

**LEARNING SUSTAINABILITY ON THE FARM:
EXPLORING ACADEMIC PROGRAMS AT THE CENTRE FOR
SUSTAINABLE FOOD SYSTEMS AT UBC FARM**

by

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Abstract

This research focuses on the academic programs at the Centre for Sustainable Food Systems at UBC Farm (the Farm). The Farm is a centre for sustainability learning and research, providing a working model of sustainable food systems with which to engage students, faculty and community. The Farm is situated within the global context of a dominant industrial food paradigm that is demonstrated to be a major contributor to the social and ecological crises the world now faces. The Farm is further situated within the context of a dominant education paradigm that provides most students with knowledge that is disconnected from social and ecological realities, leading to the misuse of knowledge and to the exacerbation of global crises.

The purpose of this research is to explore the contributions that the Farm's academic programs provide toward advancing sustainability learning from the perspective of program participants, including myself. The research methodology was guided by participatory approaches to research. Qualitative methods were employed, focusing primarily on surveys and semi-structured interviews with program participants. I have also been an involved participant in a diversity of programs at the Farm from April 2004 – December 2008.

The results of the research suggest that program participants value the ability to engage with their subject matter, not only on an abstract/theoretical level, but also on practical and affective levels. Participants feel that UBC is lacking in programs that allow students to engage physically and emotionally with their learning. Students feel their knowledge will be better recalled and more likely to be useful if they care about what they are learning, if they can engage with it in a real world context, and if they have some ownership and responsibility for what they are learning. Further, program participants feel that the Farm's academic programs would benefit from providing more theoretical context and connection to their other academic work, from additions and improvements to Farm infrastructure and resources, and from additional human resources support.

This research project was site specific. Nevertheless, it connects with and complements work being done at dozens of universities, colleges and student farms around the world.

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Chapter 1: INTRODUCTION

The purpose of this thesis is to provide an assessment and critique of the sustainability learning that takes place at the Centre for Sustainable Food Systems at UBC Farm (UBC Farm), located on the University of British Columbia (UBC) campus in Vancouver, B.C. The UBC Farm strives to be a site for **practical sustainability learning**, in particular **sustainable agriculture education**. Both of these terms will be further described and contextualized in this chapter.

1.1 A Crisis of Education

In today's world, "crisis" is a common, almost everyday word. In the past 3-4 years the climate change crisis has been transformed from an important news item being raised by people at the margins of society into a recognized global crisis that permeates almost everything that citizens of Canada and the rest of the industrialized world do on an everyday basis (Worldwatch, 2007). Those who doubt and question the reality of climate change, specifically its anthropogenic causes, are now the ones operating from the margins of society. Today the climate scientists are involved in an ongoing monitoring of its effects are realizing that the climate change crisis is actually much worse than experts had predicted as little as 10 years ago (Worldwatch, 2007). As Michael Pollan (Pollan, 2008) says: "Have you looked into the eyes of a climate scientist recently? They look really scared."

A big question that emerges is how we, as a global society, have arrived at this point? It has been over 16 years since the Union of Concerned Scientists told us in their

“Warning to Humanity” (UCS, 1992) that we must take immediate action to mitigate climate change. It has been over forty years since there was a widespread understanding of the finite ability of the planet and biosphere to absorb the harmful consequences of our industrial society (Carson, 1962; Wackernagel & Rees, 1996). Why then, have we continued to operate in such a manner that our societies and our planet have reached the point of crisis?

David Orr (Orr, 2004) has suggested that one answer to the above question is that we have a crisis of education. He points out that it is not uneducated people who have perpetuated our unsustainable culture, but rather it is “...largely the results of work by people with BAs, BSs, LLBs, MBAs, and PhDs.” (Orr, 2004: 7). Our global leaders - government officials, business executives, media personnel, teachers, professors - have all been university educated, and yet we continue to push our planet, and by proxy all human societies, to the point of crisis. Orr argues that it is not more education that we need but a transformation of education so that our educational institutions are teaching and embodying the values of a sustainable society. In his words: “It is not education, but education of a certain kind that will save us.” (Orr, 2004: 8). Orr suggests six principles to adhere to in re-envisioning education for a sustainable society. I have summarized and paraphrased them here:

1. All education is ecological education. Students learn that they are either part of or separate from the biosphere by what is included and excluded in curriculum.
2. The goal of education is not mastery of subject matter, but mastery of self – to become an effective citizen of the world.

3. Knowledge is a powerful tool – students should learn how to responsibly use it to make a positive difference in the world
4. We cannot say we know something until we understand what impact the knowledge will have on real people and communities.
5. The values of an educational institution should be reflected in all of its operations, including infrastructure, administration, faculty and staff.
6. The methods and context in which learning occurs are as important as the content of particular courses. (Orr, 2004: 13-14)

The initial goal of this thesis project was to continue work that has been done in assessing the status of the University of British Columbia (UBC) in providing an education that meets the above six principles, which can be understood as looking at how effective UBC is at providing sustainability learning (Moore, 2004; Sipos, Battisti, & Grimm, 2008). In particular, this thesis has focused on a specific resource for sustainability learning at UBC: the Centre for Sustainable Food Systems at UBC Farm. Justification for this choice of focus is provided below. David Orr poses two questions that can be seen as a framework to assess the value and effectiveness of a given college or university:

Does four years here make your graduates better planetary citizens or does it make them, in Wendell Berry's words, "itinerant professional vandals"? Does this college contribute to the development of a sustainable regional economy or, in the name of efficiency, to the processes of destruction? (Orr, 2004: 9)

1.2 Research Purpose

It is my belief that the University of British Columbia possesses, in the Centre for

Sustainable Food Systems at UBC Farm, a resource that will help to strengthen UBC's efforts to provide sustainability education and contribute to the development of a sustainable regional economy, bringing us closer to the goal of a sustainable global culture. The objective of this thesis is to assess the value of this resource by studying the responses of students who have used the Farm as a learning tool during their four years at the university. Specifically, this research sought to answer the question:

What, if any, services and advantages do academic programs at the Centre for Sustainable Food Systems at UBC Farm provide toward advancing sustainability learning at UBC, and how can these programs be enhanced and improved, according to participants in such programs?

There are some key components to this research question that help to describe the purpose of the research project. The first is that this research was based on the responses of participants in UBC Farm academic programs. The goal was to assess and evaluate the academic programs at the UBC Farm by telling the stories of the participants in these programs. Next is that the primary research question, stated above, consists of two main parts. To answer the first part, participants were asked to evaluate the academic programs at UBC Farm in the context of sustainability learning at UBC. To answer the second part, participants were asked to make suggestions on how academic programs at UBC Farm could be improved, again in the context of sustainability learning at UBC (see Appendix A, B & C). All of this was done within the context of the UBC Farm, which strives to provide a model, working, organic farm for the purposes of learning, outreach, and research in sustainability (see below Research Context). The Farm is situated on the campus of UBC, which strives to be a global leader in sustainability, and the Farm itself is a microcosm of the global struggle to envision and create sustainable food systems and sustainability education programs (see below Research Context).

1.3 Thesis Overview

Thus far this chapter has provided a brief explanation of the goals of the study, the terrain of investigation, and the overall purpose of the thesis. The remainder of Chapter 1 is dedicated to further developing the context for this investigation. This section begins by describing the local context for sustainability learning at UBC and the UBC Farm, and my personal motivations for engaging in the project. It continues by providing the larger context for the study, describing the crises of food energy and education, and contextualizing the theory and practice behind sustainability learning and sustainable agriculture education.

Chapter 2 describes the methods through which I conducted this research. It begins by discussing the approach I took to the research, and goes on to describe the methods and techniques used to gather the findings.

Chapter 3 presents the results of the research. These results are organized according to the data collection activities (survey results are presented first followed by interview results), and further divided into the themes that emerged in the research, which form the bulk of the data.

In Chapter 4, I discuss the results in the context of the relevant theory. This chapter is organized similarly to Chapter 3, but the results are contextualized with reference to the research questions.

Chapter 5 concludes the thesis, providing a summary of the findings as well as some recommendations based on the findings.

1.4 Research Context

1.4.1 Sustainability at the University of British Columbia

The vital role of universities in promoting and addressing issues such as sustainability and climate change has been recognized in several international documents ("Earth Charter", 2000; UNEP, 1992). UBC has acknowledged its own role on the international stage by endorsing both the Talloires Declaration of University Leaders for a Sustainable Future (ULSF, 1990), and the Halifax Declaration ("The Halifax Declaration", 1991). Both of these action documents provide an outline of what universities should do in order to promote a sustainable future. UBC has also taken steps in its own internal policy to demonstrate a commitment to a sustainable future, such as the creation of UBC's Sustainable Development Policy #5 (UBC, 1997a) and TREK 2010 (UBC, 2004) documents. These two documents describe a plan for the university that would appear to address all six of Orr's principles for re-designing education and more. They outline the university's guiding vision as "UBC seeks to become a centre for teaching and learning about the skills and actions needed to manage ourselves in a sustainable way" (UBC, 1997a: 1). This stated commitment to being leaders in sustainability has continued with the latest administration, as President Stephen Toope signed the University Presidents' Climate Change Statement of Action for Canada (TUPC, 2008) on March 13th, 2008, committing UBC to accelerating the reduction of greenhouse gas emissions (GHGs). A big part of these expressions of commitment to having the university become a leader in modeling and teaching sustainability and climate action, is an understanding of Orr's sixth principle – a need to diversify the context of learning and provide more practical learning opportunities. As is stated in

TREK 2010 (UBC, 2004), the university will “encourage Faculties to continue developing innovative approaches that expose undergraduates to research-based and experiential learning.” The UBC Farm has been through several stages in its over 80-year history (see below). The current stage was begun in 1999/2000, and involved students and faculty “re-inventing” the Farm with the precise goal of developing the above-mentioned types of innovative programming in mind (Quayle, 2000).

1.4.2 The Centre for Sustainable Food Systems at UBC Farm

The primary objective of this thesis is to provide a participant-based assessment and evaluation of the programming at UBC Farm. One of the reasons I chose the Farm for this research is that today, in 2008, it oversees and provides a context for a whole host of innovative programs “that expose undergraduates (and graduates) to research-based and experiential learning” (UBC, 2004), and I believe it is both underappreciated and underutilized in this regard.

The Past

The University of British Columbia has always had a farm. In fact it was one of the make-or-break requirements when the administration was looking at moving the University to its current location in Point Grey in 1922 (Quayle, 2000). If an opportunity to model food systems and provide students with practical learning in field agriculture had not been available, the university would have been moved to Mission (Bomford 2007a). As it happened there was ample agricultural potential on Point Grey, and the new campus opened with agricultural research and teaching facilities right in the midst of the Main Campus. The current UBC Farm site on South Campus was cleared from the forested Endowment Lands in the mid 1960s, and was used as an academic research site

by faculty and grad students in Botany, Forest Sciences and Agricultural Sciences for three decades (UBC Farm, 2005). By the mid 1990s there was very little academic work happening at the Farm, so that when the university developed its Official Community Plan (OCP) in 1997, the UBC Farm was included with several other sites on campus as part of a Future Housing Reserve (FHR) (UBC, 1997b), in the context of UBC's commitment with the city to provide increased housing opportunities for students and staff. This means the site retains its designation as academic zoning until such time as the administration deems that it is surplus to the academic mission of the university, at which time an amendment would be made to the OCP to change the zoning designation and build over the UBC Farm land base. This designation proved to be a catalyst for a student-driven movement to re-invent the UBC Farm (Quayle, 2000). Since 2000, a movement led by students and faculty from Land and Food Systems, but including a diversity of departments and Faculties, has sought to transform the UBC Farm into a place that will "provide educational, research and practical leadership in the area of agro-ecological design and planning in a manner that ultimately benefits present and future community farmers, foresters, planners, designers, developers, managers, leaders and other citizens." (UBC Farm, 2001).

The present

During the 2007 academic year, the Farm was used by 41 UBC credit courses as part of their curriculum. These courses included a total of over 2000 student visitors to the site (Bomford, 2007b), comprising several in-depth community service learning (CSL) projects, and over 20 students involved in student directed learning (SDL)

projects. In addition there were 35 active research projects identified in 2007, involving over 100 faculty, students and staff. To date 14 of the 26 faculties and schools at UBC have been involved in learning and research at the UBC Farm (Bomford, 2008a, 2008b).

After laying the groundwork with several informal internships, including the “Rooted at the Farm” program that is included in this study, the UBC Farm launched a formal “Sowing Seeds” Apprenticeship with seven participants for 2008. In addition, 2007 saw the completion of a student directed seminar involving nine students from the Faculties of Land and Food Systems and Applied Science. The goal of this SDL project was to establish a Farm Ambassadors (FA) program, providing information, resources and outreach about potential academic involvement at the Farm, adding structure to academic programming and increasing the number of students involved (UBC Farm Ambassadors, 2007b)

Currently, all Farm programs are set within the context of a struggle, involving students, faculty, staff as well as several community, city and advocacy organizations, to keep the Farm where it is and operating with the same land base, capacity and potential it has operated with since its re-invention in 2000. UBC’s Campus and Community Planning is in the process of reviewing and updating its Vancouver Campus Plan (CCP, 2006), and the current options that are being presented all would see the Farm reduced in size by two-thirds, from its current twenty-four hectares down to eight. In addition, two of the three options would see the Farm moved to a new location, which would disrupt and reduce the potential of its academic programs (CCP, 2008). Ultimately, it will be the university’s Board of Governors (BoG) that will vote on the final decision for the future definition of the UBC Farm. In 2006, a student- and community-led group, the Friends of

the UBC Farm (FotF), was formed to support and promote the Farm and its programs. The FotF has been leading the campaign to keep the Farm at its current size and in its current location. Table 1 below gives a brief synopsis of the campaign to “save the Farm”.

Table 1: Friends of the Farm Campaign – Important Dates

1997	<ul style="list-style-type: none"> • 24 hectare UBC Farm site is designated as “Future Housing Reserve” in UBC’s Official Community Plan
2000	<ul style="list-style-type: none"> • Faculty of Agricultural Sciences publish “Re-Inventing the UBC Farm” document – outlining the need to develop the Farm site for experiential sustainability learning
June 2001	<ul style="list-style-type: none"> • Original “Market Garden” first cultivated - marking the beginning of the Farm’s re-invention as a student-focused centre for sustainable food systems.
2001-2007	<ul style="list-style-type: none"> • Sustainability programs at the Farm grow rapidly, witnessing >50% growth per year in numbers of students and courses involved on site.
2006	<ul style="list-style-type: none"> • UBC’s Campus and Community Planning (CCP) begins the Vancouver Campus Plan (VCP) process to plan institutional development on Vancouver Campus. Future plans for 24-hectare UBC Farm site will be decided through this process. • The Friends of the UBC Farm (FotF) group is founded to support and raise awareness of the Farm.
January 2008	<ul style="list-style-type: none"> • CCP releases request for proposals for planning firm to examine feasibility of moving UBC Farm to another location on South Campus. UBC Farm is not officially notified. • FotF launch “Save the Farm” campaign to rally support for maintaining full 24-hectare Farm in its current location.
June 2008	<ul style="list-style-type: none"> • Independent consultants site use report released describing need for UBC Farm to maintain 8 hectares of field space • FotF criticizes report, stating that very few stakeholders and technical experts were consulted.
Jan – Sept 2008	<ul style="list-style-type: none"> • 100s of letters sent to UBC administration supporting the 24 hectare Farm in its current location

- October 2008
 - CCP holds community consultations on three “preferred options” for campus planning. All three options describe an eight-hectare UBC Farm. Two of three options involve moving the Farm.
 - Community members who say CCP is not operating in good faith by failing to provide 24-hectare Farm as an option openly criticize community consultations.
 - FotF present President Stephen Toope with 15,000-signature petition supporting 24-hectare Farm in its current location.

- November 2008
 - FotF coordinate a design workshop for dozens of planning experts to develop strategic plan for 50-year land use for 24-hectare UBC Farm site.
 - Metro Vancouver adopts a resolution supporting a 24-hectare UBC Farm in its current location.
 - UBC President Toope decides to remove UBC Farm from the VCP consultation process in order to reach a resolution and definition for UBC Farm sooner. Tentative plan to have UBC Board of Governors (BoG) vote on final plan for UBC Farm in February 2009.

While this research project addresses the academic programs at the Farm in the context of sustainability learning, it is impossible to completely separate these programs from the struggle to maintain the overall Farm. There is no question that the current struggle has affected programs at the Farm, eating away at human resources, and limiting the ability of the Farm to attract funders, instructors and researchers, as well as severely limiting any new infrastructure. The participants in this study have been affected by the struggle – some were motivated to study at the Farm through a desire to keep its programs afloat, others had their programs impacted by the lack of resources that has resulted from the Farm’s uncertain tenure. Finally, I must recognize that part of my own motivation for engaging in this study was to harness evidence to demonstrate the value of Farm programs in an interest to secure a future for the Farm. Thus I am a stakeholder in the UBC Farm, which of course shapes to a significant extent my perspective to conduct

this study. A brief discussion of this critical and constructivist approach to the study will be provided in Chapter 2: Methods.

