 other people and all the same shit that we get done still needs to get done and so it is like gives a perspective of I don't know maybe the difficulties in farming even though we don't physically feel them ourselves

The data suggests *the behavioral intention to farm was not necessarily a prior intention*. Several students mentioned coming to this decision during the course of the summer. For example a student reported, "I had such a great time up here…One day trellising tomatoes Ellie asked if I could see myself one day growing tomatoes and I said yes…and that slowly happened with everything."

Six of the seven, University of Montana students interviewed also expressed behavioral intentions to garden or described gardens they started after starting the summer internship at the P.E.A.S. Farm. As one student described, "I started gardening within a week of being up here, I mean I have planted stuff and just to compare myself to what we have going on up here. So I definitely think I'll be continuing that." From Yale Farm, two students identified they planned to continue to garden after the experience. According to one, "I will definitely like to grow some things. And um, which I can't say I would have said before this because I couldn't say I know how to."

Students also came to understanding that they did not want to farm. The one student interviewed at the University of Montana that had no intention to farm, expressed "it is really interesting for me to see and like hear about how satisfying this work was for them knowing that it probably wouldn't be for me." Seeing the remoteness and limited social engagement of

farmers during field trips made her realize farming would not meet her extrovert needs. Another Yale University of Montana student held the lifestyle of farming was not for her, that "I like it, but I have so many other things that I am interested in."

Student commitment to both campus agriculture projects also were evident during the 80 hours of observations especially at the University of Montana P.E.A.S. Farm. Students came early, stayed late, and volunteered on weekends when not required. "I volunteer my time, I mean, I didn't have to come up this weekend. I wanted to do watering duty because it is pleasant to be up here and get food from the field." The same individual then shredded his hand in an off-farm accident requiring several stitches and still came to the farm trying to weed and water with one hand the next day. A committed Yale University student also refused to stop working in the tomato high tunnel during a heat wave, then suffered from heat stroke needing I.V. fluids according to Yale Farm staff. Data suggests attachment to plants and community as well as sense of ownership plays a role into student commitment. For a University of Montana student:

> I am, like happy to help in the afternoons because there is so much cool stuff going on. I just genuinely, like, want to be a part of especially this last week. I've like been home for like maybe 7 hours to sleep. I am just trying to soak it all up.

For many the farm community seems to become part of their identity. According to another Yale University student, "if some part of it were to get damaged, I feel like a part of myself would get damaged."

When students were asked whether they had plans to stay involved at the campus agriculture projects, I received overwhelming positive responses (see Table 25). All but one of

the eleven students interviewed at both University of Montana and Yale University *wanted and/or planned to continue involvement* in the campus agriculture project. Students from University of Montana planned to do everything from volunteering, to taking additional credits and classes. Students expressed feelings of commitment, pride over knowledge gained and seniority, and desire to "see the season through". Similarly, Yale University students planned to volunteer and/or apply for school year positions at Yale Farm, as well as desire for future integration with their studies and the campus agriculture project. Yale University students spoke of a desire to give back to the campus agriculture project as it and the staff had given so much to them. The one Yale University student who had no plans or want to stay involved gave several reasons all pertaining to a loss of intimacy or connection to the farm resulting from not being at the farm everyday. According to this student:

> [T]o me the farm exists as my summer, you know, it is still going to be here once the year starts but it is not going to be mine anymore…it is very silly and selfish, but I don't want to come back when it is not my space any more.

The student went on to say:

> I won't know what is going on, on the farm every day so when I come here I will feel more disconnected and less like I am actually contributing because I haven't seen the process like luxuriously unfolding day by day.

Even the one dissenting student expressed sense of belonging and ownership in their answer.

Table 25
Examples of Students' Commitment to Campus Agriculture Projects

Yale Student 1	"Because I think that something amazing is happening here and the fact that um, I have, I feel like I sort of owe it to the farm to like stay involved just because it has taught me so much or it has given me this experience that I will cherish, as corny as that sounds."
UMontana Student 4	"Yeah, I'm doing it as actually an independent study, and I am doing the field trips with the little kids and guiding fieldtrips around the farm. And I will be doing the coffee to compost. So, I will be going all around town and picking up spent coffee grounds and bringing them up here."
Yale Student 2	"Yeah, I am totally going to try to get a job here next year."
Yale Student 4	"I hope it has more interaction with my studies in the coming years too, in terms of science and classes."
Yale Student 5	"And in a way I feel like I want to end up giving back to this place since it has given so much to me and especially to the staff."
UMontana Student 16	"I feel I am a little jealous of like the few that to go to school here and sure their class is ending but like you can just come up in the afternoon and like volunteer and still be part of it."
Yale Student 6	"Yeah, I want to be farm manager and work during the school year; It's been extremely satisfying to work on this farm and like seeing change and seeing things grow and the manual labor is nice too. So I'd like to continue doing that during the school year."
UMontana Student 17	"I signed up to take this class a couple of days ago continuing it in the fall and it has nothing to do with nursing."

Students also reported *increased awareness of plants, animals, weather, and farms* as part of the campus agriculture project internship experience (see Table 26). Tending and caring for crops broadened student perceptions of rain, hail, and other weather patterns to include needs of the plants and farmers. Students mentioned thinking and talking about weather constantly, especially within the context of crops and working out in the fields. Students also increased awareness of animals on the farm, both domesticated and wild. They spoke of knowing when the pigs or chickens were agitated and the hierarchy of dominance. Through being out-of-doors on the farm for substantial amounts of time, students noticed killdeer, squirrel and other wild animals patterns, habitats, and behaviors. Students at both Yale University and University of

Montana also spoke about noticing potential issues on the farm from sunburn on tender plants to irrigation, as well as farming practices on other farms during interviews. One student also reported now seeing wild lettuce everywhere in Missoula after weeding the native plant area. The increased awareness and broadened perspectives seem to be a result of increased knowledge of cultivated and uncultivated plants, wild and domesticated animals, farms, and farmers.

Table 26
Examples of Students' Increased Awareness of Plants, Animals, Weather, & Farms

Yale Student 2	"Yeah, I try to keep my eyes open as much as possible. Like I, there are a couple of things I saw today where I thought okay maybe that I am the only person that noticed this. I should probably tell Jeremy. Like when I first got here early in the afternoon, I saw a chicken had gotten loose. It is not really a big deal, and like when I walked up to it came running toward me and squatted down, picked her up and put her in the fence. Um, I walked by the basil and I saw it was getting a little sun burnt."
UMontana Student 16	"It was interesting because it was like my first week here and I was at home. It was like later in the day and so I was like wow, hail that's crazy and like never once thought like oh my god our crops they weren't really like my crops yet then. And I remember coming in the next morning and everyone who like had worked here before were like I know I saw that hail and thought like shit we didn't cover anything like it was like immediately oh this is out here vulnerable, you know I was like wow like I am so not in that frame of mind yet like it didn't occur to me. Um Which I feel like now it like starts raining and like I am well it might be a bummer for me but like it is so good for the crops."
Yale Student 3	"But yeah, what is interesting to me is that people who are not farmers or gardeners, you know it may not have rained for weeks and then it rained for an afternoon. And like, oh no it's going to rain, while the farmers are rejoicing. It is just very different."
Yale Student 5	"I wouldn't have known what they were. Like I wouldn't have known what a beet looked like still underground, and what a beet leaf looked like and I wouldn't have known what most of these plants"
Yale Student 6	"When I am looking at some kind of farm or agricultural system I like notice more things than I did before but that is just like me learning the process"

Another emerging theme in interviews and field observations was student *involvement in food access and security.* While concern for food security, access and justice came up repeatedly in both University of Montana and Yale University students as discussed later in the concerns

section, the final project in Yale's Lazarus Summer Internship seemed to provide impetus for students to develop and execute projects in food security, justice and access. Half of the six Yale University students completed projects in food security, justice and access; specifically interviewing mayoral candidates on city food policy, capturing the face and impact of food insecurity in New Haven, and developing curriculum for school students around, "what Judaism says about food justice."

Study 2 Summary

Study findings revealed the following:

(1) Summer internship experiences at Yale Farm and University of Montana P.E.A.S. Farm did not significantly affect participating students' cognitive perceptions of or connections to nature during the time frame–as an abstract concept.
(2) Connectedness to Nature scale may measure cognitive perceptions and beliefs as opposed to emotional connections.
(3) All participating students did develop strong feelings of connection to the farm as a place. More specifically, participants felt connected to the farm as a place in nature as illustrated through their attachment to plants, engagement with domesticated farm animals, and especially their sense of awe of nature's beauty, diversity, and capabilities.
(4) A number primary and secondary community, personal, and natural attachments together formed participants' connection to the farms.
(5) Possible correlation exists between levels of community and natural attachments with students' degree of introversion and extroversion.

(6) Summer internship experiences impacted participating student's pro-environmental and social behaviors.

CHAPTER 6: DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

The purpose of my research was two-fold. First, this exploratory study was undertaken to aid in understanding the current rise in campus agriculture projects especially outside the traditional land grant colleges of agriculture by gathering online documentation of campus agriculture projects and surveying their pedagogical objectives. Second, the intent of this mixed methods study was to explore in what ways academic classes immersed within campus agriculture projects at US colleges affect participating students' students' perceptions of and connections to nature. This study attempts to understand the affect of experiential learning and engagement in the land within the campus agriculture projects on students' environmental perceptions and connections to nature.

Study 1 confirmed two assumptions: first, that campus agriculture projects did indeed increase as of late, significantly between 2005 and 2010 (see Figure 1); and second, agriculture is taking on a different identity in higher education beyond traditional land grant colleges of agriculture and farm management education. Data show campus agriculture projects are much smaller in size, focused on community and sustainability, and for the majority unconnected to traditional agriculture degree programs (see Chapter 5).

Study 2 at Yale Farm and the University of Montana P.E.A.S. Farm research revealed students developed an emotional connection to the campus agriculture projects during summer internship experiences at Yale Farm and University of Montana P.E.A.S. Farm. Students' attachments to the farms, together with their concerns and beliefs, including their cognitive beliefs of nature affected students' pro-environmental and social behavioral intentions and behaviors (see Chapter 5).

In this chapter I present a discussion of the findings that emerged from each study and their implications individually and together as a whole.

A Focus on Sustainability in Emerging Campus Agriculture Projects

Study 1 revealed pedagogical objectives of campus agriculture projects overwhelming focus on sustainability issues. The four highest medians in pedagogical goals involved sustainable agriculture practices, teaching sustainability, and raising awareness of environmental issues. Over 72% of campus agriculture project managers and educators reported teaching practical skills growing food as a "very important" pedagogical objective as opposed to only 20.8% that identified teaching farm management skills as "very important." Certainly the profile emerging from the burgeoning number of campus agriculture projects looks a lot different from the traditional land grant colleges of agriculture with often hundreds or thousands of acres and a focus on research and farm management learning objectives.

Perhaps not surprising to advocates, the increase of campus agriculture projects appears very much being driven by interest in and pressure for social sustainability, environmental, and human health. Cracks in the agro-industrial food system have prompted public interest into alternatives in the food system, sustainability, and taste. The effects of the rise in interest in sustainable food can be seen by comparing popular milestones such as *Supersize Me* (Spurlock, 2004), *Omnivore's Dilemma* (Pollan, 2006) and *Animal, Vegetable, Miracle* (Kingsolver, 2007), all critiquing the agrifood system, to the simultaneous rise in campus agriculture projects. As centers for campus sustainability initiatives, campus agriculture projects can encourage alternatives to the high energy and social costs associated with agro-industrial food production, transportation, and waste, as well as resonating emotionally with cultural and familial traditions.

The effects of campus sustainable food projects go further than just working towards carbon neutrality of campuses, but build on the knowledge and perspectives every student, faculty, and staff involved in each campus agriculture projects. Campus agriculture projects offer alternatives through curricular and co-curricular activities while also encouraging and legitimizing critiques of the traditional food system (Barlett, 2013). This can be seen in the relationships between institutional mission statements and campus agriculture project objectives. A significant number of participants (76.5%) responded their institution's mission and the campus agriculture project objectives "overlaps a lot" or "overlaps some."

Although ranking on green college rating system was the lowest scoring objective on the survey with only 12.8% reporting it was "very important" to the mission of their campus agriculture project, the objective of teaching, demonstrating and increasing sustainability in college operations is important to the mission of campus agriculture projects. Campus agriculture projects have risen simultaneously alongside of the establishment of green college rating systems. The Association for the Advancement of Sustainability in Higher Education's (AASHE) piloted of STARS in 2006 and launch in 2010. The Sustainable Endowments Institute Green College Report Card graded institutions on a number of sustainability initiatives including campus agriculture projects from 2007 to 2011 (Sustainable Endowments Institute, 2011a). Seventy-nine percent of AASHE STARS rated institutions reported having a campus agriculture project producing vegetables and/or herbs (Association for the Advancement of Sustainability in Higher Education, 2013). Of colleges and universities participating in the Sustainable Endowments Institute's College Sustainability Report Card, 70% reported having a campus agriculture project (Sustainable Endowments Institute, 2011b). The ranking on green college

rating system may not be a goal in itself by campus agriculture project, but it is certainly linked with sustainability.

Cognitive Connection to Nature

Findings from Study 2 corroborate with research done by Perrin and Benassi (2009), which calls into question earlier findings by Mayer and Frantz (2004), that the CNS scale measures *emotional* connectedness to nature. Data suggests that although the CNS scale may be an important predictor of environmental beliefs, concerns, and behaviors, the measure does not assess emotional connectedness to nature, rather a cognitive connection. As Perrin and Benassi (2009) note at least six of the fourteen items plainly measure cognitions, using terms like "think," "recognize" and "understanding." For example, items ask participants their level of agreement to statements such as, "I *think* of the natural world as a community to which I belong," "I have a deep *understanding* of how my actions affect the natural world," or "When I *think* of my place on Earth, I *consider* myself to be a top member of a hierarchy that exists in nature [emphasis added]." Although the other eight items use the term "feel" in their statements, Perrin and Benassi (2009) argue "feel" is used to describe participants' opinions or considerations, cognitive assessments rather than emotional states. For example, item statements, "I *fee*l as though I belong to the earth as equally as it belongs to me" and, "I *feel* that all inhabitants of the Earth, human, and nonhuman, share a common life force [emphasis added]" utilize the term feel to imply participants' belief systems.

Participating students' responses in corresponding open text boxes to items on the CNS questionnaire confirm to Perrin and Benassi's assertions, and reflect participants' environmental beliefs, concerns, and values. Participating students repeatedly used the term "think" and

"believe" in their responses to items. For example, University of Montana students write, "I *think* I belong to the earth" and, "Yes, I *believe* in the Gaia Hypothesis. We are all one large organism that needs to work together [emphasis added]." Students utilized the term "feel" in their responses nearly always to describe their belief systems, as well. This is illustrated in a University of Montana student explanation, "I *feel* like my actions have a greater impact than grass," and I *feel* we're all made of star stuff, but I'm not always aware of a special kinship [emphasis added]." Each assertion is situated in participants' belief systems.

I also question whether humans can feel emotional connections to the abstract based on participants' abstract and vague responses, as opposed to the strong feelings of attachment to the farm as a place and sense of awe in the beauty, diversity, and capability of nature conveyed during interviews and field observations. Can an individual feel an emotional connection with a larger system, such as nature without having interacted with the whole? Are feelings of connectedness to abstract concepts emotional or cognitive? I argue direct experience, rather than abstract concepts form emotional connections as described in the next section. Findings suggest the CNS measures cognitive self-concepts that include nature-in-self as an explanation. Similarly, the INS also asks participants to conceptualize their abstract relationship with nature. Further to this point, Bruni et al. (2012) define connectedness with nature as, "an individual's belief about the extent to which he or she is part of the natural environment" (p. 198).

Connectedness to nature as a cognitive assessment does not negate its importance in predicting and understanding participants' altruistic beliefs and behaviors to the earth's community. The Connectedness to Nature and Inclusion of Self in Nature scales may measure individuals' sense of cognitive connection and the ability that people can take the perspective of

other—whether that be human or nature—as indicated by this study and the growing body of research (Olivos et al., 2011; Manner et al., 2002; Schultz, 2000, 2002; Schultz & Tabanico, 2007).

It is unclear whether summer internship experiences affect students' cognitive connectedness to nature. Qualitative and quantitative data from Study 2 revealed:

(1) Students' prior experiences, knowledge and beliefs affected their cognitive connectedness to nature as shown in total pretest and posttest scores on the CNS and INS,
(2) Yale University participants reported an increase of cognitive connection to nature, while University of Montana students did not,
(3) Students at both campus agriculture projects simultaneously expressed sometimes-conflicting beliefs of the separation, intelligence, and interconnection between humans and nature, and
(4) Many participants identified agriculture as both the manifestation of humans' negative effect on nature and a natural process integral to a truly sustainable system.

Participating students from Yale Farm and the University of Montana P.E.A.S. Farm during the summer of 2013 demonstrated a high degree of a *cognitive* connection to nature on both the pretest (CNS M=3.92, INS M=4.90) and posttest (CNS M=3.93, INS M=5.05). Students clearly perceived humans as part of nature, at the same time recognizing the terrible impact on the environment humans have had, before the start of the summer semester. Their CNS scores were higher than those reported by Mayer and Frantz (2004) in each of their five studies, the lowest scores occurred in math students at Oberlin College in study 3 (M=3.2, S.D. = .55), and

the highest occurred in adults in the Oberlin community with college or graduate degrees in study 4 (M=3.87, S.D. = .48). Although statistical significance was not found between comparing the combined students' pretest and posttests, Yale University students' scores *increased substantially* 3.17 points, while University of Montana students' total CNS score mean *decreased* 0.90. Yale University students also scored lower initially on the pretest than University of Montana. Yale University pretest total scores (CNS M=50.33, INS M=4.50) differed from those of University of Montana participants (CNS M=56.71, INS M=5.07). However, the sample sizes were too small to make any conclusive statements and findings must be considered in context of the entire study.