1.4.3 Personal Journey

Important to the context of this study is my own history and relationship to the UBC Farm and the Faculty of Land and Food Systems. I initially developed an interest in urban agriculture and sustainable food systems while studying community development at Simon Fraser University in 1999/2000. My interest in local, sustainable community systems was escalated to a powerful passion when introduced to the issues inherent to the global industrial food system and the solutions suggested and demonstrated by theorists and practitioners in the fields of urban agriculture and local food economies (see below). I realized almost immediately that food, and how we can continue to sustainably feed ourselves into the foreseeable future were issues that excited me more than any other ever had. A post-graduation search of ways to get involved with agriculture and local, sustainable food systems soon led me to the UBC Farm, as a site that seeks to model and teach sustainable food systems within a 30-minute bike ride of urban Vancouver. I initially got involved at the Farm with the Cob Building Project, a volunteer-driven demonstration project, providing practical learning in a popular natural building technique that utilizes only local materials. I spent two summers coordinating this project, and found that, while I was coordinating and teaching others, I was also learning a great deal myself. My method for teaching new volunteers how to build with “cob” was to first ignite their passions (most of them were already ignited) by telling them about the value of natural building techniques as well as some of the innovative ways in which it was being used. Next, I would get them immediately involved by

providing a practical demonstration and allowing them to begin building with their own hands. Throughout building, we would discuss and reflect on the state of the world and the contributions being made through natural building, organic agriculture and other sustainable living arts. Without completely realizing it at the time, I was coordinating an experiential learning program! The experience of coordinating and teaching cob, coupled with prior life experience as a scuba-diving instructor, gave me an understanding and appreciation for experiential learning techniques. Since my two seasons coordinating the cob-building project, I have spent four years working as outreach and education coordinator of the Farm, coordinating volunteers and students seeking practical learning and experience in all the land-based programs the Farm has to offer. Throughout my experience at the Farm, my understanding of, and passion for developing local, sustainable food systems has increased substantially. So has my appreciation for the value of practical sustainability learning. My passion has always been to become practically involved in projects. When I think about what I can do to promote a change in our food systems, I think about practical projects I can get involved in, on the ground, working with others, with our hands in the dirt. My first thought is not how to theoretically prove or develop an argument for the value of sustainable food. What I was attracted to at the UBC Farm was the practical nature of the learning that occurs there. This led me to become excited about exploring the value of the Farm and it's programming to provide students with a lasting learning experience in sustainable food systems. My choice to engage in this research project evolved out of that passion for practical sustainability learning. My experience at the UBC Farm has indicated that many students who are inclined toward experiential learning are able to engage with Farm

programs at a level never achieved in a pure classroom setting. My desire to explore this hypothesis further led directly to this thesis.

1.4.4 Student Farms

The work that is taking place at UBC Farm is not happening in isolation. There are currently over 60 student-driven university/college farms in the United States (US) and Canada (Rodale Institute, 2008), and a handful of new and growing organizations providing support to maintain current farms and develop new ones (RFC, 2007; SAEA, 2007). Some of these student initiatives, like the Student Experimental Farm at the University of California at Davis, have been in operation for many years, even decades, and have developed great examples of innovative programming and academic integration (Parr & Van Horn, 2006). UC Davis is one of several North American universities that are developing academic programs focused on sustainable agriculture education with a student-driven farm as one of the focal points¹ (Biernbaum, Thorp, & Ngouajio, 2006; Borsari & Vidrine, 2005; Carey et al., 2006; Delate, 2006; Ferguson, Lamb, & Swisher, 2006; Markhart, 2006; Ngouajio et al., 2006; Schroeder, Creamer, Linker, Mueller, & Rzewnicki, 2006; Vedeld & Krogh, 2005).

¹ There is an excellent database of North American university/college farms called the “Farming for Credit Directory”, hosted by the Rodale Institute. It can be found at: http://www.rodaleinstitute.org/ffc_directory
A directory of education and training in sustainable agriculture in the U.S. is hosted by the Alternative Farming Systems Information Center, and can be searched at: <http://www.nal.usda.gov/afsic/pubs/edtr/EDTR2008.shtml>

1.4.5 Food Crisis

One of the global crises that have been omnipresent in the media throughout 2008 is what's being called the food crisis. There are food riots throughout the developing world as staple foods are becoming more and more scarce, and inflation of food prices has put basic necessities beyond the financial reach of the world's poorest people (Economist, 2008; Gillis, 2008). Reasons cited for this are that global grain yields are dropping while population is rising, production of biofuels is taking up land formerly used for food production, and a global increase in meat consumption is shifting some grain that was a staple food for the world's poor toward the meat industry to provide food for the world's rich (Gillis, 2008; GRAIN, 2008). In addition to all this, our current global food system is heavily influenced by neoliberal trade policy, leading away from local production and consumption, and toward a system of global food trade, guided by the logic of free-market specialization driven by competitive advantages. This has resulted in a situation where the world's peasant farmers are no longer food self-sufficient, have been displaced from their land base, and must rely completely on commodity production and the fluctuations of the global market for their survival (Halweil, 2002). It is worth noting that during the course of this global food crisis, the world's largest distributors and retailers of food are recording significant increases in their net profits (GRAIN, 2008).

Many people see the above-stated challenges of the global food system as being at the root of the current food crisis, and look to developing localized food systems as a more sustainable option for the future of food (Halweil, 2002; Kloppenburg, 1996; Kneen, 1989; Pollan, 2006). Current dominant food production practices are increasingly responsible for excessive soil depletion, dropping water tables, chemical contamination of food, water and soil,

declining biodiversity, species extinction, habitat loss, and the overuse of nonrenewable energy (Gliessman, 2000; Pretty, 2008; Soule & Piper, 1992). These production practices are based on a reductionist view of the land as a factory, in which the individual parts can be manipulated to achieve maximum production efficiency. From this standpoint, soil is not viewed as a living system, but as an inert medium in which to grow crops. The crops themselves are not viewed as living communities with relationships to their surrounding ecology, but as machine components that output the desired commodity: food. Under this system, a typical unit of food will be grown on a huge acreage in a single crop monoculture. A machine will be used to amend the soil with a petroleum-based chemical fertilizer that has been shown through scientific investigation to support higher yields from a specific crop in comparison to other management practices; these data are often tracked in isolation from measurement of other ecosystem health indicators, such as soil health or wildlife biodiversity. The field will often be irrigated with water that has been tapped from an aquifer. It will also be machine-sprayed with pesticides, herbicides and fungicides, which are often developed for the specific crop, without regard to their effects on other ecosystem components such as non-target plants, insects or birds. The final product will be harvested by machine, and the soil will be machine-tilled before the process starts all over again with the same crop plant. The harvested product will be processed, often repeatedly, and will travel an average of up to 4000 kilometers before being consumed by a citizen, who will more than likely have no idea where it came from, how it was produced, who produced it, or what impact it has had on the agroecosystem and the bioregion (Halweil, 2002; Kloppenburg, 1996; Kneen, 1989; Pretty, 2008; Soule & Piper, 1992).

The devastating effects of this “brute-force” system of agriculture are surfacing in all areas of food production (Rees, 2003). The relatively thin layer of topsoil, upon which

agricultural productivity depends, has been eroding at an alarming rate for several decades (Paulson, 2008; Pimentel et al., 1995; Soule, 1992). If you consider that in the U.S. it is estimated that soil is being eroded at least 10 times faster than it takes for it to be replaced naturally (Paulson, 2008), it is easy to see that this is not a sustainable loss.

Soil is not the only finite resource that is being over-exploited by agriculture. Although only one sixth of agricultural land is irrigated, that irrigation uses almost 75% of total annual water consumption by humans. In the U.S., much of the irrigation water comes from “water mining”, tapping into underground aquifers, which are a finite resource as they cannot be replenished as quickly as they were deposited, if they are replenished at all (Soule 1992). The trouble is not only that water is being overused for industrial agriculture, but also that water is being contaminated by runoff from the inorganic chemicals used in production. In 2005, the yearly amount of pesticides applied worldwide had reached 2.56 billion kilograms per year (Pretty 2008). These chemicals may be over-applied, or may have long breakdown periods, and some of the unused chemicals tend to leach into surrounding ecosystems. There are multiple examples of lakes and estuarine environments that have been impacted by nitrogen and phosphate runoff (Pimentel, Hepperly, Hanson, Douds, & Seidel, 2005; Pimentel & Pimentel, 2007) It is estimated that 30-80% of nitrogen applied to agricultural fields runs off to contaminate water systems and the atmosphere (Pretty, 2008). Add to this the approximately 67 million birds that are killed by pesticide exposure each year in the U.S. alone (Kimbrell, 2002). Finally, expansion of agricultural land, particularly monocultural cropping systems, encroaches on habitat, and these “fence-row-to-fence-row ploughing, planting and harvesting techniques” leave much less physical space and resources for wild species and ecosystems to thrive (Kimbrell, 2002: 61; Pretty, 2008).

1.4.6 A Crisis of Energy

Perhaps the most pressing concern with industrial agriculture is the massive amount of energy that goes into producing food. Out of necessity, pre-industrial societies relied only on human, animal and solar energy, and produced more kilocalories of food energy than was contributed to its production. Industrial agriculture, on the other hand, is a net energy sink when you take into account all of the energy that goes into mechanization, transportation and the production of chemical inputs. Studies have found that agriculture in developed countries will use approximately five kilocalories of energy for every one kilocalorie produced (Pimentel & Pimentel, 2007). Other studies have found that when you include transportation and storage, this ratio can jump to 10:1 (Kneen, 1989; Rees, 2003). As one study has demonstrated, a head of iceberg lettuce that travels from California to the east coast of Canada or the U.S. will use at least 36 times the energy it provides upon being eaten (Halweil, 2002). This tendency of industrial agriculture to use more energy than it produces becomes truly concerning when we examine the nature of the energy being appropriated. The five or ten-to-one ratio of input to output net energy characteristic of this system is made possible only through the availability of cheap fossil fuel energy. The continued availability of this cheap energy source is in question right now.

It has long been understood that oil was a finite resource, yet we now have a global food system that is completely reliant upon it. Global oil production *will* peak, and one forecasting scenario put the peak in 2007, after which production will decline and fossil fuels will become more expensive and harder to find (Duncan & Younquist, 1999). This peak will likely have a significant impact on the agricultural industry. Production of agri-chemicals, heavily mechanized farming and trans-global food transportation could rapidly become much more expensive. Recent studies have variously estimated that oil will peak between 2009 and 2031 (Kaufmann & Shiers,

2008), or around 2015 (Bryce, 2008). While there are studies that claim there will be no decline in oil production in the foreseeable future (CERA, 2006), most seem to predict a decline in production beginning in the next 25 years (Brown, 2006; Bryce 2008; Kauffman & Shiers, 2008; (Sprott & Solunac, 2008). Many of the recent studies call for more investment in alternative energy sources before declining energy stocks affect our social and economic systems, but Duncan & Younquist bring this strategy into question, stating that

...there is no alternative energy source or combination thereof now known that can completely replace oil in all its many and varied uses, particularly with regard to the concentration of such a large amount of energy in such a convenient, easy to handle form for use in mobile machines (cars, trucks, tractors, airplanes, etc.) (Duncan & Younquist, 1999: 230).

The above examples call into question the sustainability of our current dominant food system, and suggest the need to develop an alternative, sustainable food system. These examples also suggest that the alternative might require a new worldview, a new way of thinking about and approaching food production, in short, a new agricultural paradigm.

Achieving an orderly social, economic, and nonmilitary transition to the post-petroleum global paradigm beginning within the next decade, with its probable much changed personal lifestyles, and the far-reaching implications for both the agricultural and industrial economies, may be the largest and most critical challenge the world has ever faced. (Duncan & Younquist, 1999: 231)

1.4.7 Local Food System/Urban Agriculture

Strong arguments have been made supporting the promotion of a local, organic food system as a key component of a sustainable, post-petroleum society (Altieri, 1995; Gliessman, 2000; Halweil, 2002; Kloppenburg, 1996; Pimentel, Hepperly, Hanson, Douds, & Seidel, 2005; Pretty 2008). Many have suggested that such a food system

would be based on the models provided by agroecology (Altieri, 1995; Gliessman, 2000; Halweil, 2002; Kloppenburg, 1996)., defined as “applying ecological concepts and principles to the design and management of systems of food production” (Gliessman, 2000: 1). In stark contrast to the monoculture and reliance on toxic inputs of industrial agriculture, an agroecosystem seeks to mimic the diversity of a natural ecosystem and to promote the development of natural relationships and cycles, thereby limiting the need for external inputs (Altieri, 1995; Gliessman, 2000). Another important factor in moving toward a more sustainable food system is the concept of relocalization, moving toward local food economies. A useful conceptual tool in envisioning this relocalization is to see the local region and food system together as a “foodshed”:

Counterposed to the global food system in such analyses are self-reliant, locally or regionally based food systems comprised of diversified farms using sustainable practices to supply fresher, more nutritious foodstuffs to small-scale processors and consumers to whom producers are linked by the bonds of community as well as economy. The landscape is understood as part of that community and, as such, human activity is shaped to conform to knowledge and experience of what the natural characteristics of that place do or do not permit (Kloppenburg, 1996: 2).

Two fundamental principles of the foodshed are the ideas of secession and succession. These imply a strategy of creating an alternative to the dominant food system. Rather than incorporating into the dominant system, the alternative is used to “slowly hollow out” the dominant system, and incrementally shift from global food system to a regional foodshed (Kloppenburg, 1996).

Tied to the concept of the foodshed is the need to develop systems of urban agriculture. For the first time in the history of the human species, 2007 marked the point at which more than half of the global population lived in cities (Worldwatch, 2007). In British Columbia, there are three regions - the lower Fraser Valley, the Capital Region

on southern Vancouver Island and the Okanagan Valley – that are the main urban areas, and are home to 80% of the population of the province. These same three areas that house 80% of the population are also home to the agricultural lands that produce 80% of the food grown in the province (Smart Growth BC, 2004). A sustainable food system requires that we are able to produce food both in and near our urban areas (Brown, 2006; Mougeot, 2006; van Veenhuizen, 2006). In Hanoi, urban farmers produce 80% of the vegetables, 50% of the poultry and pork, and 40% of the eggs consumed in the city on farms that are either in, or just outside of the city itself (Brown, 2006). In Dar es Salaam, there are more than 650 hectares of agricultural land within city limits, producing food for the city's population and livelihood for 4,000 urban farmers (Mougeot, 2006). Here in Vancouver, 44 percent of city residents produce some of their own food (Brown, 2006). The global population is projected to rise to between eight and ten billion by the year 2050 (Brown, 2006). By 2030, there could be more than 5 billion people living in urban areas (Pretty, 2008). Understanding that in the next few decades there may be limited oil for transportation and large scale agriculture, the innovation of urban food production may be one of the more viable ways to produce enough food to feed future populations (Brown, 2006; Mougeot, 2006; van Veenhuizen, 2006).

The Centre for Sustainable Food Systems at UBC Farm seeks to provide a model sustainable food system for the purposes of teaching, research and community outreach. Developing, modeling and teaching innovative practices in urban agriculture, foodshed development and agroecological systems are among its primary objectives (UBC Farm, 2001), making it an ideal microcosm within which to position this study.

1.4.8 Sustainable Agriculture Education

The terrain of investigation for this thesis is rooted in the body of educational theory and practice referred to as sustainable agriculture education (SAE). While the term agriculture education seems at first glance to be focused on the teaching the relatively narrow field of primary food production, SAE is also inclusive of the much wider food system learning that happens at the Farm such as marketing, nutrition, health, botany, and environmental education to name a few (Parr, 2007a, 2007b, 2007c).

The theoretical basis for SAE lies in the collection of theories that are commonly referred to as experiential and transformative learning (Parr, 2007b). Both of these well-discussed educational areas are rooted in the theories that make up social constructivism (Kolb, 1984; Mezirow, 1991, 2000). The school of constructivism posits that all meaning is subjective; it is created and revised within the minds of each individual based on his or her experiences, prior knowledge and social surroundings (Fosnot, 2005; Pass, 2004). The process involves people creating mental models with which to understand the world. Learning involves continuously creating, revising and updating mental models to create a picture of the world around them. While explaining meaning creation as an individual process, social constructivism also argues that learning requires social interaction based on a shared language (Parr, 2007b; Vygotsky, 1978). An important constructivist theory argues that learning happens in “zones of proximal development”, or social learning settings, where learners will update a familiar area of knowledge based on interaction with someone who has similar, but somewhat more advanced knowledge in the area (Parr, 2007b; Vygotsky, 1978).

Experiential learning (EL) is based on this concept of constructivist meaning-

making. It is an approach to education that includes, but is not limited to a practical or hands-on component. These terms are often used interchangeably in the EL literature, but for the purposes of this thesis I will use the term **practical**, as it can refer to involvement of any aspect of the body, or psycho-motor system, not only the hands. EL generally involves a combination of theoretical and practical learning components, to provide a holistic learning experience. Proponents of EL suggest that simply gaining a theoretical understanding of a subject is not enough to completely *learn* it, that practical engagement with the subject is also necessary. Similarly, EL theory suggests that a practical experience, simply *doing* something is not enough to fully learn a subject, the practical must be combined with an understanding of the theoretical context of the subject, why it matters in a personal, local, regional and/or global context (Weil & McGill, 1989; Kolb, 1984). This combination of theory and practice is one of the cornerstones of SAE as it is with all sustainability learning. It is not enough, however, to describe sustainable agriculture education as experiential learning, as it includes much more, most notably the principles of transformative learning.