According to participants' responses provided in open textboxes on the questionnaire, interviews, and field observations at Yale University and the University of Montana, students' beliefs of the human/nature relationship comprised of sometimes-conflicting beliefs of the separation, intelligence, and interconnection between humans and nature. For example, some students made statements saying, "I think many of us drastically underestimate the intelligence and emotional capabilities of animals" while also stating, "We kind of have our own thing going on around an intelligence scale that is way above and beyond anything else that is living on the Earth." A University of Montana student mentioned, "Everything is kind of nature, you know," then later qualifying, "I think that generally we would define it as everything that isn't man made more or less." Later in the interview this student goes back to say, "I mean, you build a city and its still becomes what nature is for better or worse, so it's kind of everything."

The conflicting statements given by students indicate *an ability to perceive but not reconcile opposing beliefs* that humans exist as part of nature, while at the same time have

irreparably impacted the environment. Statements like these suggest students may be in the midst of forming or reforming their beliefs on the human/nature relationship and shifting to a more ecocentric worldview. Not only did participants demonstrate conflicting beliefs about the relationship between humans and nature, but also they perceived modern agriculture as both the manifestation of humans' negative effect on nature and a natural process integral to a truly sustainable system.

Students also made conflicting statements of the relationship between nature and agriculture. One University of Montana student attempting to reconcile opposing beliefs of nature and agriculture stated when asked if the campus agriculture project was in nature, "I would definitely say that this is nature. I feel like I am in nature when I am out here." She later goes on to say:

> I definitely feel like this scale of farming is more a part of nature than like you know a farm that uses, that grows all mono-crops and use pesticides and such. But, I guess it's just a little bit more of a distance that I see now between myself, and nature. Agriculture is nature…we are working the land and using it for our methods and we are destructing, I don't know if I even want to use the word destruct. Because I feel like humans are themselves, I mean nature, I mean we are from the earth by we just have a scale of intelligence that goes above and beyond and we have the power to change things so drastically.

Her statement suggests a shifting belief system and worldview that may take longer than summer internship to settle in either direction. Many other students seemed in the process of reconciling conflicting beliefs of humans, nature, and agriculture. For example, during one interview a

University of Montana student seemed to make a revelatory statement about monocultures of huge fields of strawberries or almonds. He postulated, "That doesn't feel like nature…but I think that it is. I mean if, I think that if we were to stop completely other things would grow eventually. So, I think that there is still nature there." Additionally, at the start of the summer, a Yale University student who described agriculture as, "king of taking advantage of plants…use it to our advantage," later in August states:

> A farm, [is] in an essence an economic venture that is for…for humans dominating nature. I don't really think it is, because when we plant you know when you see something as beautiful as a Salanova lettuce head that is advantageous to the Salanova that we want to plant it too. You know it is the species had a, or were a conscious being they would be saying thank you for planting them.

His statements reveal a possible shift in beliefs through the course of the summer at Yale Farm, working and discussing Michael Pollan's (2002) *Botany of Desire*.

It is unclear if and how experiences at the Yale Farm and the P.E.A.S. Farm affected participants' beliefs and cognitive connection to nature beyond the timeframe of the summer semester. As indicated on pretest questionnaires, students also arrived with prior knowledge, beliefs, concerns, and experiences. Many of the participants at Yale University and the University of Montana were seemingly working to reconcile opposing beliefs that humans and agriculture exist as part of nature, have irreparably impacted the environment, and are integral to a truly sustainable system. More research is needed to fully understand the dynamics of the formation of cognitive connections to nature as a whole, belief systems surrounding humans, nature, and agriculture.

Emotional Connection to Farm

Although I did not set out to study participants' emotional connection to the Yale Farm and the University of Montana's P.E.A.S. Farm, the entwinement of students' connection to the farms with their perceptions of and connections to nature made studying place attachment in the context of campus agriculture projects hard to ignore. To explain participating students' connection to the farm and nature I developed a three-dimensional model based on data from interviews, field observations, and photos that addressed: socio-cultural dimensions of place, such as attachment to student community; personal dimensions of place, with emphasis on the campus agriculture projects meeting students' functional and fundamental needs, like fresh food and having fun; and natural dimensions of place, such as bonding with plants and domesticated animals. Data suggests that participants' emotional connection to the farms as a place formed together, or as a result of community, personal, and natural attachments combined. This was seen in both interviews and field observations, and photographs coded separately. The paralleled degrees that participants expressed community, personal, and natural attachments in both photos, and interviews and field observations, in spite of differing numbers of participants and datasets makes an important statement in how students form connections to campus agriculture projects. Furthermore, for some students feeling connected to the campus agriculture projects encouraged students to widen their circle of care and sense of connectedness to departments within the universities, the universities as a whole, and to the cities of New Haven and Missoula. Understanding place attachment in the context of campus agriculture projects offers important insight to the fields of both place studies and agriculture-based learning.

Study 2 findings conform to place meaning and attachment conceptualization done by Gustafson (2001), Raymond, Brown, and Weber (2010), and Sixsmith (1986). Sixsmith (1986) in investigating meaning attributed to 'home' by British university students categorized place meaning into personal, social, and physical realms. Similarly, Gustafson (2001) through a series of interviews with Swedish participants identified a three-pole framework of place meaning that was situated in the relationships between self, others, and environment. Raymond et al. (2010) similarly, developed and tested an integrated model of place attachment based on personal, community, and natural environment connections. What these three-dimensional conceptualizations do is: explore how place creates meaning and identity for meeting individuals functional needs; bring understanding to how individuals interact and are influenced by other humans and socio-cultural constructs within a place; situate the individual as an active member in an ecological context; and integrate overlapping theories of place attachment in geography and sociology, community attachment in social and community psychology, environmental identity and connectedness to nature in ecopsychology.

While traditionally place researchers (Kyle, Absher, & Graefe, 2003; Williams, et al., 1992; Vaske & Kobrin, 2001) have focused on the constructs of place identity and place dependence to conceptualize place attachment, my research and that of Gustafson (2001), Raymond et al. (2010), and Sixsmith (1986) acknowledges the clear roles community and nature play, along with self in forming in both place identity as a psychological investment with a place leading to self-identity, and that of place dependence, reflecting the importance of a place in meeting functional needs and desired activities of individuals. Raymond et al. (2010) posited limiting place attachment to place dependence and place identity "is inadequate in addressing place attachment and highlight the need to consider the social context of place bonds, including

the social interaction through which place meanings are mediated" (p.423). Their research found a multiple dimensional model including components of self, others, and environment accounted for a greater amount of variance of place attachment than the established conceptualization of place identity and place dependence. The researchers also noted the lack of attention to connectedness between nature and self in place identity as opposed to environmental identity or emotional affinity towards nature within the field of ecopyschology. By formally identifying community, nature, and self as distinct but interrelating components, place is understood as multidimensional construct defined by each component alike and the relationships that exist between. Gustafson (2001) described this conceptualization as self-others-environment. My findings do not contradict research done on the two-dimensional model comprising of place identity and place dependence, but identifies three components that participants at the Yale Farm and P.E.A.S. Farm formed feelings of attachment, identity, and dependence.

All students from both universities expressed community, personal, and natural attachments. Significant to this research was the paralleled degrees participating students expressed attachments to community (30.57% photos, 34.06% interviews/observations), personal (19.10% photos, 19.21% interviews/observations), and natural (50.31% photos, 46.72% interviews/observations), confirming validity. However, while participating students as a group reported natural attachments higher than community and personal attachments, levels of community and natural attachments differed greatly between Yale University and University of Montana students. Personal attachments did not change significantly between schools.

Several explanations are possible individually or in combination. First, levels of attachment could be affected by differing emphasis, structure, locality, curriculum, identity, and

university culture at each campus agriculture projects. Second, although all students expressed community, personal, and natural attachments, students self-identified as introverts or the characteristics of expressed a higher level of natural attachment than community attachments. Conversely, self-identified extroverted participants described higher degrees of community attachments than natural attachments. Participating Yale University students may be more introverted than participants from the University of Montana, resulting in higher degree of natural attachments. As interviews did not include standardized questions pertaining to students' degree of introversion and extroversion, only four students self-identified as either extrovert or introvert, or with characteristics of each. Due to the limited study sample and data, this finding indicates an area of further research and possible significance. Additional research is needed to explore the suggested correlation between introversion and extroversion, and the levels of community and natural attachments, as well as, the effects of campus agriculture projects' emphasis, structure, locality, curriculum, and university culture and degree of reported attachments.