Theories of transformative learning (TL), suggest that all learning is a process of making meaning. As adult learners we already have a full set of “meaning perspectives” or worldviews that make up our beliefs and assumptions and how we see the world. The goal of TL is perspective transformation through critical analysis and revision of our meaning perspectives. (Cranton, 1994; Mezirow, 1991). One model - Transformative Sustainability Learning (TSL), describes this process of transformative learning as engaging the learner through three “domains” of learning. According to TSL, a transformative learning experience will engage the learner’s higher brain process, or

“head”, their physical body, or “hands”, and their values and beliefs, or “heart”. A learning experience that effectively engages the learner’s *head, hands* and *heart* is one that can lead to permanent shift in the learner’s meaning perspectives and result in life-long learning (Sipos, Battisti, & Grimm, 2008).

The Centre for Sustainable Food Systems at UBC Farm seeks to provide opportunities for sustainability learning, with a particular focus on the model of sustainable agriculture education. The UBC Farm does this to address the crises facing all of us on the planet, primarily the food crisis and climate change. It does this in recognition of the limited effectiveness of conventional learning models at our colleges and universities in addressing these crises. Learning programs at the Farm reflect an understanding of the need to transform education so that our educational institutions are teaching and embodying the values of a sustainable society. As such, programs at the UBC Farm attempt to engage learners’ *heads, hands* and *hearts* to provide transformative and life-long learning in sustainable lifestyle and culture. The primary goal of this research thesis is to assess the effectiveness of the programs at Farm in providing sustainability learning. It proposes to do so primarily by studying the responses of student participants in the Farm’s academic programs and comparing them to the models of sustainable agriculture education and transformative sustainability learning.

Chapter 2: **METHODS**

2.1 Research Paradigm

This research has followed a constructivist paradigm. Central to this paradigm is the idea that all meaning is subjective; it is created and revised within the minds of each individual based on his or her experiences, prior knowledge and social surroundings (Fosnot, 2005; Pass, 2004). Following Ernest Stringer, this research has been conducted based on the assumption that social reality is "...an unstable and dynamic construction that is fabricated, maintained, and modified by people during their interaction with each other and their environment." (Stringer, 1999: 192). In this paradigm, the researcher chooses not to remain completely objective and the interaction between researcher and participants is viewed as positive and unavoidable. As such, my own values and beliefs have influenced how I have approached this research process and my interaction with the participants. I chose to work alongside participants in their UBC Farm academic programs, and during data collection, I chose to help them to express their stories in their own words, based on an understanding that "[h]umans are, to a large extent, what they define themselves to be in any given situation." (Stringer, 1999: 192).

2.2 Methodology

Previous research involving student farms and sustainable agriculture education has focused on describing existing programming (Clark, 2006; Thompson, 2008), and on eliciting opinions and feedback from academics (Parr, Trexler, Khanna, & Battisti, 2007)

and agricultural practitioners (Trexler, Parr, & Khanna, 2006). Very little work has been done to date attempting to describe the opinions and evaluative feedback of student participants in student farm academic programs. Studies that have been conducted with students have been quantitative in nature and have focused on assessing the *amount* that students have learned (Borsari & Vidrine, 2005). A previous study of UBC Farm programs employed an assessment model to evaluate programs but did not produce data based on responses of student participants (Sipos, 2005; Sipos, Battisti, & Grimm, 2008).

The present study has focused on student responses and employed qualitative methods in interviews and open-ended survey questions. One of the goals was to allow students to describe in their own words the value of UBC Farm programs and suggestions for how they could be improved to enhance student learning at UBC Farm. I wanted to know how students would rate the value of the academic programs at the Farm, and what suggestions they would make, and I didn't want to restrict their answers to my preconceived ideas on the subject. The qualitative methods were useful, because they allowed unanticipated values and suggestions to arise. In asking "what were the most rewarding aspects of your UBC Farm program experience?" the range of possible answers is not limited to a list of selections, and participants are able to guide their responses to a great extent. The primary goal of this study was to answer the question:

What, if any, services and advantages do academic programs at the Centre for Sustainable Food Systems at UBC Farm (CSFS), provide toward advancing sustainability learning at UBC, and how can these programs be enhanced and improved, according to participants in such programs?

2.2.1 Sample

In deciding on a sample for this study I made several conscious and purposive decisions. I chose the UBC Farm as a case study because I had significant experience with the programs there, because it was local and convenient, and because I was passionate about the place and the work that is done there. I next established guidelines for the type of program I wanted to include in the study. I was interested in programs that included the following characteristics:

- were geared toward and included UBC students (additional inclusion of non-UBC adult learners was considered acceptable)
- were structured around a primary goal of providing a learning experience for adults (including, but not limited to, for-credit UBC courses and programs)
- practical learning activities were focused around the integrated teaching fields at the UBC Farm.

Using my own experience at UBC Farm, and with the help of Program Coordinator Mark Bomford, I selected the following four programs that adhered to the above characteristics:

1. Course Tours: UBC credit courses that come to the UBC Farm for a 1 - 3 hour guided tour of the site, its programs and their implications for local and global issues. Typically involves an entire class, from 25 to 200 students.
2. Community Service Learning (CSL): students from UBC credit courses that engage in a structured, multi-day, practical project as a service to the

UBC Farm, and as a required assignment for the completion of the course.

CSL projects require both action and reflection as a structured part of the program.

3. Student Directed Learning (SDL): student directed learning projects that focus on an aspect of the UBC Farm. Both undergrad and graduate, always involve a faculty supervisor, typically involve research, typically (but not necessarily) for credit.
4. Rooted: The Rooted at the Farm Volunteer Internship Program. An informal internship held at the Farm from May to October in 2006 and 2007. Involved dedicated volunteer hours at the UBC Farm, speakers and presentations on topics relevant to Agroecology, and some reflection assignments. Not exclusive to UBC students, though majority of participants were.

It was decided that these four programs covered the breadth of current academic programming at the Farm and that acquiring a data sample from each would provide a good representation of student academic learning at the Farm. All of the sampling employed purposive and convenience samples (Robson, 1993). It was purposive in the sense that I chose the four program areas from which to select participants, based on my knowledge and judgment. It was convenient in the sense that the study period fell between May and October of 2007, being the period that is richest in both Farm production and teaching activities, and I selected participants from programs that were happening at that time, or in the case of directed study students, participants who were

available during that time. Sample methods from each specific program area are presented below.

Course Tours

The UBC Farm provides 10 – 15 of these course tours per year. There were three that took place during the study period: Agricultural Sciences 250, Education Studies 314, and Education Studies 428. Tour participation was as follows: 180 students for AGSC 250, 28 students for EDST 314, and 26 students for EDST 428. Surveys were available for all students in each tour.

Community Service Learning

There are 2-5 courses per year that participate in community service learning (CSL) at the UBC Farm. Many of these are coordinated through the UBC Community Learning Initiative (UBC Learning Exchange, 2008). During the study period, there was one CSL project at the Farm with students from the Food Nutrition and Health (FNH) 250 class. Three students participated in the project, which ran for three weeks in June 2007. All three participants were interviewed for this study.

CSL projects at the Farm have involved courses from a number of different faculties and programs. In my experience, the majority of students that participate are either new to the Farm or have very limited prior experience with Farm programs. This was also true of the three FNH participants. All were 2nd year students who had never been to the Farm before the project. Although FNH is a program in the LFS faculty, there has been little academic connection between this program and the Farm (Bomford, 2007a).

Directed Studies

Many of the new projects and enterprises that have developed at the UBC Farm since 2001 have been the work of student directed studies. It is student directed studies that have laid the foundation for the Farm becoming the living laboratory that it is today. This is the most diverse and most difficult to define program area in this study. There were only two active directed studies during the period of study. Because of this, and because there have been directed studies over the past 5 years that have made very important contributions to sustainability learning at the Farm, I chose a sample that included every student who has completed a directed study at the Farm since 2001 for whom there is still current contact information at the Farm. This resulted in a possible sample of 13 students. Seven of these were available and agreed to an interview. Of the seven, four had completed an undergraduate directed study at the Farm for credit, one had completed part of her PhD research at the Farm, and two had participated in post-graduate non-credit research. All were students from the LFS Faculty. All but one were either current students or graduates of either the Agroecology or Global Resource Systems (GRS) programs. The seven directed study participants were all supporters of the UBC Farm and were experienced with Farm programs before they participated in their directed studies. They are not representative of a typical UBC student. They are, however, representative of the type of students who have engaged in directed studies at the Farm. Directed studies are an important academic program at the Farm, and the seven datasets retrieved in this sample represent insight into this sector of UBC Farm learning experiences.

Rooted

The “Rooted at the Farm” volunteer internship program was begun in 2006 to provide an opportunity for student volunteers to engage in more committed learning at the Farm. It was seen as a pilot for the more formalized Sowing Seeds Apprenticeship (see Chapter 4: Discussion). The participants in this study were part of the second year of the program. This program had no formal relationship with academic curriculum at UBC, and did not result in any university credits for the participants. I chose to include this program in the study because it fit the criteria, and because it was intended to be a pilot for the Sowing Seeds Apprenticeship, which, in turn was planned to be integrated with a formal Agroecology Practicum (Bomford, 2007a). The Rooted program had 11 participants in 2007. I requested an interview from all of them, and six were willing and able to complete an interview during the study period. Of the six, five were current UBC students and one was a college diploma graduate. Of the five UBC students, one was from the Global Resource Systems program, two were from Arts, one was from Economics, and one was a Physics graduate student.

2.3 Data Collection

Data was collected from May through October, 2007. At the time I was living and working at UBC Farm, and was engaged with UBC Farm academic programs and with most of the study participants on a regular basis.

2.3.1 Observation

During and prior to the data collection period I was engaged with UBC Farm academic programs and with many of the participants. I have significant personal experience with and knowledge of the UBC Farm academic programs and of students' experiences with these programs. I was able to use this knowledge and experience to better understand and interpret the data (see Chapter 4: Discussion).

2.3.2 Surveys

The first of the four academic programs included in the study, course tours, represented a large sample size. There were too many to interview in the scope of this study, so I developed a short survey to elicit responses from these students. The survey consisted of three closed-ended Likert-scale rating responses, and two open-ended questions with space for the respondent to write a few sentences (Appendix A).

For the AGSC 250 class (Land, Food and Community I – a required course for all students in the Faculty of Land and Food Systems (LFS)), 180 surveys were provided to the teaching assistants in accordance with the approximately 180 students who attended the tour. The TAs requested that the students complete the surveys during their next scheduled class time. 90 (50%) of the surveys were completed and returned to me.

Between the EDST 314 and EDST 428 classes, there were 54 students – twenty-eight in 314 and twenty-six in 428, and the tours were completed in the same week. The course lecturer requested that students in both classes complete the surveys, and returned

them to me as one bunch for the two classes. A total of 43 (80%) were completed and returned.

2.3.3 Interviews

Interviews form the bulk of my data. I interviewed 16 participants in total: three Community Service Learning participants, seven directed study participants, and six Rooted participants. Guest found that, in this type of research, 6 to 12 interviews achieved “data saturation” that was generally “...sufficient to enable development of meaningful themes and useful interpretations.” (Guest, 2006: 78). I reviewed the data after each interview and after 10 interviews I began to see that there were relevant themes emerging (Weinstein, 2005). Because this study was looking at the UBC Farm as a case study and because the research question was directed toward exploring *in general* the value of UBC Farm academic programs and ways that they could be improved, the inclusion of participants from different programs didn’t hinder the data interpretation. There were some interesting differences in specific responses, noted in the results and discussion chapters, but the major themes that emerged were relevant to all programs and to the UBC Farm as a case study.

Interviews lasted between 40 minutes and 2 hours. Fifteen of the interviews were electronically recorded; one was recorded with written notes, as the participant requested that they not be electronically recorded. All interviews followed the semi-structured interview guide (Appendix B), but the interviews were conducted in a conversational style, with plenty of opportunity for the participants to contribute their own stories, opinions and feelings (Robson, 1993; Rubin & Rubin, 2005).

Interview data may be limited, as participants are less likely to report on anything that will reflect poorly on themselves or something they care about (Rubin & Rubin, 2005). I tried to mitigate this issue in regards to the Farm by telling participants at the beginning of the interview that the study was looking for truthful and critical information, and that it was in the best interest of themselves and the Farm that they be as open and honest as possible (Appendix B). It is important to acknowledge, however, that my role at the Farm, my relationship to some of the participants, and the participants differing relationships to the Farm and its programs may have influenced some of the answers.

2.3.4 Rating Scale Survey

Near the end of the interview, participants were asked to fill out a rating scale survey. This survey consisted of 11 Likert-scale rating questions, asking participants to rate UBC Farm academic programs in terms of different elements that are recognized as important to sustainability learning (Appendix C). This survey was purposely held back to the end of the interview to allow participants to answer in their own words first. The rating scale was provided at the end mostly as a way to bring out any ideas that may have been missed earlier in the conversation.

2.4 Consent

The consent process began when I initially contacted each of the potential interview participants. Initial contact for interview participants was conducted over email, and each email contained a greeting, a short description of the study and request for participation; attached to the initial contact email was a longer description of the study (Appendix D), and an informed consent form (Appendix E). If the participant consented to the

interview, a time and place that worked for the participant was chosen. At the beginning of each interview, participants were presented with a hard copy of the study description and consent form, and asked to sign the consent form if they still consented to an interview. The participants were informed that they could end the interview at any time, and refuse consent at any time. If the participant consented to electronic recording the audio recorder was switched on, and the interview began. Consent was also sought throughout the data analysis process. All participants received copies of their interview transcripts, with a request that they review it and renew their consent to use the script as data in the study. This will be discussed further in the section on validity.

2.5 Data Analysis

Preliminary data analysis was ongoing throughout the data collection process. After each interview I spent some time reviewing my notes, and I periodically listened to recordings of early interviews to help in preparation of a new interview. As a result, I began to see patterns emerging in the data, and took note of some emerging themes in my field journal throughout the study period.

Data analysis began in earnest after all the data was collected. I personally transcribed all 16 interviews. For the one interview that was not electronically recorded I took notes by hand. This interview I transcribed immediately following my meeting with the student, so as not to forget any important details. I transcribed four other interviews during the data collection process, but most were transcribed in the weeks following the last interview. Before transcribing I would review my notes from the interview to get myself back in the mind frame of the interview and take note of any behavioral

characteristics of the participant during the interview. I kept notes throughout the transcription process, keeping track of themes that emerged. After the last transcription, I wrote a short paper on what I knew about students' perception of the value of UBC Farm academic programs and how they can be enhanced. This paper provided a foundation for the analysis process and made the identification of relevant themes and meta-themes in a large amount of data much easier.

2.5.1 Coding

The next step was to conduct a comparative analysis of the interview data – coding the repeating ideas in the data in order to establish themes with which to provide an interpretation of the data (Rubin & Rubin, 2005). I conducted the analysis based on the models presented by O'Connor and Gibson (O'Connor & Gibson, 2003) and Weinstein (Weinstein, 2005). I used the TAMS Analyzer (TA), developed by Matthew Weinstein (Weinstein, 2005) to aid in this process, allowing me to turn over 180 pages of transcribed interview into a clear collection of themes that answer the research question (see Tables 3, 4, 5). The step-by-step process of this coding and analyzing is presented below:

1. Identifying the context: with the research question posted on the wall over my computer, I re-read my notes from data collection and transcribing and the short paper I wrote at the end of the transcription process. I used this information to establish the initial themes I had identified in the research and recorded these as “codes” in the TA. I next read through each transcript and applied the thematic codes to any passage of text to which they were relevant. At the same time I was

vigilant for any “repeating ideas” that addressed the research question and had not yet been assigned a thematic code. I recorded these as themes as I went along.

2. Identifying all the themes: Every time I identified a repeating theme that was not yet recorded as a code, I would create the code, mark the passage, and then go through each transcript to see where else the code applied, and mark it in each. I repeated this process until there were no more new codes.

3. Identifying all the sub-themes: Once all the themes were recorded and marked as codes, I went through and identified sub-themes, and sub-themes of sub-themes. The TA allows you to apply as many sub-themes as are needed while still keeping the themes organized in families. This means the researcher can at any time view and analyze the data for the larger theme, or from any of the sub themes. For example, I had used the code “Hands” to identify all passages where participants mentioned the value of practical learning opportunities. But there were many specific reasons and situations through which this theme appeared, so to provide more depth and clarity I went through and applied sub-theme codes such as “real world” and “responsibility”. All of these could still be searched and analyzed under the Hands theme, or under any of the sub-themes, providing considerable flexibility to the analysis.

4. Identifying overarching meta-themes: The final stage in this coding process involved organizing all the themes and sub-themes into meta-themes to create a theoretical framework to present the data in an accessible way that addresses the research questions (see Results). This was accomplished by exporting all the data in theme groupings to Excel workbooks and reading and re-reading each with the

research question in mind.

2.5.2 Survey Data

In analyzing the data from the survey, I began by entering the responses from the first three (Likert-scale) questions into Excel and solved for the mean and standard deviation of each response for each course grouping. To analyze the responses to the two open ended questions, I used the TAMS analyzer in a similar but simplified process to the analysis of the interview data. In this case I began with simply reading through and applying themes to the repeating ideas that supported the research questions. After this was done I re-read the data with the coded themes several times to ensure all relevant passages were coded and that the initial coding and selection of themes was accurate and relevant.

2.6 Validity and Reliability

In order to ensure the validity of the results of this study, I needed to ensure that my interpretation of the data was justified. Following from O'Connor and Gibson (O'Connor & Gibson, 2003), I concentrated on three areas to ensure the results were valid.

First, I employed two *triangulation* techniques in my study. By relying on data from four distinct groups (and three in the same interview process) to address the same research question, I am able to support the validity of the results by demonstrating that the results did not simply emerge from the specific social realities of one group. Most of the themes were corroborated across the different groups (see Results), thereby validating those results. In cases where there were differences in responses between groups, the

implications of this are explored and discussed (see Discussion). I also employed two different methods of data collection – surveys and interviews – to address the same research question. While there was certainly a difference in scope between my use of these two methods, the flavour of the questions was the same and some corroboration is evident in the data from each method (see Results).

Second, I ensured that the research methods were *transparent*. By following the research process and methodology described above I have ensured that my research methods have remained transparent and replicable. I have clearly outlined the steps taken to arrive at my results in the above description of methods. The organization of meta-themes, themes, and sub-themes provides a clear map of how my theory of sustainable agriculture education remains grounded in the data.

Third, throughout the research process I obtained *feedback from the participants*. I sent each interview participant a transcript of their interview, asking them to read it over and inform me if they felt it still represented their views. I further informed them that no response would mean that they continued to consent to the use of their views as presented. Fifteen of the sixteen participants replied stating that their views were valid as presented, one did not reply.

Chapter 3: RESULTS

The dominant paradigm in education is focused on thinking and memorizing, at the expense of doing, experiencing, creating and mastering. It emphasizes intellect over skill, autonomy, creativity or passion (Orr, 2004).

The model of Transformative Sustainability Learning (TSL) challenges this paradigm, arguing that in order for learning to be effectively remembered and incorporated as life-long learning, the learning process must incorporate not only the abstract/theoretical domain, but also the psychomotor and the affective learning domains. To simplify, a transformative learning experience must include and balance elements of all three areas: *head*, *hands* and *heart* (Sipos, Battisti, & Grimm, 2008).

In the Results section I highlight the important ideas expressed by participants in UBC Farm education programs in terms of the value of UBC Farm programs in delivering sustainability learning, and ways that sustainability learning can be enhanced and improved in these programs. TSL and the pedagogical models on which it is based are relevant to this thesis, providing a framework through which to better understand and describe the assessments provided by the participants. This model also helps to illustrate why sites such as the UBC Farm are valuable for promoting and expanding sustainability learning. This thesis asserts that by providing a place where students can apply their learning in practice, and engage with passion and emotion, the UBC Farm and similar centres for learning provide an opportunity to advance sustainability learning in a way that classroom learning alone is limited. In addition the TSL model is excellent in helping to identify and describe areas for improvement in the delivery of sustainability

learning, the second of the main goals for this thesis. These findings are relevant to anyone seeking to promote, deliver or study sustainability education, or any related pedagogy.

The Results chapter is organized into two sections, the first addressing the findings from the survey portion of the research, and the second describing the findings from the interviews.

3.1 Surveys

Surveys were disseminated at the end of class tours of the UBC Farm. These tours involved a 2-3 hour walking demonstration, introducing students to various different programs, activities, and learning possibilities at the Farm. There were no activities or projects involved; students were simply given extended introductions to the various programs *in situ*. Total respondents numbered 133 students from 3 classes.

The first three questions on the survey asked the students to rate elements of the experience from 1 to 5, with 1 meaning poor, and 5 meaning excellent. The average value of the 133 responses is presented below in Table 2.

Table 2: Median value for student survey responses

Rating Question	Average Value
Overall learning experience	4
Learning new ideas/concepts	3.96
Thinking about life/career/education goals in new ways	3.6

An average of 4 out of 5 over 133 responses is very high. It is clear that in terms of the overall learning experience and learning new ideas and concepts, students found their UBC Farm tour to be a very valuable experience. A 3.6 out of 5 in thinking about life/career/education goals in new ways also suggests that for the majority of these students their UBC Farm tour was a transformative learning experience.

Without suggesting specific ways that the UBC Farm contributes to sustainability learning, these findings demonstrate that what the UBC Farm has to offer is valuable to students in their learning experience.

The final two survey questions asked for an open ended written response. The first of these asked students to describe the best or most rewarding aspect of the tour. Over 60% of the students stated that just learning more about the Farm or about its different programs and opportunities was the most rewarding aspect. This supports the idea that the UBC Farm is seen as a valuable resource as students find it rewarding to know more about it and the opportunities available to them at the Farm.

The last question asked students to describe what was missing from the experience and how it could be improved. The relevant finding from the responses to this question was that 36% of the students suggested that having more practical, hands-on activities would improve the experience. That over a third of students would suggest having a hands-learning experience without being asked about practical learning opportunities suggests that having a practical component to their education is something that many students value. This idea was explored in more depth in the interviews.

3.2 Interviews

Interview data is presented in three sections, following the three meta-themes that emerged through interview data analysis. Data relevant to the meta-themes is presented first in the form of a table. The first section explores the perceived value of UBC Farm academic programs in providing a practical component to sustainability learning at UBC (Table 3). The second section explores the perceived value of affective learning components to sustainability learning (Table 4). The third outlines student suggestions to improve UBC Farm academic programs in terms of their potential to deliver sustainability learning programs (Table 5). Following the tables is a detailed description of the findings. The tables provide an outline of each of the themes, meta-themes and sub-themes that emerged in the interviews. Beside each theme a percentage is provided for the number of participants that expressed ideas under this theme. A percentage is provided for the total participants, as well as for the percentage of participants in each of the separate groups that were interviewed (see Chapter 2: Methods for a description of the groups). In the description section, specific quotes from participants are used to illustrate each theme. These quotes are a sample of the responses that were included in each theme, but not all responses are presented.

3.2.1 UBC FARM PROVIDES AN IMPORTANT PRACTICAL COMPONENT FOR SUSTAINABILITY LEARNING

Table 3: Interview data for practical learning components

I. UBC FARM PROVIDES AN IMPORTANT PRACTICAL COMPONENT FOR SUSTAINABILITY LEARNING	
<i>A. University needs more opportunities for the practical application of knowledge</i>	T: 87.5%
1. Practical learning is an important component of education	R: 100%
2. Understanding complex systems requires direct practical experience	CSL: 67%
3. Learners require the opportunity to apply and critically assess their knowledge	DS: 86%
<i>B. I engaged in the project because I wanted practical experience</i>	T: 75%
4. I wanted an opportunity to apply the knowledge I was learning in class	R: 83%
5. I wanted to gain experience or skill in a certain area	CSL: 67%
6. I wanted to engage in practical research to see how I liked the experience	DS: 71.5%
<i>C. The practical learning component was very valuable to my education</i>	T: 94%
7. It was valuable to do practical work in a real world setting	R: 83%
8. I gained critical thinking and problem solving skills	CSL: 100%
9. I gained tangible skills and knowledge that I will retain better than theory alone	DS: 100%
10. I gained skills and knowledge that will be beneficial to my life and career	
11. The project produced tangible results that can be applied and be a benefit to the community	
<i>D. I gained a sense of confidence and ownership</i>	T: 81%
12. By having ownership over my own learning, I was able to learn more and retain information better	R: 67%
13. I have gained an increased sense of confidence, and better decision-making skills	CSL: 67%
14. I value the sense of accomplishment and pride that came from facing a challenge and overcoming it.	DS: 100%
<i>E. I learn best through practical experience</i>	T: 50%
15. I am a tactile learner, the Farm provides a forum for people who learn like me	R: 50%
16. I'm a hands-on learner. If I do something, especially if I do it wrong, then I will never forget	CSL: 33%
	DS: 57%

Legend: T = total (all participants n = 16), R = rooted (n = 6), CSL = Service Learning students (n = 3), DS = directed study students (n = 7)

A. University needs more opportunities for the practical application of knowledge

One of the common themes in interviewing participants in UBC Farm education programs was that participants felt that there was a need for more opportunity for

practical application of learning at the university (Table 3, IA). The majority of participants in UBC Farm academic programs are from the faculty of Land and Food Systems, so many comments focused specifically on the need for practical application in learning agriculture. However, there was an almost universal sentiment that the university is lacking in opportunities to apply learning, and that such opportunities are an important component of their education. In citing the importance of practical learning opportunities, participants focused on two points; the need to actually interact with complex natural systems in order to gain a significant understanding of them, and the value of being able to apply and critically assess knowledge in practice, in a “real world” context.

Participants in UBC Farm education programs expressed a strong feeling that there aren't enough opportunities for students to get practical experience at UBC. Rosy, a graduate of UBC's Agroecology Program, expresses this in describing her reaction upon first coming to the Faculty of Agricultural Sciences. “When I got here there [were] not a lot of practical parts of my [upcoming] education. [...] Labs were few and far between, and I guess being in agriculture I sort of expected to learn about plants.” This feeling that practical opportunities are missing is coupled not only with an expression that these opportunities are important, but also a sentiment that opportunities like this should be available to students at university. Tegan, a 4th year student in the Global Resource Systems program and graduate of the UBC Farm's Rooted program, expressed this sentiment in her interview:

Well, I don't really think that you can have a degree in agricultural sciences if you have not been to a farm. You can tell people how to plant a seed or harvest something, but you can't really know until you do it. It's like a math problem, looks easy enough, but you can't actually know until you go to do it.

Some of the participants saw this lack of practical application as a reason to criticize the quality of the education they received, as Greg does: “I feel that’s probably the biggest weakness of the education, I don’t know if [it’s true in] every Faculty, but I would think that [in a Faculty] like Land and Food Systems there needs to be a more practical component to it.” The responses under this theme indicate that for most participants in UBC Farm academic programs, having an opportunity for a practical application of learning is very important to how they perceive the value of their education.

Participants expressed two main reasons for the importance of practical learning opportunities. The first of these involves working with and understanding complex systems. Participants expressed the fact that complex systems, like natural systems, are impossible to fully understand by reading a textbook or listening to a lecture alone, and really require some direct experience, which requires getting out of the classroom, in order to begin to fully understand them. Amanda expresses that with this statement: “I think any faculty that’s based on a natural system has to have a component that’s outside, and a concrete building is not a natural system, it’s not like you’re standing in your system where you can see it and appreciate it.” Amanda then goes on to explain this statement citing the complexity of natural systems and the need to have direct experience, “until you’ve actually seen it in the field, I don’t know if you really appreciate the connections, and how amazing it is, and also how it’s a lot trickier to design a system for that to work around...”

The other main reason that participants cited for the value of practical learning was to have a chance to apply their learning and critically assess it for themselves. This increased their learning by allowing them to take some responsibility for learning

themselves, and it also produced unanticipated learning as some students found that when they applied learning from their classes, that it changed their understanding of what they had learned. Greg explained this through his experience:

It allowed me to apply a lot of what I had learned and be able to critically assess what I was learning in class. Some of it worked great, some of it didn't work at all, and some of it worked mediocre, and I was able to look at that and say: but what if I try this, this, and this? So it really allowed me to take that knowledge and run with it, and even go beyond.

B. I engaged in the project because I wanted practical experience

Along with the perceived lack of practical learning opportunities at UBC, participants expressed a desire to engage in such activities, and many participants cited this as the reason they chose to engage in a project or program at UBC Farm (Table 3, IB). Specifically, participants stated three main reasons that they wanted to engage in a project at UBC Farm; they wanted an opportunity to apply the knowledge they were learning in class, or they wanted to gain experience or skill in a certain area, or they wanted to engage in practical research to see how they liked the experience. They saw the UBC Farm as an opportunity to get this experience and wanted to make use of it while they could.

One participant, a student who researched, planted and maintained several crops of winter cereals at the Farm as a directed study, described her desire to initiate the project as a matter of personal interest in gaining experience: "I wanted to try to grow out a bunch of cereals, just because that was my own interest, and so that just sort of came out of my own desire to do something hands-on while I was still here and still had the resources available to me." She felt that she needed to initiate the project, because as she says "I didn't think that I would have the opportunity unless I did it myself, because I

didn't think I was going to find a class that would offer that". Many of the participants, like this one, were less focused on a specific learning outcome, but more interested in gaining some experience with a practical project. For some of the participants, it was a focus on their future careers or plans for post-graduate work. For others, it was a focus on experimenting with different techniques or crops or learning methods to gain experience and get a sense of whether they enjoyed them. Amanda describes this in telling of her desire to initiate a research project at the Farm, "I wanted a project to do pest management, which is what I got. And I was also thinking about doing a Master's project and I wasn't sure if I really liked, well I hadn't ever really done any research, so I wanted to try that out."

Finally, many participants explained that their desire to engage in a project or program at the Farm emerged from a desire to practically apply the knowledge that they were learning in class. One student who chose to participate in a Community Service Learning project with a group in her FNH 250 class describes this in stating why she wanted to join the project: "We learn in class all day, but don't know how applicable it is. This was an opportunity to try to [find out how applicable our learning is]." Participants expressed that they wanted to apply their learning both to critically assess it and see if it was applicable, as well as to test it themselves so that they could see it in action in order to better remember it and be able to apply it in the future.

C. The practical learning was very valuable to me

I just like the fact that the Farm is there, I just like going out there, I mean that is so rewarding, to actually do something, instead of just talk about it, that's the most rewarding thing for me...action – *SDL student*.

The students in UBC Farm academic programs expressed overwhelmingly the value of the practical learning component that they received through engaging in a project at the UBC Farm (Table 3, IC). As seen above, many expressed that the availability of this sort of learning is limited at the university and so particularly valued the opportunity to receive this kind of experience at the UBC Farm. Students perceive an important distinction between the theoretical learning that is typical of a university class, and the “real world” application that is available through practical programs like those offered at the Farm. Greg, a Land and Food Systems graduate who completed two directed studies at the Farm as well as working there as production coordinator, expresses this sentiment:

I mean, when you read a book, you can try to read between the lines and be critical, but unless you've got a body of knowledge in that, it's hard to be critical of something that you're reading out of a textbook, we tend to take it at face value. When you're doing something in real life terms, all sorts of other things pop up, different variables and factors, and that's what real life is. And I've read many times that businesses complain that people are coming out of university and they're totally unprepared for the real world, and I think the UBC Farm is a fantastic solution to that.

One of the values expressed about this real life application of knowledge is that it forces the student to acknowledge and address issues as they arise. Students have stated that this is an unparalleled learning opportunity as it provides them with experience in critical thinking and problem solving complex issues as they occur in a real life context, as in this quote: “I think there was a lot that I learned there that was just, how to organize and run a

project, logistically [...] in the real world.” It is felt that problem solving skills for complex, unpredicted issues are difficult to simulate, making the opportunity to learn a subject (particularly one as multidisciplinary as agriculture) by practice in a real world context an important part of learning, as expressed by Amanda: “I think the main lesson was that things don’t go as you think they would go, and you have to be flexible with the way that you’ve designed your project, and you have to be able to adjust it and change things completely if something’s not working.” This opportunity to experiment and learn in a practical context is viewed as particularly valuable when it comes to knowledge retention and career training. Many of the students expressed that they felt they would remember what they learned better as a result of having had the opportunity to engage with it physically and apply it in a practical setting. Sarah, who designed and planted an orchard as a directed study says this: “Having the realistic application of my knowledge, rather than just doing theoretical discussion about an orchard and learning about it theoretically, I actually got to do the hands-on application and apply that knowledge so now it’s more tangible to me and it’s information I think I will retain better.” An important benefit of having the practical experience and increased knowledge retention is that students perceive this as something that will benefit them when they move beyond the university and into a career. Many students said that they felt that the practical experience they received would be a great benefit in their lives and careers. Beyond this, some students are also of the opinion that the Farm programs provide a “reality check”, particularly for students in programs that are focused on applied knowledge, and for students who intend to apply their knowledge practically in their careers. There is a feeling expressed that university education can leave students with an overly idealistic

and naïve view of how things work in the world, thereby leaving them not fully prepared to apply their knowledge in a real world setting. Greg expresses it this way,

It...was very grounding I would say. I would say a lot of people coming out of UBC, or out of Land and Food Systems think they're all knowledgeable about agriculture and stuff, and I think they're going to go out into the workforce and they're going to get a real shocker. Or they're going to go and be telling farmers, oh you need to change your production to do this, this and this, and the farmer's going to say: you're nuts; because that would be totally inefficient, and I would lose lots of money. Because they're very idealistic in the Faculty, and I like their vision and stuff, but it needs a little grounding at times, and I think the Farm provided that for me. And I'd feel more confident now going out, say I was an extension agent giving recommendations to a farmer, because I've tried these things before and I can critically evaluate them. Whereas a lot of people graduating from the faculty have never even planted a seed, and I don't know how they can go out and make recommendations and have confidence in them, because they don't have that real world experience.

One of the reasons that the programs at UBC Farm are perceived as being valuable is that they provide an opportunity to experiment in a real world context, within the relative safety of a student run, experimental farm. The Farm is perceived as providing a safe starting place, a stepping-stone of sorts for students to try all sorts of different things that they can then apply as learning in their life and career beyond the university. Amanda explains: "UBC Farm is an ideal place for students to get a step into that...and it's great because it has so many different activities, and lots of different areas, and it's a perfect trial ground for things like that...it's a stepping stone I think."

Another advantage of practical experience is that it produces tangible results. Students stated that they liked the fact that "rather than just being an essay that a professor reads once, and then sits on the hard drive of my computer," the end result of their projects would actually be applied or would continue to exist as a resource. There was a strong sentiment of the value of doing something real that exists beyond the

theoretical and has impacts beyond the limited setting of the classroom. One of the members of the FNH 250 CSL group who produced recipes and nutritional information for UBC Farm Market customers, expressed the value of results this way: “But this one, you got to show people what you did, got a good reaction out of it, and it really felt like you achieved something, and you weren’t just out to get a grade in the end.”

D. I gained a sense of confidence and ownership

This was a really wonderful opportunity for me to test my independence and my responsibility and my sense of ownership over a project, rather than always being within the safe structure of a university classroom. And the possibilities were so much bigger when I stepped out of the university classroom with what I wanted to attain and what I wanted to learn – *SDL student*.