Community Attachment

Community was an important part of students' summer internship experiences, especially for University of Montana participants. Places often become meaningful as a result of *relationships built between self and others* (Gustafson, 2001; Raymond et al., 2010)**.** In this case, fellow students, faculty, and staff built meaningful relationships with each other and the greater community through working together over the course of the summer, and sharing a midday meal. For University of Montana students harvesting, cooking, and eating lunch together was a key factor to their attachment to students and staff. To this point, harvesting, cooking, and serving

food for the annual P.E.A.S. Farm Party fundraiser with an estimated 900 community members in attendance was also an important experience for University of Montana students in connecting with the larger community of Missoula. Participants spoke of the pride of they felt, and joy in interfacing with the larger community in the context of the farm and the produce grown. Yale University students did not have the same experience, instead sharing a harvested green salad and potluck dishes and ingredients like bread, pickles, and cheeses. Weekly, a lunch was cooked and hosted by staff. Not cooking and eating meals directly harvested from students' farming efforts may have negatively affected Yale University participants' degree of community attachment.

The campus agriculture projects as places created unique spaces which social relationships grew and strengthened as the farm grew. Several participants from the University of Montana used similar analogies suggesting people and plants grew together. Many of participating students at Yale University and University of Montana felt they made lasting professional and social relationships. For example, a Yale University student stated:

> Jacquie, the past two days has really been helping with edit my resume, which you know has been fabulous. And she was just talking to me, I am going to forward her all of my cover letters and then she is going to proof read them, and help me along with that. So, in many ways that is just another example of how this internship is going to like carry me on. It is so much more than just working on a farm.

In establishing lasting friendships a University of Montana student asserts, "Some of us I'm sure would never have met otherwise, and I am sure we will be friends after this." Another University of Montana student describes he "made some friends forever."

Place meaning also develops from the *sense of community and belonging* relationships with fellow students, staff, faculty, and larger community form (Gustafson, 2001; Sampson & Goodrich, 2009). In a study by Hammitt, Backlund and Bixler (2006) strong correlations were found between place identity and feelings of belonging to a place. In their study place identity also was found responsible for most of the variance in place attachment. Participants at Yale University and the University of Montana spoke earnestly of feeling a sense of belonging as a result of the friendships and relationships formed with members at the farms, and the culture of openness and welcome instilled in the campus agriculture projects. A University of Montana student described:

> Ellie [P.E.A.S. Farm Graduate Caretaker] has been really great about…[asking] do you want to come up and hang out and like have potlucks and like this is your space too…I feel like that has been a big part of us bonding as a group too, especially because like I didn't know anyone here

Another University of Montana participating student explained, "I just really like having that sense of belonging and community, we all in this together." Students from both universities even described the farms as "home." One University of Montana student stated, "its been great to just feel like this a space where I like just feel like I can come here and like have a home here." Similarly a Yale University student explained her connection to the farm as, "it's kind of how you have a connection to like home."

Place meaning also develops through the effect community has in *creating an identity for a place* (Sampson & Goodrich, 2009). Sampson and Goodrich (2009) argued "communities carry with them a specificity that binds them to particular locales, while locales provide a set of

parameters or boundaries to the possibilities of what can be symbolically drawn upon" (p. 913). They contended individuals develop place identity through culturally constructs. In my research, Yale Farm's identity grew in part from ideas and advocacy of students troubled with the harmful impact of pesticides on human and environmental health of food served in the dining halls, and work done by student interns of Yale Sustainable Food Project. Its identity was directly tied to its student advocacy origins. As one Yale University student stated:

> This is a real social place, like one thing that really got me interested in the Yale Farm last year when I first came to volunteer. I noticed that all the people that worked here were so cool and they, it's like the farm is its own little social club for all these, for all the crunchy, hippie type people at Yale. And I kind of wanted to be a part of that.

The P.E.A.S. Farm conversely, took root as a collaborative effort between University of Montana Environmental Studies department, the Missoula Food Bank, and Garden City Harvest creating an identity of community engagement and service. Participating students appreciated the P.E.A.S. Farm community objectives that resulted from the campus agriculture projects' objectives and identity. One University of Montana student expressed, "it's so cool to see what, like how deep into the community this organization wants to be." The same student described feeling a sense of purpose and connection to the larger community as a result. He explains, "feeling that your work is meaningful because of the bigger picture–because you are growing food for people who wouldn't be eating this kind of food otherwise."

While the P.E.A.S. Farm as an organization and as an identity engaged with the broader community through its multiple community programs, CSA, and donations, both campus agriculture projects gave participants a larger sense of purpose and connection knowing they

were helping feed the larger communities and especially those in the community in need. Yale University students spoke of the power of selling produce to EBT (Electronic Benefit Transfer) customers on state public food assistance. University of Montana participants sincerely expressed the importance of the role the P.E.A.S. Farm played in donating produce to the Missoula Food Bank as part of their community attachments, even without interacting with final recipients. In each case, prior student, staff, faculty, and outside community formed a perpetuating identity around the farms as a place. Shared experiences and activities, the identity of the campus agriculture projects, relationships formed, and feelings of belonging by participants, all developed community attachments specific and unique to place for students.

Personal Attachment

Participating students from both Yale University and the University of Montana expressed similar levels of personal attachments between 11.32% and 24.10%. Participants described a number of personal place attachments leading to students' connection to the farms, including appreciation of fresh and new foods, enjoyment of physical work, satisfaction of tangible products of farming and cooking, enjoyment of working outside, connection to self, and escape from school and city. Personal attachments met physical and fundamental human needs of participating students more so than other known alternatives for students.

Traditional two-dimensional models of place attachment have focused on individual or personal attachments to place, deriving from place identity and place dependence. Vaske and Kobrin (2001) defined place dependence as personal attachments reflecting the "importance of a resource in providing amenities necessary for desired activities" (p. 17). They asserted functional attachment or place dependence occurs in a relationship with a place over time. Place identity is

most often conceptualized as the physical and social attributes of a place that leads to psychological investment and self-identity (Ramkisson, Weiler, & Graham Smith, 2012).

My research diverges from the traditional two-dimension model of place attachment. Identified personal attachments did conform to traditional conceptualization of place dependence. The campus agriculture projects supported participating students' functional needs and activities from eating to working to having fun. However, I found students' connection to farm and their place identity did not fit within community, personal, or natural attachments exclusively. Rather data collected through interviews, field observations, and photo-elicitation suggests place identity formed through the relationships between each category and in conjunction. Participants described incorporating the campus agriculture projects into self-identity in the context of personal, community, and natural attachments combined. One Yale University student said, "The way I feel about this farm, like if some part of it were to get damaged, I feel like a part of myself would get damaged…I really dig that, being a group of people protecting a place." He described the physical constructs and student community together. Another Yale University student described her incorporation of farm into self in the context of social and natural obligation. She explained, "I feel like having been here for so long, even if I didn't want to stay involved, I feel like I kind of need to…it has almost just become a part of me." A University of Montana student likewise stated he wanted to make the farm more a part of his identity. He questioned, "How do I make this a very significant part of who I am" in the context of discussing his appreciation of fresh foods and connection to the farm.

Raymond et al. (2010) positioned both place dependence and place identity into personal context. This conceptualization does not acknowledge the role community and nature within a

place plays into forming emotional and/or symbolic meaning given to a place, or place identity. Participants' personal attachments in this model, traditionally place dependence influenced their community and natural attachments, and integration of the farm into self. While eating, cooking, working, and having fun were categorized as personal attachments, participants' experiences reflect interrelations with community and natural attachments. Appreciation of fresh and new foods was enhanced and impacted by the secondary community attachment of appreciation of community meals. For example, a University of Montana student spoke about appreciation of fresh and new foods in the context of community meals. Kohlrabi was new to him. It was through cooking lunch with someone else and "kind of just help each other" that came to "love it." Community and natural attachments equally affected enjoyment of physical work. Physically difficult or tedious tasks were made more enjoyable and purposeful through community attachments such as, enjoying working with fellow students, faculty, and staff, and appreciating campus agriculture project's community objectives. Natural attachments, like attachment to plants, domesticated farm animals, and growth cycles, and feelings of ownership and responsibility also affected students' enjoyment of physical work. As a University of Montana student explained while weeding was "not a very meaningful task…its part of the bigger picture, which is meaningful to me." Satisfaction of tangible products of farming and cooking, a personal attachment fed into students' feelings of accomplishment and natural attachments, sense of ownership and responsibility. Enjoying working outside related to and made possible participants' awe of nature, and feelings of knowing the land. Having fun, another identified personal attachment was possible in part due to students' community and natural attachments. Participants' community and natural attachments interrelated with their personal attachments or traditional conceptualizations of place dependence.

Personal, community, and natural attachments were three broad categorizations of participating students' connection to farm, but as Gustafon (2001) found the meanings of place were often positioned in relationships between self, community, and nature. Participants' place identity derived from community, personal, and natural attachments together.

Natural Attachment

While the traditional two-dimensional model of place attachment does consider physical properties of a place and meaning, it does not include nature as a living community. Sixsmith's (1986) three-dimensional model only considers the physical realm in the context of structure, services, architecture, etc. Gustafson's (2001) three-pole framework of place attachment does acknowledge the natural environment in the form of weather and seasons, but stops before recognizing the reciprocal relationships that can form between individuals and the more-than-human community. Scanell and Gifford (2010) compared the effect of physical/natural attachment with civic or social place attachment on pro-environmental behavior, but does not measure individuals' personal attachments or place dependence in relation. The field of research in environmental identity (Clayton, 2003; Hinds & Spark, 2009), nature connectedness (Mayer & Frantz, 2004), and emotional affinity towards nature (Kals et al., 1999) emphasize connections between individuals and nature. Raymond et al. (2010) highlighted the importance of relationships with the more-than-human world, along with community and personal attachments describing it as "nature bonding." They noted while current research, "show the importance of place attachment to built environments, they do not provide scales for measuring the intensity of these attachments across multiple place contexts, including personal, community and natural environment contexts" (p. 425).

Research findings fit within Raymond et al.'s (2010) work as well as, the research of Clayton (2003), Mayer and Frantz (2004), and Kals et al., (1999) in considering the relationships humans form with the more-than-human community. Participants reported a high degree of natural attachments to the campus agriculture projects. Nearly 60% of all Yale University coding references of community, personal and natural attachments was that of natural attachments at primary and secondary levels. On a secondary level, attachment to farm's growth cycle, connection the farm and nature during time alone, feelings of knowing the land, and sense of group ownership deepened participants' natural attachment and connection to the farm. Primary levels of natural attachment included: attachment to plants; engagement with farm animals; natural sense of ownership, awe of beauty, diversity, and capability in nature.

Students' natural attachment and strong connection to the farms as places were clearly evident. For participants' the farms were living places that they felt responsible to and for. As one University of Montana student admitted, "I feel I am like thinking for another person." Most experienced a strong sense of responsibility and personal ownership. Two students' sense of ownership was so high as to work through pain as opposed to not finishing a task or come to the farm. According to Yale Farm Manager, a student worked in a high tunnel during a summer heat wave in spite of misgivings. She "wanted to finish the task" and developed heat stroke, needing intravenous fluids. Likewise, a University of Montana student shredded his hand during an off-farm bike accident needing stitches but came to the farm the next day determined to work. Others described their attachment to plants and sense of responsibility. One University of Montana student described regret leaving pumpkins still growing or other crops tended at the end of the summer saying, "I think that it would be hard not to see it [the pumpkins grown].

Participants' descriptive accounts revealed not only affective natural attachments feeding into their connections to the farms as places, but also their emotional connectedness to nature. Interviews, field observations and photo-elicitation revealed many participating students began to identify with and relate to plants themselves through tending and witnessing their growth process. Students repeatedly described cultivated plants as "my babies," or "tiny little things." A Yale University student spoke of weeding and "ripping of a tight collar and the plant can finally have room to breathe." Another Yale University student spoke of his engagement with the chickens, and now talked to them. These examples show the extent that participants related to cultivated plants, domesticated farm animals and the more-than-human community.

Participants at Yale University and the University of Montana also described a sense of awe toward the cultivated plants, domesticated farm animals, the farms, and nature. In the true sense of the word, they felt in awe of the beauty, diversity and capabilities of nature. Students spoke of feeling reverence before the power of nature, or "those things that aren't really in human control." Through the "sweetness of a tomato," "the vibrant color of a tomato," the "lustrous" of kale, "seeing the amount of variation in all these plants," and "the fractals that exist in you know a head of broccoli" participants perceived the intrinsic value in the more-than-human world, and incorporated a more ecocentric worldview. Farming allowed students to perceive what humans cannot control, shifting humans from the center of the universe to being within nature. As one Yale University student explained,

> It is incredible that they can turn sunlight into eventually your lunch, you know. Because that is something that humans can't do. And sometimes, a lot of the time in fact, as often as possible, in my opinion it is good to remind yourself what the limits are of being

> human especially because we devote so much of our energy and interest to other pursuits besides food. Well, give back some of that glory where it is deserved.

Similarly, a University of Montana student stated, "It's like a powerful thing to get out into the wild, where there is bigger stuff than you…it's humbling."

Bailey (1905), Leopold (1968), and Orr (1991, 2004) argued agriculture-based education and campus agriculture projects could distinctively impact students' perceptions of connectedness with nature. Participants at Yale University and the University of Montana reported the campus agriculture projects allowed them to witness the beauty, diversity, and power of the more-than-human world. For this reason, Bailey (1915) argued, "It is incumbent on us to take special pains…that all people or as many of them as possible, shall have contact with the earth and all the earth's righteousness shall be abundantly taught" (p.23).

Data suggests that connection to the campus agriculture projects is not exclusively segmented into the three categories of community, personal, and natural attachments, but that each informs, impacts and relates to each other. Gustafson (2001) argues the meanings of place "often situated in the relationship between self, others, and/or environment, rather than unambiguously belonging to just one of these categories" (p. 9). Researchers have also called for a more integrated approach to advance place attachment theory (Lewicka, 2011; Ramkisson et al., 2012; Raymond et al., 2010; Sampson & Goodrich, 2009). Understanding the three dynamics of community, personal, and natural in the context of campus agriculture projects, while not considering the built environment or economics, I hope adds in part to this move for integration.

Environmentally and Socially Responsible Behavior

As data from Study 1 indicates, emerging campus agriculture projects are very much being driven by interest in and pressure for social sustainability, and environmental and human health. Concerns about global climate change and the industrial food system are propelling college and university administrators, faculty, staff and students alike to take interest and action into sustainability and alternatives to the modern food system. Data offers empirical evidence campus agriculture projects deepen connection to place, and offers substitutes to anthropocentric beliefs and behaviors. Data from Study 2 suggests campus agriculture projects provide knowledge and skills, affect beliefs, concerns, and worldviews, as well as foster emotional, community, personal, and natural attachments to place. Students who participated in the campus agriculture projects at Yale University and the University of Montana also reported changes in behaviors and behavioral intentions including: buying and eating habits; behavioral intentions and behaviors toward farming and gardening; staying involved in the campus agriculture projects; awareness of plants, animals, weather, and farms; and involvement in food access and security.

In the more than thirty years of research ecopsychologists, sociologists, and environmentalists have explored the motivations and barriers of environmental and social responsible behaviors in response to environmental degradation and social injustice (Kollmuss & Agyeman, 2002). Numerous frameworks have been developed, but no definitive explanation exists uniting factors of direct and non-direct environmentally responsible behavior. While no definitive model exists, research has demonstrated positive connections to nature, and emotional attachment to place factor into pro-environmental behaviors (Clayton, 2003; Dunlap, Van Liere,

Mertig, & Jones, 2000; Dutcher et al., 2007; Franz et al., 2005; Mayer & Frantz, 2004; Nisbet et al., 2009; Musser & Malkus, 1994; Schultz, 2001). Research has more recently focused on the impact emotional attachments have on pro-environmental behaviors rather than strictly cognitive, knowledge-based relationships (Franz et al., 2005; Iozzi, 1989; Kals et al., 1999; Pooley & O'Connor; Stern & Dietz, 1994; Vaske & Kobrin, 2001). Kals et al. (1999) in examining emotional aspects of nature-protective behavior found emotional affinity a strong predictor part of experiences in nature when paired with direct experiences in nature, and dialogue on ecological responsibility and ethics.

Data from this research found participating students' environmental and social beliefs, concerns, and connections (cognitive and affective) underlie changes pro-environmental and social behaviors (see Figure 2). Chawla's (1998, 1999) research showed emotional connections are a significant part in forming environmental beliefs, concerns, and values. I argue participating students' community, personal, and natural emotional attachments together with their cognitive beliefs and connectedness provided the knowledge, skills, opportunity, and motivation to impact students' buying and eating habits; behavioral intentions and behaviors toward farming and gardening; staying involved in the campus agriculture project; awareness of plants, animals, weather, and farms; and involvement in food access and security. Forming community, personal, and natural attachments to the campus agriculture projects as places impacted students pro-environmental and social behaviors specific to their experiences at the campus agriculture projects—food, farming, and the more-than-human community at the farms.

Findings illustrate *specific* altruistic environmentally and socially responsible behaviors are motivated by *specific* corresponding knowledge, skills, awareness, concerns, cognitive

beliefs and connection to nature, and especially community, personal, and natural attachments of place. While experiences at the campus agriculture projects motivated pro-environmental and social behaviors specific to farming, food, and the more-than-human community at the farms, participating students did not report an increase in cognitive connectedness to nature or behaviors beyond food, farming, or the more-than-human community at the farms. Students expanded their sense of self to include the human and more-than-human communities at the farms at least within the time frame of the summer internship.