One of the most oft stated advantages of the practical learning projects that students engaged in at UBC Farm was an opportunity to have a sense of ownership and autonomy over the project (Table 3, ID). Students felt that by having ownership over their own learning, they were able to learn more and retain information better. They also express that they have gained an increased sense of confidence, better decision-making skills, as well as the pleasure and accomplishment of facing a challenge and overcoming it.

One of the participants in the Rooted program compared the pedagogy to that of the Montessori school “where you get to choose what you’re interested in and follow through a little more. And people obviously learn better that way, because they care. And because they’re involved, you can’t pretend like you’re not listening when you’re actually doing it.” Participants expressed a distinction between being taught or told information in a class, and being in charge of finding the information necessary to

complete the project. There was a strong sentiment that having autonomy and being left to make their own mistakes was a valuable learning experience and led to better retention of knowledge. Amanda expressed this in our interview: “I think you might not always do things properly, or learn all the facts that you’re supposed to, but you learn a lot more just by being in charge, rather than having it fed to you.”

In addition to what they learned, participants expressed that having autonomy over their learning projects helped them to develop confidence in themselves and their ability to perform tasks and carry out projects on their own. In particular, participants stated that they felt much more confident about going out to perform research. One directed study participant, who intends to pursue a career in research, expressed the increased confidence like this, “it’s probably personal growth in terms of confidence building, and doing your own project makes you feel like you’re actually a scientist...like maybe I actually know how to do research...”

Another benefit that students found in having some ownership over their learning was that it forced them to make their own decisions, giving them practice and increasing their confidence in decision-making. “I feel like there were a lot of issues that have come up all along in my management decisions that have challenged me and caused me to think and ask more questions,” is how Sarah described this process occurring throughout her project. In addition, participants expressed the importance of realizing that there will always be unexpected issues that come up in any significant practical research or learning project, meaning that decision-making skills are that much more important. As Amanda explains, “I don’t think those go away, you just get better at making the right decisions.”

Participants recognize that the need to make decisions is a fact of life, and therefore appreciate the value of having to practice management style decision-making.

Finally, many participants also expressed the enjoyment they got from facing the challenge of taking ownership their own learning. John sums up this sentiment simply, saying “It’s a challenge, that’s the best part. I mean, who doesn’t like to be challenged?”

E. I learn best through concrete experience

One of the interesting themes to emerge from this research is noting that half of the participants described themselves as being a tactile or hands-on learner (Table 3, IE).

They explained this by saying that they learn best by doing or engaging physically, and that simply being told something or reading about it was not an effective way for them to learn. Greg expresses this sentiment in describing his own learning preferences. “And for me I’m a very tactile learner, I learn through doing, way more than sitting there reading a book or listening to a lecturer. So I mean if you want to consider sort of learning styles, it provides a forum for people like me that generally isn’t available.”

Again there is the recurrent theme that the Farm programs provide a forum for a certain type of learning that isn’t generally available at the university. As Rosy sums up, the participants who describe themselves as tactile learners also feel that they will learn best and remember the most if their education includes some seeing and doing, “ But then I’m a hands-on learner, right? If I do something, especially if I do it wrong, then I will never forget.”

3.2.2 A HEART CONNECTION IS AN IMPORTANT COMPONENT OF LEARNING

Table 4: Interview data for affective learning components

II. A HEART CONNECTION IS AN IMPORTANT COMPONENT OF LEARNING	
<i>A. I engaged in the project because I was emotionally/spiritually drawn to it.</i>	T: 75%
17. I feel a connection to the Farm and wanted to get involved.	R: 67%
18. I was really excited or passionate about the project.	CSL: 67%
19. I wanted to help and enhance the Farm through the project.	DS: 86%
 <i>B. I feel a strong connection to the project and the UBC Farm</i>	 T: 100%
20. It was important to know that we were contributing to the community at the Farm	R: 100%
21. I am passionate and inspired by the Farm and the work I did there. It feels good to support that.	CSL: 100%
22. It is important to feel that my work makes a difference and contributes something positive to the world.	DS: 100%
 <i>C. I am concerned about the future of the UBC Farm</i>	 T: 25%
23. It's automatic to me that every university should have something like that, but we have to fight tooth and nail for everything.	R: 0%
24. What if the university decides to turn that into condos? How devastating that would be...	CSL: 0%
	DS: 57%

Legend: T = total (all participants n = 16), R = rooted (n = 6), CSL = Service Learning students (n = 3), DS = directed study students (n = 7)

A. I engaged in the project because I was emotionally drawn to it

Many of the participants expressed that they were initially drawn to the project they engaged in at the Farm by an emotional reaction to the project or the UBC Farm itself (Table 4, IIA). This emotional response varied from a feeling of passion and love for the Farm, to a feeling of connection and interest in being involved, to simply feeling

like a project on the Farm would be enjoyable and uplifting. There were several ways that participants expressed the emotional connection that drew them to doing a Farm project. One way was through an expression of connection to the Farm, of wanting to be involved at the Farm or specifically with the community at the Farm; another was to express a passionate interest in the project that they engaged in. Other participants expressed a desire to help the Farm in some way through their project.

It can be difficult to quantify an emotional reaction, but it is easy to recognize when one is present. Participants had a whole range of language to express their connection to the Farm. Some, like Arthur, stated a commitment and dedication to the Farm, “I also wanted to spend some time on the Farm and I thought it would be a good way to be dedicated to that.” Others expressed much more of an emotional reaction and connection to the Farm, as one of Arthur’s Rooted colleagues did: “I love the Farm; it’s very beautiful and close. And I had the summer mostly available to do something cool...”. Other participants expressed more of a connection to the project than to the Farm itself. Many participants were excited about the Farm community, wanting to get involved with others, or share their work with others. A participant in the FNH 250 CSL group exemplifies both of these points in this quote:

When I read about it I was very interested in doing it, because it seemed...it wasn’t like a regular school project where you just kind of sit by yourself, read a bunch of papers and then write something in the end. We actually got to share with other people and it was a good experience.

One of the strongest themes that emerged in participants’ desire to engage in a project at the Farm was the desire to help the UBC Farm to develop and expand, or simply to give something back to the Farm. This is clearly expressed by Sarah and Amanda, who both completed directed studies at the Farm.

I wanted to do a project at the Farm, because I was in my 4th year at the time, in AgSci, and when I started my degree, had almost no interest in agriculture and got really into it through this faculty, and took a lot of agroecology courses, and some of them had field trips to the farm, and I volunteered at the Farm, one spring or fall or something, and I felt like it was a very important part of campus, and I wanted to get to know it better, and give back to the Farm. - Amanda

A lot of it was wanting to do something that benefited the Farm; wanting to do something that would benefit the connection between the Farm and the Faculty; wanting to do something that would benefit students; wanting to do something that benefits people who were interested in urban production. - Sarah

B. I feel a passionate connection to the project and the UBC Farm

It stands alone on my resume as something that I feel really proud of and really excited about and really emotionally connected to...I love that project – *SDL student.*

It is easy for me to state that people who work, volunteer or participate in learning programs at the Farm feel an emotional connection to the place and the projects that are housed there. It is a very beautiful location, and there is a very large and passionate community. It is a place where people can go and they know that others will share their values and concerns, and where they feel like they can contribute and make a difference. My experience in four years at the Farm has shown me that people always seem a little more energized and vibrant when engaged in an activity at the Farm, and if not giddily happy, then at least content and peaceful. The evidence that has emerged from my interviews with participants in UBC Farm education programs supports all of these ideas. It is, in fact one of the strongest and most prevalent themes to have emerged, with all 16 interview participants reporting some emotional value or connection that arose for them from the project or program they were involved with at the Farm (Table 4 IIB).

There were a variety of reasons that participants gave for their connection to the Farm. The most common of these, cited at least once by all 16 participants, was connecting with and contributing to the Farm community. Christian, one of the Rooted participants, had this to say about his experience at the Farm, and how it compares to his other university experiences: “Well here you actually feel like you’re contributing to community, and doing something in return. Your work actually comes back as an investment.” An important distinction in Christian’s statement, and those of several others is the feeling of pride and accomplishment in having something to contribute to community. These participants were attracted to being in community, but more than that, they are very excited about being able to feel that they gave something valuable back to the community. For Tara, a graduate student who ran part of her thesis research in a greenhouse at the Farm, the appreciation came from just being able to connect with community while at the Farm, even though her research was very individually focused.

I liked the social aspect of the Farm too, and in the summer there’s kids there. And that it feels like you’re not so lonely as a researcher, whereas if I worked at the lower Ag Canada greenhouse here, which is sort of isolated by itself...I liked the farm for that...being part of a community based project, even though my research is sort of by itself, there were people around.

Some responses were focused on the value of giving back or contributing to community, others reported the value of simply being in, or feeling a part of community.

Other participants were more general and described being enamored with the whole Farm and what it does. The main role of the Farm is to be a demonstration and teaching site for urban agriculture; one Rooted participant told a story of being completely enchanted with seeing this demonstration and teaching in action.

I brought my sister and her partner Darren to one of the harvest shifts and it was a gorgeous day, there were tons of people who came, volunteers from all different companies that day, so it was huge groups out volunteering that day. And she had never seen anything in the ground before. Amazing, we grew up in Alberta, and had no experience with farms, and obviously it's not the same kind of farms but, because they all grow canola and cows, and mustard seed. And she loved it; she went home and told my dad about it, was so excited. And it's not like she's young, she's not 12, she's 23, and was just thrilled. So she spent the whole day, both of them, worked their butts off, and got to pick a whole bunch of stuff, and didn't complain once, was super pumped about being there. And she's a real city slicker in that way. Albertan, oddly, not a lot of respect for that nature kind of connection. Very distant, and she's like wow this is what a radish looks like? Because I'm sure I was like that at one point, but I don't remember. Seeing someone else do it, and be vocal about it...that was the most rewarding

In this story, the participant is less focused on specifics but is describing an emotionally charged reaction to the larger picture at the Farm, the setting, the community, and the education. It is clear in the above quote that the participant was moved and inspired by the event described. Inspiration was a common response from participants, and came in all shapes and sizes. Julie told of a much simpler, but no less relevant inspiration, "And then seeing something...I remember I planted clover as a ground cover, and then I saw it grow and I was really touched by it." The way that the participants describe these experiences suggests that the emotional response is a very important part of their experience with UBC Farm programs.

One other important theme in exploring the emotional connection that participants felt toward their project and the Farm, was that it is very important to the participants to feel like they are making a difference, that their work is actually doing something beyond the classroom, as is described here.

I found that in the human geography course that I took at UBC as well, I had just finished, right before I started at the Farm. And it talked a ton

about social issues and farming issues, well it was a social geography class, so it talked about everything. And I get so upset and wanting to do something about it, or curl up in a ball and want to cry. And then having some place that makes it feel like you're doing something, even if you're just changing for your own life, being able to tangibly do something I think was really beneficial. Because I get really frustrated, and feel like there's nothing I can do, but it definitely felt like going to the Farm was something I could do.

C. I am concerned about the future of the UBC Farm

One theme that emerged among some of the participants was a very passionate concern for the future of the UBC Farm (Table 4, IIC). These participants expressed being afraid that the Farm would not continue to exist in its current state, and had a strong response to this idea. The emotional responses associated with the idea of losing the UBC Farm to development were diverse, running the spectrum from fear and sadness to outright anger and frustration. I have selected two passages that demonstrate this diversity of responses:

That being said it makes me nervous, what if...there was definitely fear around the longevity of the Farm and I've just planted this orchard that means so much to me and means so much to many people, and what if? What if the university decides to turn that into condos? How devastating that would be... - Sarah

It's just, it seems really difficult for the Farm to stay as it is, even if it's a market garden or research site or both...I mean it's automatic to me that every university should have something like that, but we have to fight tooth and nail for everything. - John

For several participants, the response to the uncertain future of the UBC Farm did not end with an emotional reaction. They also expressed a strong desire to do something to help maintain the Farm in its current location and capacity. As we saw earlier, in many

cases this was cited as one of the reasons that they chose to engage in a project at the Farm.

3.2.3 UBC FARM PROGRAMS NEED MORE STRUCTURE

Table 5: Interview data for student needs and wants to enhance sustainability learning at UBC Farm

III. UBC FARM PROGRAMS NEED MORE STRUCTURE (STUDENT NEEDS AND WANTS)	
<i>A. UBC Farm education programs need more connection to theory and knowledge integration.</i>	
25. There needs to be more integration of theory and opportunities to do practical research.	T: 75% R: 67% CSL: 100%
26. Students need to have more ownership and autonomy in the learning process.	DS: 71%
27. There needs to be more opportunity for reflection and discussion of learning.	
28. UBC Farm programs could be better integrated with academic courses and programs.	
<i>B. The UBC Farm needs to improve its physical and informational resources</i>	
29. UBC Farm needs more readily accessible information about its programs and procedures – more transparency of operations.	T: 75% R: 50% CSL: 67%
30. There needs to be more outreach and advertising about opportunities that exist at the Farm.	DS: 100%
31. The Farm needs more physical teaching/research space, and appropriate tools.	
<i>C. UBC Farm education programs need human resource support</i>	
32. It would have been useful if there was a main contact person for directed studies	T: 31% R: 0%
33. I would have appreciated it had my supervisor gotten more involved	CSL: 0%
34. There needs to be some full-time positions to manage academic work at the Farm.	DS: 71%

Legend: T = total (all participants n = 16), **R = rooted** (n = 6), **CSL = Service Learning students** (n = 3), **DS = directed study students** (n = 7)

The second part of the main research question seeks to address a participant evaluation of UBC Farm academic programs. The main objective here is to compile a set of student needs and wants when it comes to sustainable agriculture education, and answer the question: What do students want from sustainable agriculture education that isn't currently being met or fully addressed by UBC Farm education programs? The

responses to these evaluative questions revealed a number of interesting themes to explore (Table 5). Most of the participants felt that UBC Farm education programs would benefit from more structure and development of programming. The more specific critiques and suggestions were divided among the three different education program areas. The participants in Rooted and the Community Service Learning programs expressed a need to discuss the relevance of their learning (Table 5, IIIA). They saw the value in taking the projects they were performing and making the intellectual connections to local and global issues. The directed study participants, on the other hand, focused more on the need for resources at the Farm to enhance the learning potential. One of the more commonly cited need for the directed study students was a need for more human resources support (Table 5, IIIC). These students expressed the passion they have for their projects and the value of the experiential learning, but also expressed feelings of being overwhelmed and under supported, and felt that their learning potential would have been increased with stronger support from faculty and staff.

A. UBC Farm education programs need more connection to theory and integration with academic programming.

The need for more integration with theory and academic knowledge in the learning programs was an important theme that emerged from the interviews. As can be seen earlier in the results, participants found the practical and emotional learning opportunities at the Farm to be valuable (Tables 3 & 4). Responses in this section cover a whole variety of areas where students felt it would be valuable to add more abstract/theoretical learning to the existing practical programs. Participants expressed that

by structuring the cognitive component in areas such as theory and research learning, or increasing the amount of ownership and autonomy afforded the students, the effectiveness of the learning would be increased. This suggests the participants were interested in an integration of different learning experiences, but still wanted them to include a component of theoretical knowledge. Many participants also mentioned reflection and discussion as areas that were lacking in their program and would be beneficial to their learning. Finally, participants felt that there could be more integration with other university academic programs, including official connection with existing courses and the opportunity to teach and share the results of their projects in an academic setting (Table 5, IIIA).

One theme that was very strong among participants in Directed Studies projects, was a desire to have learning objectives set out at the beginning to structure their project and give them a map of the direction in which to take their research and learning. It was felt that this would allow them to concentrate more on what they intended to do and learn and limit occurrences of straying off topic, as one agroecology student describes here:

If you don't have a totally set goal as to what you want to learn, if you don't have those learning outcomes spelled out really clearly at the beginning then it's really hard, because you end up going off topic so far, trying to just figure out what the limits are to your topic. Is it just what I find interesting? Because that's an awful lot of stuff...

Another area where participants called for more structure was in asking for more research. This was particularly relevant among Rooted participants, many of whom felt there could have been a research component in the program. Tegan was one of these, stating:

But there could definitely have been a research component. That could have almost been...that could have been what people were doing as they

were planting or something, doing some sort of research while they were there, that could have been their end project.

Responsibility and autonomy was another area that Rooted participants in particular felt there could have been more of. This is particularly interesting in light of the significant student response describing the value they received from the responsibility they did receive throughout their projects (Table 3, ID).

Maybe even have your own individual plot of land, maybe having a project where [for example] we're going to start growing blueberries. And the Rooted people have to work together to research what we need to do to start a blueberry [planting at the UBC Farm]? The resources are out there, you just need some leadership, and I think it would really bring the group together, be more cohesive. And it would be very rewarding, both for the people who do it and for the UBC Farm.

A very interesting sub-theme to emerge in the area of cognitive structure was one of relevance and the integration of learning. This sub-theme emerged only in the Rooted and CSL groups, but was very significant in both of them. Here the students are calling for more theory and more opportunity for reflection to help them come to grips with the new knowledge and skills they acquire.