Conclusion

Campus agriculture projects "evaluate, disseminate, and legitimize critiques of the conventional food system" according to Barlett (2013, p. 102). Data suggests campus agriculture projects can and do play a role in providing students with knowledge, skills, and emotional connections to a place needed to address what the American College and University Presidents' Climate Commitment (2104) described as, "critical, systemic challenges faced by the world in this new century" (para. 3). Through attention to sustainability initiatives and pedagogies, campus agriculture projects distinctively impact students' perceptions of connectedness to nature through experiencing agriculture's role in establishing a new worldview. Campus agriculture projects set students within nature, not just physically but perceptually. They can challenge assumptions of the human/nature relationship, especially around the aspect of agriculture. Both Leopold (1968), and Bailey (1911) envisioned the unique opportunity agriculture could play in teaching ecology, ethics, and shifting in perceptions. Participants at Yale Farm and P.E.A.S. Farm both professed to the sense of awe in nature's beauty, diversity, and capabilities that the farms instilled in them. Perceiving the power of nature on the farms reversed participants'

perceptual ground from humans as being all-powerful to understanding "the limits are of being human…Just because we like clipped of cucumbers, and weeded the area, and strung them up, and kept to our list of best practices, doesn't mean that they are going to grow" (interview with Yale student).

More important, experiences in farming students can development community, personal, and natural attachments that impact students' pro-environmental and social behaviors. The study demonstrated feeling connected to the campus agriculture projects encouraged students to widen their circle of care to include the farm as a natural place, the community, university, municipality, and more-than-human community, as well as the role attachments played in forming pro-environmental and social behaviors. Understanding place attachment in the context of campus agriculture projects offers important insight to the fields place studies, agriculture-based learning, and environmentally responsible behavior. While experiences at the campus agriculture projects motivated pro-environmental and social behaviors specific to farming, food, and the more-than-human community at the farms, participating students did not report an increase in cognitive connectedness to nature or behaviors beyond food, farming, or the more-than-human community at the farms. My hope is that this research contributes to assessing the intellectual, emotional, and physical values agriculture-based learning and campus agriculture projects in higher education.

Recommendations

Additional research is needed to understand the intellectual, emotional, behavioral, and physical objectives and outcomes of campus agriculture projects, especially as they exist outside land grant colleges of agriculture. Campus agriculture projects represent a commitment of

resources—financial, physical, and human—by colleges and universities to an activity that is traditionally the terrain of agricultural schools and land grant universities. Such investment of resources requires programs provide and meet valued learning objectives and outcomes important to the administration and the overall mission of the college. Without research demonstrating the positive effects and value of campus agriculture projects on students, that faculty, staff and students the persistence of campus agriculture projects may not continue through budget renewals, as well as faculty, staff, and student turnover. Campus agriculture projects, especially unconnected to degrees to gain credibility must show positive learning outcomes that connect to multiple disciplines and/or college-wide emotional and physical goals.

More research is needed to understand the outcomes of all reported learning goals, and outcomes, including in-depth studies at a more diverse and larger sampling of campus agriculture projects, a more integrated and tested model of place attachment, environmentally responsible behaviors, and developed theory on introversion and extroversion at campus agriculture projects to further understand the emerging intersection occurring between higher education and campus agriculture projects. The long-term effects of the school and campus agriculture projects have yet to be seen. It is unknown how students' behaviors, beliefs, and perceptions of and connections to nature are affected in the longer term. As Barlett (2013) wrote, "This is a critical moment for academic engagement with food" (p. 102). Assessments of campus agriculture projects are needed for their continuance and support.

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Appendix A: Study 1 Pedagogical Objectives National Survey

Hello:
You are invited to participate in a research study as part of doctoral research in sustainability education at Prescott College. I am researching pedagogical goals of campus agriculture projects in higher education institutions. This information is provided to help you decide whether or not to take part. If you decide to take part in the study, check agree to terms box and continue with the survey.

What is the purpose of this study?
This is a research study for the completion of my PhD studies in Sustainability Education at Prescott College. You are invited along with other farm educators to participate in this study identifying common and differentiating curriculum goals of campus farms. I will be using this survey to develop a picture of how campus farms may impact students intellectually and emotionally. By checking the box below you are agreeing for this information to be utilized in this way.

What will happen during this study?
If you choose to participate by checking agree to terms box, you will be led to a survey of ten questions. It should only take a few minutes. All questions are institutional and do not require personal information beyond name, title and contact information.

Are there any benefits to me?
My hope is that existing and newly designed collegiate farms and curriculum will benefit from learning the results. I will share a final report with participants and publish my dissertation as a part of this process.

Will I be paid to participate in the study?
There is no compensation associated with this study, however I will share any published or publically available papers done during my doctoral course work.

Will the information that is obtained from me be kept confidential?
Individual names or titles will not be used in any reports or publications resulting from the study. Due to the nature of this study of college or university programs, institution names will be referred to. It is possible that representatives of the Federal Government will want to come to Prescott College to review your information. If that occurs, a copy of the information may be provided to them but your name will be removed before the information is released.

What if I am harmed by the study procedures?
Your participation in this study is completely voluntary. There are no foreseeable risks associated with this project. However, if you feel uncomfortable answering any questions, you can withdraw from the survey at any point.

May I change my mind about participating?
Your participation in this study is completely voluntary. You may decide to not begin or to discontinue your participation in the study at any time. Your refusing to participate will have no

effect on your employment or evaluation. You can discontinue your participation with no effect on your employment or evaluation. Also any new information discovered about the research will be provided to you.

Whom can I contact for additional information?
You can obtain further information about the research or voice concerns or complaints about the research by contacting the Principal Investigator Kerri LaCharite, PhD Candidate at [redacted]. If you have questions concerning your rights as a research participant, have general questions, concerns or complaints, or want to talk to someone other than the researcher, you may call the Human Subjects Committee Chairperson at toll-free (877) 350-2100 or gradsupportteam@prescott.edu.

Your Signature
By checking the agree to terms box, I affirm that I have that I have read the information contained in the form, that the study has been explained to me, that my questions have been answered and that I agree to take part in this study. I do not give up any of my legal rights by agreeing to terms outlined in this form.

Thank you very much for your time and support. Please start with the survey now by clicking on the Agree To Terms box.
❍Agree to Terms

1. Please fill out the following information
Name:
Title:
Faculty/ Staff/ Student:
Institution:
Email Address:

2. How many acres (square feet if appropriate) are typically in crop production on your institution's campus farm?
3. What year was your institution's produce garden or farm established?
4. Consider which departments or groups provide labor, oversight and financial support as well as the garden/ farm's mission. Please choose the model(s) that best describes your garden/ farm. (You may choose as many as appropriate)
❍ Academic (Specific or various disciplines)
❍ Community (Includes members of faculty, staff, students, and possibly outside community)
❍ Student Community (Student clubs or groups)
❍ Residence (Student living, cooperative housing)
❍ Dining (Oversight, labor, and/or financial support comes from in-house or outside dining service)
❍ Demonstration (Exhibition for larger community)
❍ Collaboration (College works with outside or separate organization)
❍ Integrated Work (Limited instances where work including that on the farm/ garden is integral to the college mission)
❍ Other (please specify)

5. Is your farm or garden open and accessible to all undergraduates regardless to course of student through volunteering, classes, research or employment?

- ❍ Yes
- ❍ No
- ❍ Other (please specify)

6. What types of agriculture-based curriculum does your institution provide (Select all that apply)?

- ❍ Undergraduate Major
- ❍ Undergraduate Major Emphasis
- ❍ Undergraduate Minor
- ❍ Undergraduate Minor Emphasis
- ❍ Undergraduate Elective Classes
- ❍ Undergraduate Classes in Core Curriculum or General Education
- ❍ Certificate
- ❍ Graduate Degree
- ❍ Not Applicable
- ❍ Other (please specify)

7. Of this list, which requires participation in the college garden (Select all that apply)?

- ❍ Undergraduate Major
- ❍ Undergraduate Major Emphasis
- ❍ Undergraduate Minor
- ❍ Undergraduate Minor Emphasis
- ❍ Undergraduate Elective Classes
- ❍ Undergraduate Classes in Core Curriculum or General Education
- ❍Certificate
- ❍ Graduate Degree
- ❍ Not Applicable
- ❍Other (please specify)

8. How important are the intellectual goals below to the garden/ farm mission, governance and activities? (Intellectual goals can apply to formal classroom study or informal learning)

Very Important	Important	Somewhat Important	Not Important at All
❍	❍	❍	❍

Teach healthy eating habits
Offer practical skills in growing food
Establish interdisciplinary learning
Teach sustainability through agriculture
Introduce local, national and global agriculture concepts
Explain history of agriculture and its relationship with the development of society
Teach agricultural technologies and techniques
Establish sustainable agriculture practices
Make connections between agriculture systems, the environmental & human health

Teach farm management skills
Introduce vegetable crop production and management
Other Important Intellectual Goals (please specify)

9. How important are the emotional goals below to the garden/ farm mission, governance and activities? (Emotional goals can apply to formal classroom study or informal learning)

Very Important	Important	Somewhat Important	Not Important at All
❍	❍	❍	❍

Instill work ethic in students
Raise awareness of environmental issues
Teach environmental attitudes
Establish attachment to place
Increase students' connection with nature
Foster sense of belonging
Cultivate interest in learning
Deepen perceptions of nature
Raise self-concept and self-esteem
Other Important Emotional Goals (please specify)

10. How important are the physical goals below to the garden/ farm mission, governance and activities? (Physical goals can apply to formal classroom study or informal learning)

Very Important	Important	Somewhat Important	Not Important at All
❍	❍	❍	❍

Increase food access for students and/ or staff
Donate produce to local food banks or kitchens
Increase healthy eating habits
Encourage physical activity
Reduce food miles
Provide food to dining services or on-campus venue
Reduce on-campus food waste
Protect biodiversity
Provide time outdoors
Ranking on green college rating system (AASHE's STARS, Princeton Green Review, The College Sustainability Report Card)
Other Important Physical Goals (please specify)

12. What is the relationship between the farm/ garden and college's mission objectives?
❍ Overlaps a lot
❍ Overlaps some
❍ Mostly separate
❍ Does not overlap at all

Thank you so much for your participation!

Appendix B: Study 2 Student Connectedness to Nature Questionnaire

Section One:
Please answer each of these questions in terms of the way you generally feel. There are no right or wrong answers. Using the following scale, in the space provided ***next*** to each question simply state as honestly and candidly as you can what you are presently experiencing. Please explain your thoughts and feelings about each in the text box ***below*** each question.

1	2	3	4	5
Strongly Disagree		Neutral		Strongly Agree

_____1. I often feel a sense of oneness with the natural world around me.

_____2. I think of the natural world as a community to which I belong.

_____3. I recognize and appreciate the intelligence of other living organisms.

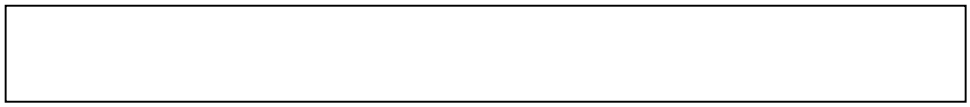
_____4. I often feel disconnected from nature.

_____5. When I think of my life, I imagine myself to be part of a larger cyclical process of living.

_____6. I often feel a kinship with animals and plants.

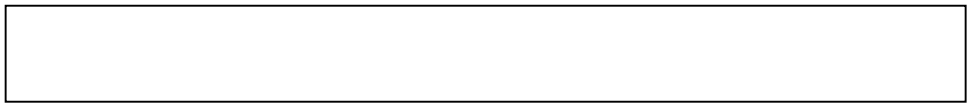
_____7. I feel as though I belong to the Earth as equally as it belongs to me.

_____8. I have a deep understanding of how my actions affect the natural world.



_____9. I often feel part of the web of life.

_____10. I feel that all inhabitants of Earth, human, and nonhuman, share a common 'life force'.



_____11. Like a tree can be part of a forest, I feel embedded within the broader natural world.

_____12. When I think of my place on Earth, I consider myself to be a top member of a hierarchy that exists in nature.

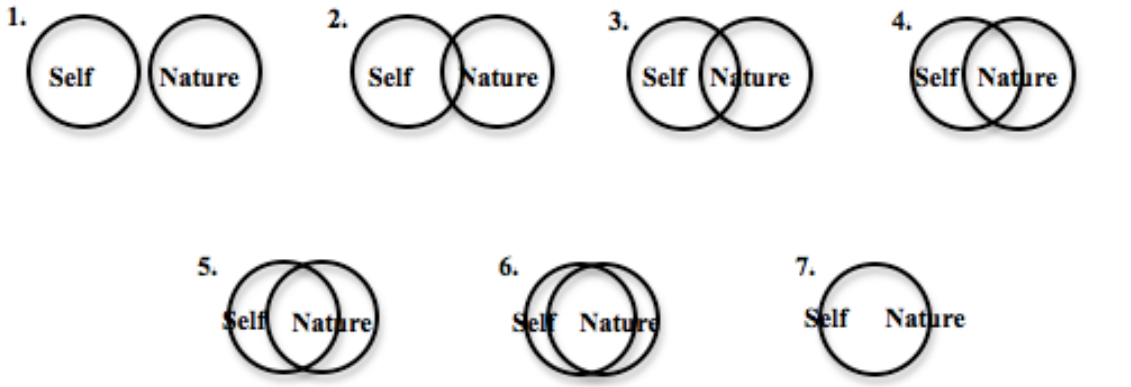
_____13. I often feel like I am only a small part of the natural world around me, and that I am no more important than the grass on the ground or the birds in the trees.

_____14. My personal welfare is independent of the welfare of the natural world.

Section Two:

Please circle the picture below which best describes your relationship with the natural environment. How interconnected are you with nature?

15.



Appendix C: Study 2 Photo-elicitation Instructions

Thank you for participating in this study!

My hope is to have a clearer understanding of the role of agriculture in the development of the human/ nature relationship. Data collected in this study might help further identify goals and curriculum content for campus farms and be used to further discuss the role and worth of agriculture in liberal artis higher education and sustainability initiatives.

- Please take three photographs of a place(s) or subject(s) within the campus farm that you feel ***connected*** to with the provided disposable camera. The pictures should exemplify your relationship to the farm, the land, and the natural community. This can be any subject, angle, depth of focus, etc of your choosing within the confines of the farm. This could be the earthworm below, the hawk above, a ripe watermelon to be feasted on, the farm as a whole, etc. I am interested in what and how you see the land and all within it.

- Please write in marker on the camera the dates and number of photos taken on each date.

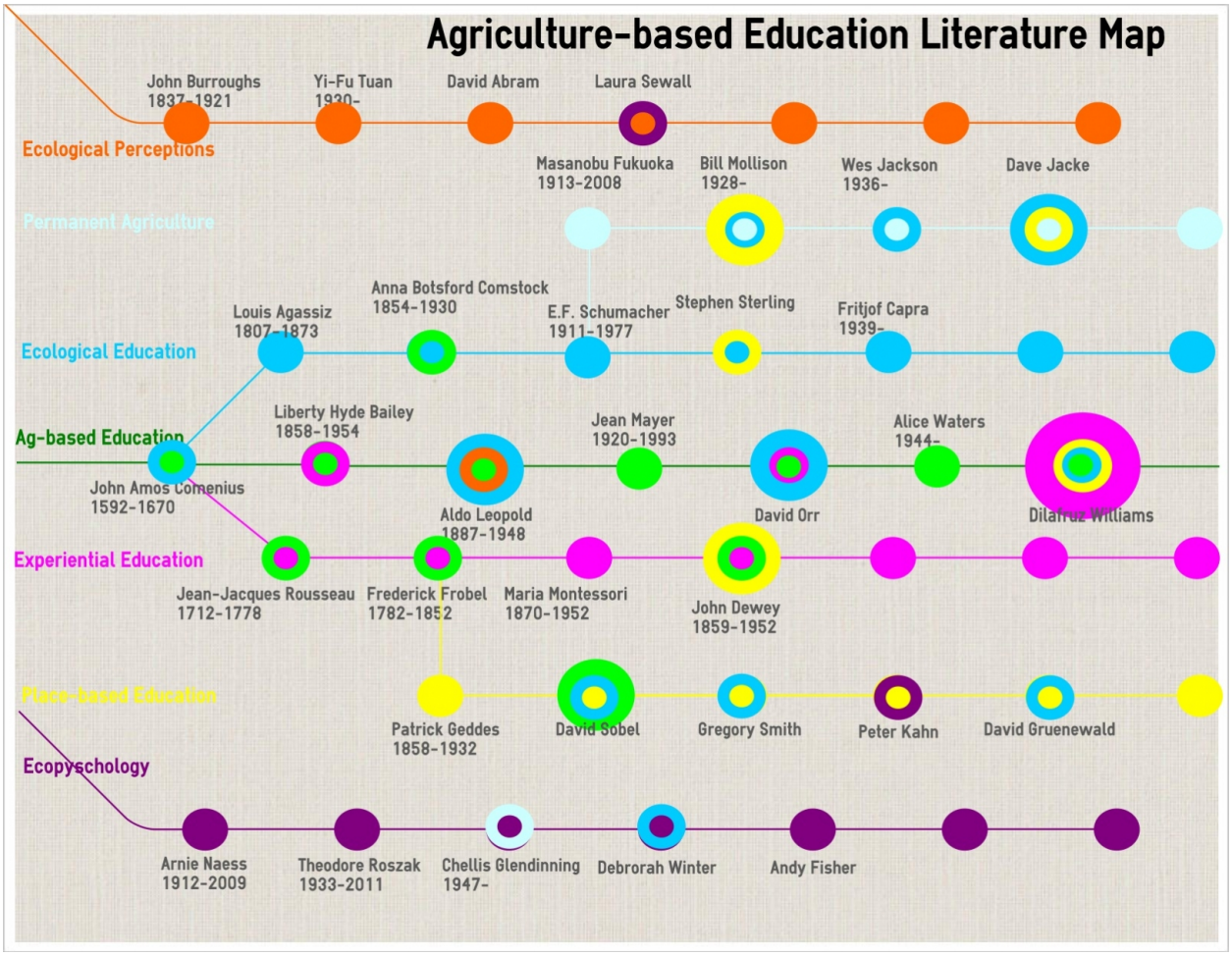
- Then please deposit the camera into the collection box on Thursday, August 1st between 8:30am and 4:30pm.