One of the reasons that participants stated for the importance of reflection was wanting to translate actions into meaningful knowledge, as Tegan describes: "It would have been nice if there had been a classroom component maybe before [the practical field work]. Like a bit of theory and explanations as to why things work the way they do. I know a lot of people were like: we did this, we planted the peas, or the kale, but we don't really know how it fits all together." Tegan and others are asking for more theoretical and conceptual background to help them to integrate all the pieces of learning and experience

into a solid tapestry of knowledge. Other participants wanted to discuss how to turn knowledge into action, or how to take what they had learned and apply it in their lives:

...looking at the issues in depth, so that we can make better connections as to what is really going on, and how important it is to support local farming, and the impact that it has globally and nationally, and what we can do to change it and make a difference. The small steps that people can take, and even larger ones.

One point that was repeated often is that reflection is more valuable as a group, rather than individual exercise. Participants feel that more knowledge is generated through group discussion, and that discussions allow individuals to solidify their own thoughts by sharing and hearing the thoughts of others. In describing her Rooted experience Chereen stresses the importance "...to have a couple [of] group discussion sessions, you know. And then we can get everybody's ideas about making those connections. Make it more tangible I guess, instead of just a thought, a random thought."

Finally, participants also felt it was important to better integrate UBC Farm programs with existing academic courses and other official academic programs throughout the University. Some participants mention integrating whole courses in the planning and operation of the Farm, as potential ways to accomplish this, as one FNH student did: "It would be neat to have an Agroecology class involved. Give the students all the information and resources and have them come up with a planting plan and rotation – they should try out new things. Let them have a sense of application, seeing their ideas tested." It should be noted that there has been an Agroecology class involved in helping to develop a sound crop rotation at the UBC Farm for several years. Developing an

ongoing student program at the Farm, where students could feel they were contributing to something larger was also suggested:

I'd like to see, you know how the Rodale institute, they have their 20-year long organic farming systems research trial...I think along with this internship, or something, obviously everybody can't do their own project like I did, because it would be a huge competition for resources and space, but I think that would be a really neat kind of thing to get students...more experiential knowledge and research in agroecology, and instead of them all doing their very own project, getting together and starting some long-term project where new students come and they have all this data behind them, and they're current for this year, and they'll build on it...

In the above quote, when John mentions an “internship” he is referring to the Sowing Seeds apprenticeship (see Discussion and Chapter 1, The Centre for Sustainable Food Systems at UBC Farm) This program was mentioned by several participants as something that will improve the capacity for educating students at the Farm. Rosy is expressing this in trying to describe a way for all students in the faculty to spend time at the Farm:

Maybe each student who goes through the faculty has to spend some time down there. Whether it's a practicum, or a project, or something...you know because every student who goes through this faculty, if you're in this faculty, you know even if you're a foodie, or a dietetics student, you can somehow do something down there, you don't have to be planting or harvesting...And it's real world stuff.

Greg sees the number of students who benefit from relevant practical education at the Farm as being low, but considers the apprenticeship as an important tool to help remedy this situation:

I guess the biggest complaint I have though, is that most of what I learned at the UBC Farm comes from working there, and very few people work there. So, the Farm's ability to touch a significant portion of the student body in its current state is quite difficult, especially when [often] it is on the initiative of the student to get involved there. And I think the internship program would reach a lot more people.

Many students also mention the desire to teach and disseminate the results from their own projects. This is seen both as beneficial to their own education through taking ownership and teaching what they learned and as a way to increase outreach of the possibilities that exist at the Farm, as Amanda describes, “you should have to teach what you’ve learned, maybe even [give] a poster presentation, or tell new students about it, you know like in AGSC 100, maybe people should have to talk about their research.” This idea of dissemination of results and peer teaching was common, particularly among directed studies students.

B. The UBC Farm needs to improve its physical and informational resources

One area that participants felt that the Farm needs improvement was in having enough resources to accommodate current student needs, while also working to increase student use of UBC Farm programs. Many participants stated that having more and better physical and informational resources would be important for integrating more students into directed studies, community service learning, and other academic programming at the Farm (Table 5, IIIB). The resources suggested by participants ranged over a number of sub-themes, covering informational resources about Farm structure and programming, as well as information describing research and learning opportunities, and more advertising and outreach to disseminate this information to a diversity of students. Suggestions also covered physical resources, such as tools and equipment, physical workspace and funding.

Some participants expressed a need for more readily accessible information about Farm programs and procedures. Data showed that students are not sufficiently aware of what projects are possible and desirable, and of what procedures should be followed in initiating and completing projects. Specifically, some students wanted to see a set of guidelines that to make it easier for students to get a sense of how research is and can be conducted at the Farm, as Tara describes here:

I don't know if it exists, but I never saw anything like a guideline for researchers working at the Farm. Or what about people who are interested in doing research at the Farm, what about having a source for people like me that might...ok say I wanted to do research at the Farm, what can I do, what would be the guidelines, what would be the limitations that would be set?

Along with guidelines, there was a call for making available information about what kind of projects are available and what sort of resources exist to help students in accessing and completing projects at the Farm:

And even just a list of what kind of resources are available and what kind of projects would be appropriate. Maybe that would be a way to do it: if the Farm and some of the supervisors that are involved both in academics and with the Farm came up with some ideas for projects, making those kind of things more available, more apparent, even to first year undergrads who have no idea why they're here, what they're doing, like maybe somebody needs some volunteer help, and somebody can actually see, oh that project sounds interesting, or...I think just making a lot more things a lot more transparent.

I think the key word that John uses in the above quote is “transparent”. There were a number of comments from participants calling for more transparency of operations and programming at the Farm. Another example of this was an expressed desire to understand better the big picture of what happens at the Farm, as Arthur describes: “It would be interesting in the orientation to have the Farm staff talk about the life cycle of the Farm,

and what happens in the course of a year, what they see happening.” Related to this was a desire to have a better sense of the staffing and human resources at the Farm: “I just am not sure who actually works [at the UBC Farm] full time and who’s a volunteer. It doesn’t really matter, but who does what? Who’s the Farmteam? Like a poster, you could put it on a poster”.

Another area related to transparency was that participants wanted to see more awareness of the Farm. Many participants called for outreach and advertising to get the word out and increase the number of UBC students using UBC Farm programs. Here John states the value of “just making people aware that those opportunities exist, and that they're encouraged, and that there may be resources available, and supervision...”. Some of the comments in this area focused on increasing the diversity of students and student projects at the Farm, as this one does: “Get some Arts students out there! Get some creative projects out there, because it’s definitely something that could be more used by the students, and it’s not. And I don’t think it’s any fault of the students, because they just don’t know.”

Participants commented that one of the limitations to this diversity of projects is a lack of the tools and equipment necessary to realize many projects. As demonstrated earlier in the results (Table 3, IC), students value the Farm and its programming for the ability to engage in practical projects in a real life setting. However, Greg, who has experience both as a directed study student and as a staff member at the Farm, feels that there are limitations to these practical learning opportunities because “...there’s not a lot of equipment there that people can use that would put things into a real life context.”

Tied to this equipment limitation is a lack of physical space for instruction and experimentation. As one directed study student commented: “It could really help to have a bit of lab space, it doesn’t have to be elaborate, but some scales and microscopes”.

Finally, participants commented that another important limitation to education projects at the Farm is funding. Education is the primary mandate of the Farm, and the integrated teaching fields are the primary “outdoor classroom” on site. However, participants feel without direct funding for academic programming, the opportunities for learning are limited, as Sarah describes here: “In general I think it comes down to the funding piece. I think the Farm is torn between being a place where it’s production based in order to pay the staff that are there, but then our mandate for education is not financially being supported.”

C. UBC Farm education programs lack human resource support

So you need some people who can really be consistent figures at the Farm, who know everything at the Farm, who can handle the education, who are well connected with professors on the campus or with academic programming to get it more integrated – *CSL student*.

One of the challenges that come along with a lack of funding is a lack of human resources. The UBC Farm is recognized as a place with tremendous potential where everyone is overworked, and the staff does what they can to get everything done. A strong theme among the directed study students was a feeling that they did not have enough human resource support during the course of their program. They expressed that it would be very beneficial to have at least one position dedicated to working with

students to facilitate the learning and research process. They also expressed the importance of receiving more support from faculty and the university itself to facilitate independent study and research (Table 5, IIIC).

Greg is able to discuss the issue of human resource support from the point of view of someone who worked on staff and was looked to for support from students and faculty:

I know [as] somebody who worked at the Farm and worked with a lot of people who did directed studies, that I kind of shrugged them off. There wasn't the attention that they needed, or the access to the resources, because I was too busy with other things. So I think the Farm isn't able to provide the support [for] people who are doing directed studies, or professors doing course work. The Farm can get some tools together for them to do their stuff but they're not going to get a lot of support from the Farm, or planning and that sort of thing. I guess it depends on what the courses need, but I think that also limits what classes are going to do at the Farm, based on what the professor themselves can organize and get together, because if it's something that will require much of an effort on the part of the Farm, there's just nobody to get that done.

Several participants stated that they felt it was important that the Farm have a staff person whose job it is “to get that done” – to provide support, guidance, and coordination for students engaged in projects at the Farm (Table 5, IIIC). Sarah, a GRS student who completed a directed study at the Farm describes this clearly, “...it would have been useful if there was a main contact person for directed studies who had sat me down walked through it with me and maybe helped me with a little more structure.” When asked what she meant by structure, Sarah described having learning objectives and parameters at the beginning and getting a sense of how much work was required. This sentiment is evident in this quote from another directed study participant: “Probably if I had sat down with someone at the beginning and figured out exactly what I was going to do and done it, that would have been more doable”. Participants felt that having someone

at the Farm who was dedicated to reviewing and overseeing student learning would have helped keep their projects manageable, and ensured that their personal learning objectives were met.

Another challenge was that some participants didn't feel that their independent studies receive enough support from Faculty members or from the university. It is clear that these participants view this as an important component of their education. Several participants mentioned that their faculty supervisors were overworked and didn't have time to give the support that was needed or to be involved and promote independent learning, as John describes: "I would have appreciated it had my supervisor gotten more involved, I would have appreciated if other faculty members, my supervisor included would encourage students to do more real research projects or experimentation on the Farm. Nobody encouraged me to do it; it was just something that I wanted to do."

Students feel that these "real research projects" are an important learning component and are frustrated, like Sarah says, "...to feel like I was paying the university a lot of money and I didn't have a huge amount of support."

A summary of the results and discussion is presented in Chapter 5: Conclusion.

Chapter 4: **DISCUSSION**

This chapter provides a discussion of the results in the context of the relevant literature and research in the areas of sustainability learning and sustainable agriculture education. The discussion will further position the academic programs at the Centre for Sustainable Food Systems at UBC Farm in the context of sustainability learning at UBC. The discussion follows the same format as the results, first providing a discussion of the survey results, then a discussion of each of the themes to emerge from the interviews with participants.

Survey Discussion

One of the goals of the UBC Farm is to provide effective experiential learning opportunities (UBC Farm, 2001). Responses to the survey indicate the importance of experiential education to students who have participated in a UBC Farm tour. UBC Farm provides these tours as a means to both allow students to have first-hand exposure to a working small-scale organic agricultural system, and to give students a preliminary demonstration of the learning opportunities that exist at the Farm (Bomford, 2007a).

A theoretical basis for the educational value of a farm tour can be found in previous publications in the areas of transformative and experiential learning (Borsari & Vidrine, 2005; Holden et al., 2008; Trexler, Parr, & Khanna, 2006). According to Mezirow (Mezirow, 1991), our understanding of the world is based on our perceptions and interpretations of our own experiences. We continuously construct these perceptions in response to our learning, socialization, and unique experiences. Transformative

learning occurs when we examine and begin to validate or revise these perceptions (Cranton, 1994). Students in a learning environment are in a continual process of revising and building upon their perceptions. However, most learning does not occur in transformative leaps. New knowledge and perceptions must fit within the framework of already held beliefs and assumptions, in order to be incorporated as new learning. A UBC Farm tour provides an experiential overview of a diverse agricultural operation and other components of a sustainable food system. The goal of the tours is to allow students to engage with *head, hands* and *heart* in a broad range of potential new learning. These experiences may serve to bring awareness to students' previously held beliefs, such that they have the tools to validate and/or revise their perceptive framework through these experiences. In addition, a UBC Farm tour provides information on how students can get involved to increase their learning in areas that are relevant to them.

The student tour participants who responded to the survey rated their experience as very high (3.96 - 4) in terms of both the overall learning experience and learning new ideas and concepts. This is consistent with the findings of previous studies in terms of the value of farm tours (Francis & Carter, 2001; Trexler, Parr, & Khanna, 2006). In a 2002 survey of 40 agricultural practitioners, a team from the University of California at Davis (Trexler, Parr, & Khanna, 2006) attempted to discern the most important criteria for inclusion in an agricultural major. This study demonstrated that farm visits and field trips are very important experiences for undergraduates, with “exposure to the overall complexity of an agricultural system”, and “working farm tours” being two of the top factors (Trexler, Parr, & Khanna, 2006: 19). In a review of criteria for training programs in sustainable agriculture for U.S. extension agents, farm tours were again found to be

one of the most effective learning methods (Francis & Carter, 2001). In this case the tours were identified as an effective way to “see things in action” (p. 79), and as an important complement to other learning methods.

The third question asked students to rate the experience in terms of whether it had caused them to think about their life, education and career goals in new ways. Students rated this as good with a mean score of 3.6 out of 5. This indicates that for the majority of students it was to some extent a transformative learning experience. It suggests that students have taken some of the information from the tour and incorporated it into their set of beliefs and perceptions, where it has begun to influence their thoughts and decisions, and will hence affect their future learning potential (Cranton, 1994; Mezirow, 1991). That students have revised and built upon their beliefs and perceptions indicates that some transformative learning has occurred and the potential for further transformative learning in these areas has increased (Cranton, 1994).

The first of the two open-ended questions asked participants to describe what they felt was the most rewarding aspect of the tour. Sixty percent of these students described that learning more about some aspect of the Farm, either more knowledge of the whole Farm, a specific Farm program or information about ways that they could get involved was the most rewarding outcome. This is consistent with the iterative cycle of transformative learning (Cranton, 1994). These students have identified with some aspect of learning from the tour and are open, and in some cases eager, to expand their experience and learning in that area. This also supports the reasons for giving these tours, demonstrating that students’ learning interest is engaged by certain aspects of a general tour and that, for many students, this creates a possibility of further developing their

experience and learning in this area. Other sustainable agriculture education programs have found similar results, and thus a farm tour is featured as a broad introduction and systems level view at several universities and student farms (Francis et al., 2001; Parr & Van Horn, 2006; Trexler, Parr, & Khanna, 2006)

The number of students who go from being initially engaged by a UBC Farm tour to furthering their level of learning through class projects or directed studies is not currently known. This would be an interesting area for further study because it could demonstrate that these students are progressing through an iterative cycle of transformative learning, taking action to build on the new knowledge and understanding that they have acquired (Cranton, 1994).

When asked to describe how the tour could be improved, thirty six (36) percent of student participants said that improvements could be made by having a practical component to the tour. This is of particular interest as this was an open-ended question that did not specifically ask students to comment on whether a practical component would be valuable. This suggests that the UBC Farm tour could be further developed to become more of a “working farm tour”, including opportunities for students to engage physically with different aspects of the working farm (Trexler, Parr, & Khanna, 2006). In all eight of the sustainable agriculture education programs in the U.S. and Europe that were reviewed for this study, an experiential learning component that allows students the opportunity to get physically involved in growing food was featured (Biernbaum, Thorp, & Ngouajio, 2006; Carey et al., 2006; Delate, 2006; Ferguson, Lamb, & Swisher, 2006; Francis et al., 2001; Markhart, 2006; Parr & Van Horn, 2006; Vedeld & Krogh, 2005). Student participants in UBC Farm tours have recognized and expressed an understanding

that having the ability to engage physically with their subject would enhance their learning potential (Cranton, 1994). This will be discussed in more detail in describing the data from the interviews.

4.2 Interview Discussion

4.2.1 UBC FARM PROVIDES AN IMPORTANT PRACTICAL COMPONENT FOR SUSTAINABILITY LEARNING

A. University needs more opportunities for the practical application of knowledge

Participants in UBC Farm academic programs find that the Farm provides an opportunity to engage practically with what they are learning, something they identify as important to include in their education. From my four years' experience at the Farm I can say that that is one of the primary reasons that people come to the Farm. Usually, people are there to learn, but to learn in a very specific way – by sticking their hands and their feet and their noses into their subject; by just doing something and learning from the act. Not to say that that is the only way they want to learn, but that the Farm offers a rare convenient opportunity to engage physically with an agricultural system.

The practical element that participants are calling for has been well discussed in the theories that developed around experiential learning (EL). There has been a significant amount of literature over the last 30 years calling for a shift in the pedagogy of higher education toward an interdisciplinary, systems-level education that would include experiential learning as a key component (Bawden & Packham, 1993; Weil & McGill, 1989; Boud & Pascoe, 1978; Cortese, 2003; Francis et al., 2001; Joplin, 1981; Kolb, 1984; Orr, 2004). Many schools worldwide are in the process of developing sustainable

agriculture education programs in recognition of this need for a systems approach, with an experiential pedagogy, in many cases centered on a student farm, as the focal point (Biernbaum, Thorp, & Ngouajio, 2006; Carey et al., 2006; Delate, 2006; Ferguson, Lamb, & Swisher, 2006; Francis et al., 2001; Markhart, 2006; Parr & Van Horn, 2006; Vedeld & Krogh, 2005).