- Do not write your name on the camera. It is identified with a number assigned to you for confidentiality.

- I will provide printed photos taken after interviews are conducted.

You can obtain further information about the research or voice concerns or complaints about the research by contacting the Principal Investigator Kerri LaCharite, PhD Candidate at (412) 781-0179 or klacharite@prescott.edu. If you have questions concerning your rights as a research participant, have general questions, concerns or complaints, or would like to give input about the research and cannot reach the researcher, or want to talk to someone other than the researcher, you may call the Human Subjects Committee Chairperson for this study at toll-free (877) 350-2100. If you would like to contact the Human Subjects Committee Chairperson by email, please use the following email address: gradsupportteam@prescott.edu

Appendix D: Literature Map



Appendix E: Connectedness to Nature Scale

Please answer each of these questions in terms of the way you generally fell. There are no right or wrong answers. Using the following scale, in the space provided next to each question simply state as honestly and candidly as you can what you are presently experiencing.

1	2	3	4	5
Strongly Disagree		Neutral		Strongly Agree

_____1. I often feel a sense of oneness with the natural world around me.

_____2. I think of the natural world as a community to which I belong.

_____3. I recognize and appreciate the intelligence of other living organisms.

_____4. I often feel disconnected from nature.

_____5. When I think of my life, I imagine myself to be part of a larger cyclical process of living.

_____6. I often feel a kinship with animals and plants.

_____7. I feel as though I belong to the Earth as equally as it belongs to me.

_____8. I have a deep understanding of how my actions affect the natural world.

_____9. I often feel part of the web of life.

_____10. I feel that all inhabitants of Earth, human, and nonhuman, share a common 'life force'.

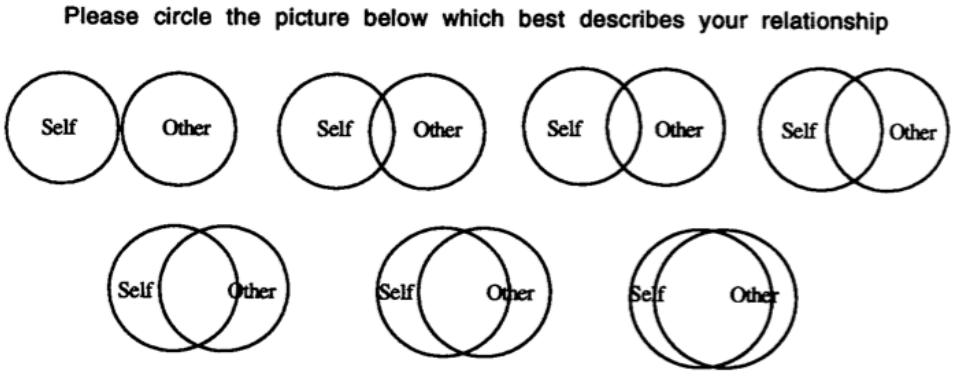
_____11. Like a tree can be part of a forest, I feel embedded within the broader natural world.

_____12. When I think of my place on Earth, I consider myself to be a top member of a hierarchy that exists in nature.

_____13. I often feel like I am only a small part of the natural world around me, and that I am no more important than the grass on the ground or the birds in the trees.

_____14. My personal welfare is independent of the welfare of the natural world.

Appendix F: Inclusion of Other in Self



Appendix G: Hollow Mask

Appendix H: Rubin Vase

Appendix I: Community Attachment Participant Photographs

Photo 1

Photo 2

University of Montana P.E.A.S. Farm Participant Photographs

Photo 3

Photo 4

Yale University Farm Participant Photographs

Appendix I: Community Attachment Participant Photographs

Photo 5

Photo 6

University of Montana P.E.A.S. Farm Participant Photographs

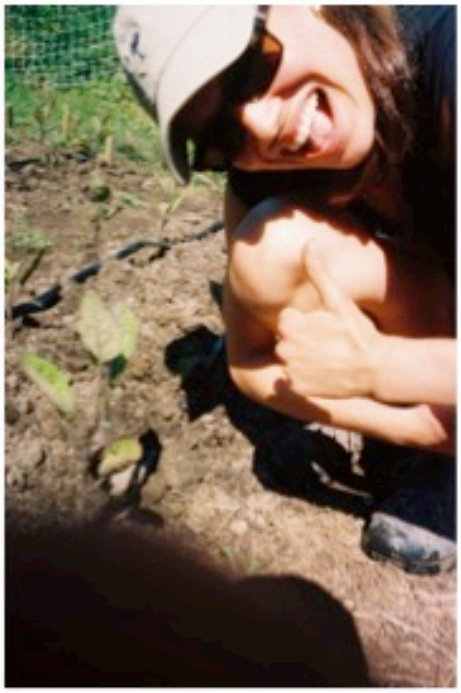


Photo 7

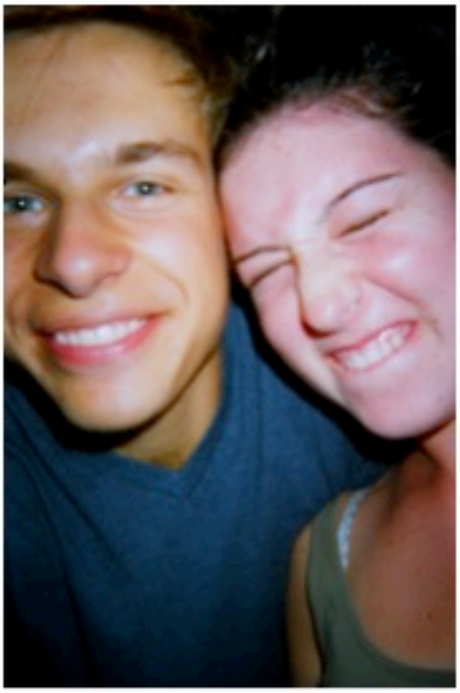


Photo 8

Yale University Farm Participant Photographs

Appendix J: Personal Attachment Participant Photographs

Photo 9

Photo 10

University of Montana P.E.A.S. Farm Participant Photographs

Photo 11

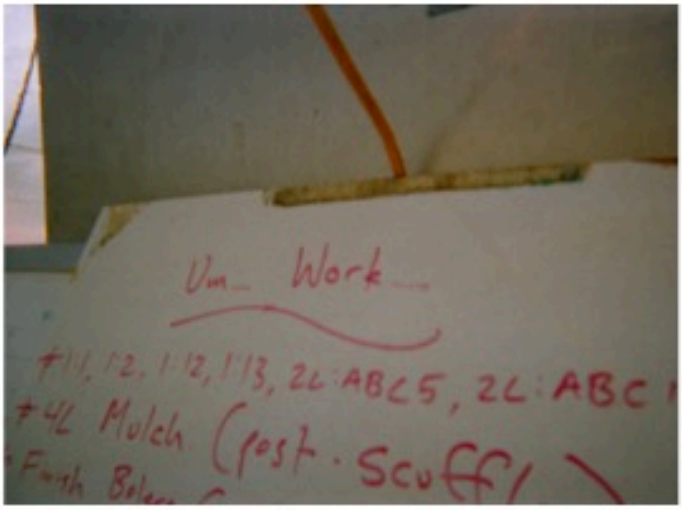


Photo 12

Yale University Farm Participant Photographs

Appendix J: Personal Attachment Participant Photographs

Photo 13

Photo 14

University of Montana P.E.A.S. Farm Participant Photographs

Photo 15

Photo 16

Yale University Farm Participant Photographs

Appendix K: Natural Attachment Participant Photographs

Photo 17

Photo 18

University of Montana P.E.A.S. Farm Participant Photographs

Photo 19
Yale University Farm Participant Photographs

Photo 20

Appendix K: Natural Attachment Participant Photographs

Photo 21

Photo 22

University of Montana P.E.A.S. Farm Participant Photographs

Photo 23

Photo 24

Yale University Farm Participant Photographs