This is relevant to this discussion as the Faculty of Land and Food Systems (LFS) has been going through a similar transformation in response to these issues and to the needs of present and future learners (CIT, 2000). In transitioning from Agricultural Sciences to the current LFS, the faculty was seeking in part to transform its pedagogy to reflect an understanding of the need for student-centred and systems-level learning. There was a clear vision of the need to provide experiential learning opportunities for students, in fact, in recognition of the Faculty's core values, experiential learning was understood to represent "an integral part of every student's program" (CIT, 2000: 7). This vision was to be realized through labs, work-studies, field trips, and supervised program activities involving practical experience. The UBC Farm is mentioned as one of several sites where practical learning activities could be focused (CIT, 2000). This year stands as the 10th since the launch of this faculty transformation process, and there have been significant progressive changes to the faculty's pedagogy, particularly in regards to student centred and systems level teaching (Rojas, 2008). The Agroecology program has adopted a Problem Based Learning (PBL) model (Jolliffe, 2005; Riseman, 2005)., and the Faculty's Land, Food and Community (LFC) core undergraduate curricular series provides an integrated, systems-level learning model to all LFS students through 2nd, 3rd and 4th year (Rojas, 2008). The LFC curriculum has always included some experiential learning

component at the UBC Farm, and the Faculty members involved with the LFC series are always looking for ways to improve the experiential opportunities available to students. The LFS Faculty is currently undergoing another re-structuring, as the Agroecology program will now be known as the Food and Environment (FENV) concentration in Applied Biology (APBI). The new FENV concentration may begin to address the desire for more practical learning opportunities at the Farm as it "...will be strongly focused on the Centre for Sustainable Food Systems at UBC Farm - an on-campus living laboratory for experiential learning" (Vercammen, 2008). The FENV concentration will also include a six to twelve credit practicum at the UBC Farm as one option in a required capstone experience for students. With the evolving developments in the LFS Faculty aside, it is clear from the responses of participants in UBC Farm academic programs that they feel there still isn't enough opportunity for experiential learning within programs of the Faculty of Land and Food Systems or throughout the University. It would be too lengthy and off topic to explore and discuss here the reasons why the Faculty's vision has not yet met the desires and expectations of participants in this study. It is sufficient to state that both students and the Faculty are interested in having experiential learning as part of the program pedagogy (CIT, 2000), and the UBC Farm community is interested in providing experiential learning opportunities for more students and courses (Bomford, 2007a). The challenge remains to continue enhancing the connections so that all stakeholders are satisfied with the results.

Much has been written about the value of having an experiential component in any learning environment (Bawden & Packham, 1993; Weil & McGill, 1989; CIT, 2000; Dewey, 1938; Francis & Carter, 2001; Holden et al., 2008; Joplin, 1981; Kolb, 1984;

Parr, 2007c; Quay, 2003; Sipos, Battisti, & Grimm, 2008). Laura Joplin went so far as to state that “All learning is experiential”. She goes on to describe all learning processes as ones where the learner can “significantly identify with, seriously interact with, form a personal relationship with...” the subject (Joplin, 1981: 1). The Curriculum Implementation Team in the Faculty of Agricultural Sciences (now Land and Food Systems) has called for “field trips on a faculty wide basis and within specific programs to enable the student to experience first hand the application of concepts and principles learned in courses.” (CIT, 2000). Practical learning opportunities such as those described have been and continue to be implemented in the core LFC series and in the former Agroecology program (continued in the FENV concentration). It is clear, however, that participants in UBC Farm academic programs are describing their desire to have more opportunity to “seriously interact with” their subject matter within their university curriculum. From the results of this study, it seems that these students see this as a crucial part of their education, and one that is not made available to their satisfaction. David Kolb (1984) has developed a model of learning that can be used to better understand this sentiment. In Kolb’s model learning progresses through a four-stage iterative cycle. The stages of this cycle, as demonstrated in Figure 1, are concrete experience, reflective observation, abstract conceptualization, and active experimentation.

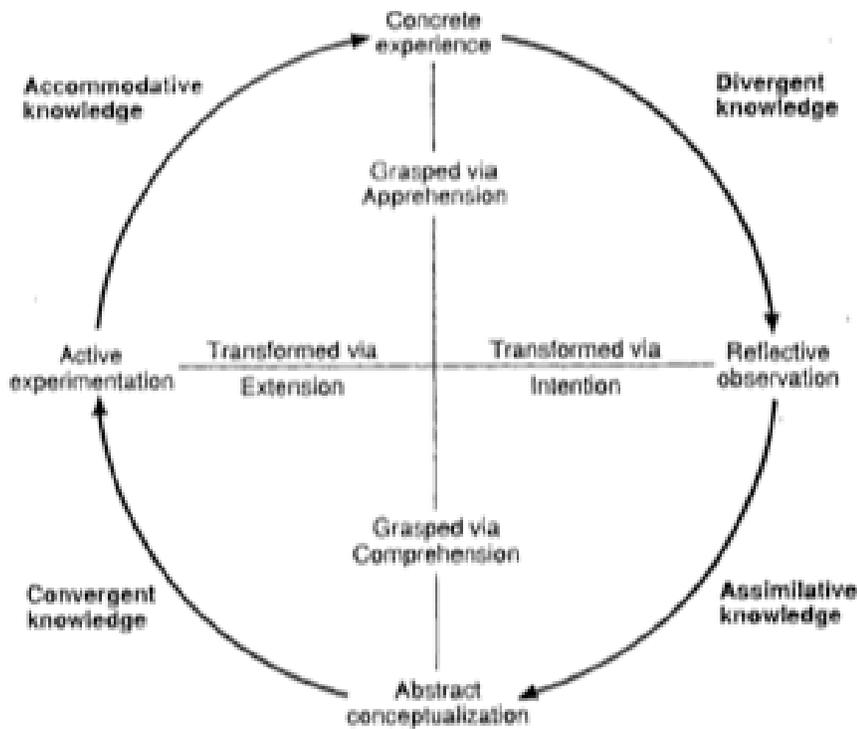


Figure 1: Experiential Learning Cycle (Kolb, 1984)

Kolb suggests, like Mezirow and others, that learning occurs through the learner making meaning from experiences, or through reflecting and revising meaning that was made through past experiences. In other words, learning is an active, subjective process of creating or revising meaning through iterative cycles of experience, reflection, conceptualization, and experimentation (Kolb, 1984). Kolb suggests that all stages of learning must be present in order for knowledge to be fully assimilated and for true life-long learning to be complete. Participants in this study seem to be expressing a need for more concrete experience and active experimentation in their university curriculum. They also seem to be aware that without these they are not attaining their full learning potential.

The idea of concrete experience and active experimentation being critical components of a learning curriculum is reinforced by two studies conducted through the University of California at Davis (Trexler, Parr, & Khanna, 2006). Both were web-based Delphi studies, and both were conducted to determine what necessary content knowledge and experiences to include in an undergraduate major in sustainable agriculture. The first sought agricultural practitioners' opinions, and the second the opinions of academics from a variety of U.S. agriculturally based colleges and universities. In the survey of agricultural practitioners, "internships", "field experience as a complement to classroom learning", "on-farm research" and "hands on experience on student farm" were all rated as "very important" (3.5 – 4.49 out of 5) (Trexler, Parr, & Khanna, 2006: 19-21). In the survey of academics, "experiences in the classroom and in the field", "experiential learning", and "opportunity to apply learned theory into practice" were all rated as "very important" (Parr, Trexler, Khanna & Battisti, 2006: 530).

One of the points mentioned by participants at UBC Farm as a reason for a necessary practical component was the idea of studying a complex system. Much of the student work that takes place at the UBC Farm involves the biological sciences. This means it involves complex systems. As James Kay and Eric Schneider wrote, living systems "are not static things, they are dynamic entities made up of self-organizing processes" (Kay, 1994: 37). This is true of ecosystems, it is also true of our food systems, economic systems and communities (Francis et al., 2001). Kay and Schneider taught that we need to "stop managing ecosystems for some fixed state" (Kay, 1994: 37). It has also been widely suggested that we need to stop *teaching* about complex systems from or for a fixed state (Bawden & Packham, 1993; Cortese, 2003; Francis & Carter, 2001; Francis et

al., 2001). From the standpoint of teaching and learning complex systems, there is clear logic to the students' sentiments that truly understanding such a system requires some concrete experience (Francis & Carter, 2001; Parr & Van Horn, 2006). When Amanda mentioned that "until you've actually seen it in the field, I don't know if you really appreciate the connections, and how amazing it is, and also how it's a lot trickier to design a system for that to work around," the indication is that the missing element in her education program was Kolb's concrete experience stage. It suggests that she would still be keen to reflect on what she learned in the field, conceptualize through applying theories, and run experiments in the laboratory, but that the learning cycle will not be complete without the opportunity to interact physically with the system.

When Greg speaks of the lack of practical opportunities, he seems to be referring to a different stage in the experiential learning cycle:

It allowed me to apply a lot of what I had learned and be able to critically assess what I was learning in class. Some of it worked great, some of it didn't work at all, and some of it worked mediocre, and I was able to look at that and say: but what if I try this, this, and this? So it really allowed me to take that knowledge and run with it, and even go beyond.

It seems clear that Greg thinks he has been through reflection and conceptualization as part of his class work. According to Greg, what he accomplished through his directed studies at the Farm was an opportunity for active experimentation.

Using Kolb's model to reflect on the words of student participants, it seems that these students are only partially satisfied with their education. These participants expressed that opportunities for concrete experience and active experimentation are lacking in their programs of study, and that the UBC Farm can and does provide an opportunity for this.

B. I engaged in the project because I wanted practical experience

Both UBC's TREK 2010 document (UBC, 2004) and the Faculty of Land and Food System's Curriculum Information Package (CIT, 2000) state the need to provide undergraduate students with practical research opportunities before they graduate. At UBC, the Discover Undergraduate Research Office (DURO), exists to promote these opportunities as "...UBC's gateway for students, faculty, and staff interested in engaging undergraduate students from all disciplines in the research process." (DURO, 2008).

Some reasons to promote practical research opportunities are clear from the responses of participants in this section. Students are interested in exploring different ways of learning before they graduate. They see this as an opportunity to investigate different options in terms of a career, or to decide whether post-graduate work is something that they want to pursue. Amanda stated clearly that she had never had an opportunity to try her hand at practical research, and wanted to see if it appealed to her before committing to graduate school. Amanda is currently researching integrated pest management as part of her work to obtain a Master of Science degree in Plant Science, so it stands to reason that having had the opportunity to practice her research skills, she was able to feel more confident in choosing graduate work for herself. One of the main goals of the UBC Farm is to be able to provide students with this kind of opportunity. It was with the idea of promoting practical research and learning opportunities in mind that a group of students was identified in Fall 2007 to initiate a "Farm Ambassadors" (FA) program as a student directed study. I was a part of the supervisory team for this initiative. The many goals of the Ambassadors include promoting the possibility of practical research and learning at

the Farm to students and academics in a variety of faculties and departments; making available the reports and details of past research and learning projects that were conducted at the Farm; and providing resources such as suggestions for future projects, contacts of likely supervisors, sources of funding, etc. (UBC Farm Ambassadors, 2007a, 2007b). The goal was for the students to initiate an FA program that would be self-perpetuating and would continue to operate and grow for years to come. Realization of an operating, long-term FA program could be very helpful to realizing the goals of practical research and experiential sustainability learning stated in UBC's TREK 2010 vision (UBC, 2004) as well as realizing the full potential of the UBC Farm. Further, it would go a long way to providing the opportunity to gain experience and clarity for many more students like Amanda.

C. The practical learning was very valuable to me

One of the interesting discussions to arise from this theme in the responses is the repetition of the concept of learning in the "real world". This is by no means unheard of in the literature on experiential learning. Kolb uses the term himself in stating that the EL model "...emphasizes the critical linkages that can be developed between the classroom and the "real world" with experiential learning methods." (Kolb, 1984: 4). And that seems to be exactly what participants in UBC Farm programs are saying. They want to make that link to know that their knowledge and experience will be valid and useful in their lives beyond the university. I assume that the quotation marks that are used when Kolb and others use the term are to point out that there really is no distinction between university and the "real world". Everything students do and learn at university exists in

the real world. The reflecting and conceptualizing that students do in class is very much a part of the real world. This purportedly fictitious distinction is a valid point, as I have certainly heard students, and the participants in this study are clearly no exception, referring to the real world as something that exists externally to the university. I've thought and said it myself.

However, the reference to learning experience at the UBC Farm as “real world” experience interests me for another reason. If we consider the real world of agriculture and food systems, the dominant model, or vast majority of it, looks nothing like what is happening at UBC Farm (Altieri, 1995; Gliessman, 2000; Pretty, 2007; Soule & Piper, 1992). In fact, the dominant “real world” of food systems is the industrial model, featuring reliance on chemical inputs, soil and water resource degradation, monoculture design and vertically- and horizontally-integrated corporate food chains feeding a global food system that delivers a food product with no sense of origin or history (Halweil, 2002; Lang & Heasman, 2004; Soule & Piper, 1992). When looked at this way, the UBC Farm, rather than being a model of the real world, actually demonstrates more of the “ideal world” of food systems. As I will discuss, the vision of the UBC Farm is one of providing a model for sustainable urban agriculture, and in this context, an “ideal” demonstration site is necessary.

Alejandro Rojas (Rojas, 2008) has devised a model of learning to help students envision what they call the “realm of the potential”. In this model he has created a distinction between three forms of reality (Figure 2). The first form is our “personal” reality. This is all the experiences and learning we have had to date, out of which we have created meaning and which have contributed to who we are and how we think. The next

is reality “as it is”. This represents the realities out in the world, external to our personal thought processes: the facts and universal laws we learn in school, the current dominant global food system, etc. The third form is reality “as it should be”. This is where learners can explore the ideal world, for example what would be the ideal food system for a sustainable future. Once a learner has distinguished these three distinct realities, she can begin to see the “realm of the potential”. A learner can begin to get a picture of realistic future possibilities that are informed by, but not limited to, the learning of past and present realities when these three “lenses” are first distinguished, then brought together to create new vision and action.

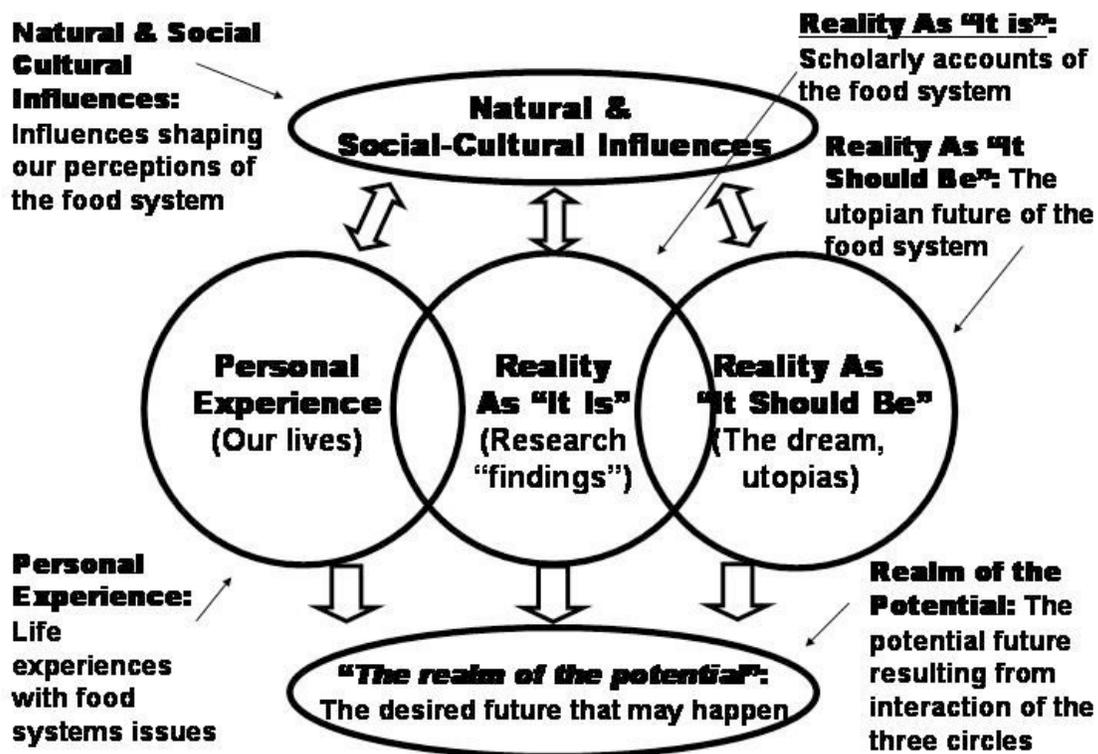


Figure 2: The Realm of the Potential (Rojas, 2008)

Within the Rojas “Realm of the Potential” model, we can see that the UBC Farm and learners who support its growth together create a form of reality “as it should be”. As the centrepiece of the Centre for Sustainable Food Systems, the Farm strives to be a model of that ideal world, to portray a working representation of a food system as it could or should be (UBC Farm, 2001). If learners are able to come to the UBC Farm with their personally constructed reality and their knowledge from theoretical coursework and life of the way the world is, and engage with the Farm as an ideal reality, then the Farm is doing exactly what it aims to do. Through this engagement with the “ideal”, learners create an image of future potential, then assimilate that potential into their learning and take it with them into their lives and careers beyond the university and the Farm. At least some of the participants in this study appear to recognize this as the role of the Farm and clearly mention using it as such. Amanda referred to the farm as a stepping-stone, which seems like a similar analogy. It is a place where students can immerse themselves in an ideal food system reality, which will hopefully help them to form an image of how they could potentially make a difference in life, before stepping into the world “as it is”.

While the UBC Farm may present an image of an ideal food system, it is also part of a growing sub-culture of local sustainable food systems that is becoming more a part of reality as it is (Halweil, 2002; Kloppenburg, 1996; Pollan, 2006; Pretty, 2007). At 20% growth per year, “organic” is the fastest growing food sector, and while not all of this represents small, diverse farms serving a local market, it has led to an increase in the demand for university graduates with working knowledge of organic and sustainable food systems throughout North America (Agunga, 1995; Francis & Carter, 2001; Trexler, Parr, & Khanna, 2006). There are now over 60 student farms in North America, and a number

of sustainable agriculture education programs either newly developed or under development (Biernbaum, Thorp, & Ngouajio, 2006; Delate, 2006; Ferguson, Lamb, & Swisher, 2006; Francis et al., 2001; George, Clewett, Birch, Wright, & Allen, 2007; Markhart, 2006; Ngouajio et al., 2006; Parr & Van Horn, 2006; Schroeder, Creamer, Linker, Mueller, & Rzewnicki, 2006; Trexler, Parr, & Khanna, 2006; Vedeld & Krogh, 2005). Participants in UBC Farm academic programs are particularly interested in the field of sustainable agriculture, and intend to use the skills gained at the UBC Farm in their undergraduate programs and in their careers (see Chapter 3: Results).

Many of the responses under this theme dealt with gaining real world experience that would be applicable and beneficial to future careers or post-graduate work. John Dewey was a pioneer thinker on experiential learning (EL), who wrote extensively on the role of EL as a way to promote life-long learning. Dewey was adamant that education needed to be about more than just filling students' heads with information, but should instead be more focused on helping students to become better citizens, and be more effective in their work and personal life (Dewey, 1938). He developed a theory on experiential learning methods as the web that connects education with work and personal development (Figure 3) (Dewey, 1938; Kolb, 1984).

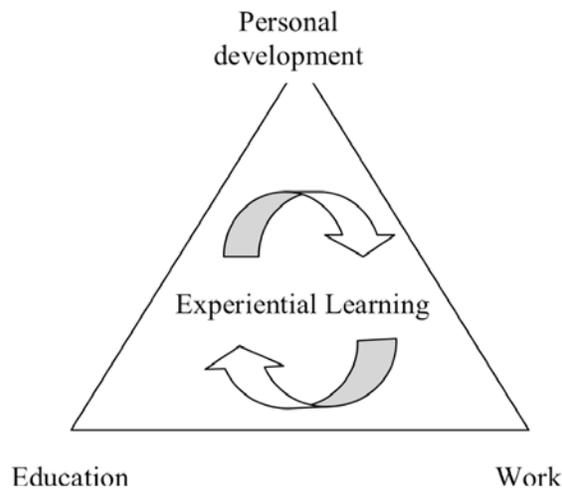


Figure 3: Dewey's Experiential Learning Process (adapted from Kolb 1984)

Participants in UBC Farm academic programs state that they developed skills and knowledge through the practical projects they undertook at the Farm that will serve them throughout their lives as they move beyond their degree program. This seems to reflect Dewey's goals for experiential education. This is not to say that UBC Farm programming represents a perfect model of EL. As will be discussed, there are several ways that Farm programming can be enhanced to improve its capacity to deliver effective experiential learning.

Another reason that participants mentioned that they valued the practical learning at UBC Farm was because they retained knowledge learned more effectively than if they had just read or been taught the theory. To better understand this we can turn again to theories of transformative learning. According to Mezirow all learning is a process of making meaning. As adult learners we already have a full set of "meaning schemes" that make up our beliefs and assumptions and how we see the world. In order to "learn" something new, it either has to fit into our existing meaning schemes, or we must make

adjustments to our meaning schemes in order to accommodate the new piece of knowledge – which is why all adult learning is transformative (Mezirow, 1991). According to the model of Transformative Sustainability Learning (TSL), the method by which this transformative learning happens is that the learning process engages the student in all three learning domains: Abstract/rational, psycho-motor, and affective (Sipos, Battisti, & Grimm, 2008). To simplify, in order for any learning to be transformative and truly have the student create new meaning that will stick with them for the long term, the learning process must engage the learners’ higher brain process, “abstract/rational” or *head*, their physical body, “psycho-motor” or *hands*, and their values and beliefs, “affective” or *heart*.

In discussing her SDL project, Sarah described feeling a strong affective connection to her project. “It stands alone on my resume as something that I feel really proud of and really excited about and really emotionally connected to...I love that project.” She also describes the cognitive and psycho-motor elements of the project as being significant. “Having the realistic application of my knowledge, rather than just doing theoretical discussion about an orchard and learning about it theoretically, I actually got to do the hands-on application and apply that knowledge so now it’s more tangible to me and it’s information I think I will retain better.” This suggests that for Sarah and many of the other participants in UBC Farm academic programs, all three domains of learning were engaged and the learning process was transformative, and could lead to lifelong learning (Cranton, 1994; Mezirow, 1991).

D. I gained a sense of confidence and ownership

Learner control or autonomy is one of the more talked about aspects of experiential learning. David Boud (Boud & Pascoe, 1978; Weil & McGill, 1989) has identified three features that are common, in varying degrees, to the EL programs he has studied: 1) the degree of correspondence of the learning environment to the real environment; 2) the degree of involvement of self; 3) the degree of learner control. We have already had a lengthy discussion about students' perception of the value of UBC Farm programs and its correspondence to the real world. We have seen in the results that students had a high degree of self-involvement and emotional learning with the projects, and will discuss this further in the next section. What is clear from the participant responses under this theme is that there was also the perception of a high degree of learner control or autonomy over the UBC Farm projects. Boud (Weil & McGill, 1989) also goes on to distinguish three aspects of autonomy that he feels are often confounded. The first, and most obvious in this case is *autonomy as an approach to teaching and learning*. Here is where students engage in 'self-directed learning' through a whole range of possible teaching methods. In the case of UBC Farm programs, we have an example of students engaging in self-directed learning through three quite different programs and reporting favourably about some of the outcomes. The second aspect is *autonomy as a goal*. "Here the aim of the educators is to foster the development of autonomous persons, i.e. people who will reach their own understandings and make their own decisions without being unduly influenced by others." (Weil & McGill, 1989: 43). From the responses of participants it appears that UBC Farm programs have been effective at

contributing to developing autonomous persons (Table 3, ID). Many of the student responses under this theme spoke of how the students gained more confidence in areas such as decision-making and project management. The third and final aspect identified by Boud is *autonomy as a necessary element in learning*. Here we are referring to students becoming autonomous with respect to a given body of knowledge and skills (Weil & McGill, 1989). From the responses of participants it is clear, particularly in the case of the directed study students, that the majority of them feels they became autonomous with a given body of knowledge and skills (Table 3, ID). We can see this clearly with respect to practical research, and with respect to each of their specific topic areas. In the case of the Rooted and CSL students, there is not enough evidence in most cases to suggest whether they did become autonomous in a given area of knowledge.

To summarize, participants in UBC Farm academic programs did report achieving a high level of control and autonomy through their projects. This autonomy led to increased knowledge and skill retention (lifelong learning), and increased confidence in decision-making, project management, and facing and overcoming challenges. The autonomy achieved did satisfy all three aspects as described by Boud, although only conclusively for the directed study group in terms of becoming autonomous in a body of knowledge.

E. I learn best through concrete experience

As we saw in the results, eight of the 16 participants reported themselves as learning best through a practical or experiential style. This is particularly interesting as this is not information that was sought in the interviews, it was simply volunteered by half of the

participants. One hypothesis is that students who are practical learners are much more likely to be drawn to UBC Farm programs than those who are not, but it would be interesting to test this.

In Kolb's (1984) experiential learning theory, the author describes four different learning styles that all learners fall into, based on their socialization, prior learning experience and current reality. These learning styles correspond to the four stages or components of experiential learning that we saw in Kolb's EL model (Figure 1). The first is the *convergent* learning style, which relies primarily on the abilities of *abstract conceptualization* and *active experimentation*. Next is the *divergent* style, which shows strength in *concrete experience* and *reflective observation*. Third is *assimilation*, where the dominant learning abilities are *abstract conceptualization* and *reflective observation*. Finally we have the *accommodative* learning style, which emphasizes *concrete experience* and *active experimentation* as learning strengths (Kolb, 1984: 77-78).

Accommodative learners learn best by “doing”, by having a practical application of their learning, as Kolb describes:

The greatest strength of this orientation lies in doing things, in carrying out plans and tasks and getting involved in new experiences. The adaptive emphasis of this orientation is on opportunity seeking, risk taking, and action. This style is called accommodative because it is best suited for those situations where one must adapt oneself to changing immediate circumstances. (Kolb, 1984: 78)

Based on the responses of the participants, it is likely that many of them are accommodative learners. Certainly the participants who voluntarily described themselves as learning best through practical methods seem to be placing themselves in this category. Kolb has developed an instrument, called the Learning Style Inventory (LSI), which uses subjects' responses to questions to identify them with one of the learning styles. Through

a review of studies conducted with post-secondary students in design and architecture programs, I found that about 15-20% of the students were identified as *accommodative* learners (Brew, 2002; Demirbas & Demirkan, 2007; Kvan & Jia, 2005; Moores, Change, & Smith, 2004). I found no studies that involved applying the LSI to students in agriculture or applied biology programs, although it seems likely that students who have predominantly *accommodative* learning style would be drawn to applied learning programs and particularly to practical learning programs such as those offered at the UBC Farm. I took the LSI test myself, and found that I fall into the *accommodative* learning style category. It would be an interesting study to apply the LSI to gather data on the percentage of UBC students that fall into each learning style and compare that to the dominant learning styles of the students using the UBC Farm. Greg said “if you want to consider sort of learning styles, it provides a forum for people like me that generally isn’t available.” Greg may have a predominantly accommodative learning style, and the data indicates that participants in UBC Farm academic programs appreciate the Farm as somewhere that provides a necessary venue for concrete experience, active experimentation and learning by “doing”.

4.2.2 A HEART CONNECTION IS AN IMPORTANT COMPONENT OF LEARNING

A. I engaged in the project because I was emotionally drawn to it

The second meta-theme that emerged from interview participants’ responses was in the area of emotional connection and emotional learning. In the well-recognized

“Bloom’s Taxonomy” (Bloom, 1964) of learning domains, these responses would fall into the affective domain of learning. In the affective domain we are concerned with the enablement of values, attitudes, morality, and spirituality as they affect behaviour and learning (Sipos, Battisti, & Grimm, 2008). Recent studies in the area of emotional learning have demonstrated that engaging learners at an emotional level can lead to greater development at the cognitive level of learning (Goodman, 2000; Palmer, 2004). A long-standing belief that emotion serves to impair logic and reasoning (dating back to Descartes and other thinkers of the Age of Reason), is being disputed, and there is now evidence that, far from being an impediment, emotional engagement is important, if not indispensable for many functions of cognition and learning (Blanchette & Richards, 2004). If we return to David Boud’s model of experiential learning, we can see that one of the three main dimensions of experiential learning is the “degree of involvement of self” (Weil & McGill, 1989). In reviewing a variety of experiential education programs, Boud found that all of them sought and achieved, to varying degrees, some self-involvement or emotional ‘buy-in’ from students (Boud & Pascoe, 1978). The same can be said for transformative learning where the goal is perspective transformation through critical analysis and revision of our meaning perspectives or worldviews (Cranton, 1994; Mezirow, 1991). The more emotionally engaged a student is in the learning process, the more likely that the new knowledge and skill will be ‘taken home’ as a transformative life-long lesson (Sipos, Battisti, & Grimm, 2008). Responses from participants in this theme demonstrate that an emotional connection is cited as one of the reasons that students choose to engage in an academic program at the UBC Farm. This is felt to be

important because it demonstrates evidence of “involvement of self” or emotional buy-in right from the outset.

B. I feel a passionate connection to the project and the UBC Farm

The UBC farm is a beautiful place. Both the forest and the fields support a thriving diversity of plants, animals and fungi. There is a moral position commonly referred to as ‘eco-centrism’. As opposed to ‘anthropocentrism’ through which humans and human activities are viewed as paramount in the global community, someone with an eco-centric view would tend to consider humans as merely one set of many equal stakeholders in the interdependent web of life on earth. Aldo Leopold beautifully stated the moral position of eco-centrism over 50 years ago: “A thing is right when it tends to uphold the beauty, integrity and stability of nature. It is wrong when it tends otherwise” (Leopold, 1949/1989). The eco-centric position is a pillar of all of the UBC Farm’s activities. You can see it reflected in the Farm’s mission:

The UBC Farm will function as a catalyst for change through the investigation and demonstration of alternative methods that improve the ecological, economic and social health of our urban communities. The UBC Farm will provide educational, research and practical leadership in the area of agro-ecological design and planning in a manner that ultimately benefits present and future community farmers, foresters, planners, designers, developers, managers, leaders and other citizens. (UBC Farm, 2001)

Participants in UBC Farm academic programs expressed a connection to the value position of the Farm. They felt emotionally and spiritually connected to the Farm because of its natural beauty, because it upholds the importance of learning about the integrity of

natural systems, because it reflects and promotes sustainable living (see Chapter 3: Results; Table 4, IIB).

This also led to participants expecting that they would be able to come to the Farm and connect with people who shared the same values and beliefs as them. A connection to community was one of the most oft cited reasons participants felt an emotional and spiritual connection to the Farm. Students stated that they liked not only connecting with but also learning from people who shared their values. This type of learning from peers and mentors with whom a community connection is shared has been discussed at great length by the Russian social constructivist, Les Vygotsky. Vygotsky devised a theory he called the zone of proximal development (ZPD) (Vygotsky, 1978). He argued that there were two levels of cognitive development, the first being the worldview and knowledge already attained by the learner, and the second being that which it is possible for the learner to attain with the social support of someone who has already attained more knowledge in a given area. Learning occurs in the space between those two levels of development (Kolb, 1984; Parr, 2007a; Vygotsky, 1978). In order for this proximal development to be effective, learners must be able to assimilate the new learning into their already existing meaning perspectives, such that it can't deviate too much from the values, beliefs and worldview of the learner (Mezirow 1991, Cranton, 1994). This helps explain the attraction for participants, as learners, to the learning community at UBC Farm. Internships and apprenticeships, like Rooted and Sowing Seeds, are good examples of arranging a learner's zone of proximal development; faculty/student mentorship models, as with a graduate student or undergraduate directed study can also be a good example of ZPD, but conscious effort needs to be taken to be

present to the difference in knowledge and skill level to ensure that the student is getting the social support needed for learning (Parr, 2007a). As well as these formal learning structures that exist at the Farm, participants commented on the value of the informal learning that occurs. There were many comments from participants that touched on the learning that happened between peers while working in the UBC Farm fields or at the Saturday Market interacting with community members. These informal learning opportunities represent an important zone of proximal development at the Farm, and one to which participants seemed to be quite drawn.

Having discussed the ecological and community development services that the Farm performs, it is important also to discuss how the Farm is a link between the two. The UBC Farm positions itself as a model demonstration site for urban agriculture (UBC Farm, 2001), as such it is positioned right at the crossroads where nature and culture meet (Ableman, 1998, 2005). One eco-centric position on the state of our culture in North America is that we as a culture have lost our connection to nature (Leopold, 1949/1989; Orr, 2004). Certainly many have argued that we have lost our connection to food production and agriculture as dominant culture in North America (Gliessman, 2000; Halweil, 2002; Soule & Piper, 1992). As a centre for sustainable urban agriculture, occupying land right in an urban core and surrounded by 2 million citizens, the UBC Farm is in a position to not only model and study sustainable food systems, but to provide a very unique opportunity for urban citizens to connect with and learn about agriculture and food production. It was evident in the responses of participants that this unique positioning of the Farm as an opportunity to connect with nature and agriculture was very important to them. Particularly in the story of the sister and her partner connecting with

agriculture for the first time, and in several stories of participants being touched by seeing some thing that they planted actually grow (see Results, section IIB). It is clear in these stories and comments that the participants in UBC Farm academic programs are touched, moved and inspired by the opportunity that the UBC Farm provides to connect with agriculture, and that it brings them to the Farm, connects them with the Farm and community, and inspires them to learn more about sustainable food systems (see Results, section IIB).

C. I am concerned about the future of the UBC Farm

The UBC Farm in its current location on South Campus at UBC is designated as part of a “Future Housing Reserve” in the university’s Official Community Plan (OCP) (UBC, 1997b). Currently the decision for what will happen to the land base the UBC Farm now occupies is being reviewed through the Vancouver Campus Plan (VCP) process, which is being facilitated by the university’s Campus and Community Planning department (CCP, 2006). The future of the UBC Farm in its current location is still very much uncertain. As both an undergraduate and graduate student at UBC I have been privy to many discussions with students and student groups concerned about the future of the UBC Farm. Currently, there is student, Faculty, staff and community movement, being coordinated by the Friends of the UBC Farm (FotF) student group that is lobbying and taking action to ensure that the Farm remains as a vital education, research and community resource at its current size and in its current location (FotF, 2008).

Not surprisingly, this emerged as a theme in this research, with some students voicing a strong emotional response to the idea of development on the Farm site. This

was not information that was specifically sought in the interviews. None of the participants were asked to comment on their reactions to the future of the UBC Farm or the possibility that the Farm might lose some or its entire current land base. The fact that it did emerge as a response from some participants reinforces the concept that participants feel a strong emotional and spiritual attachment to the UBC Farm, as was discussed in earlier sections.

4.2.3 UBC FARM PROGRAMS NEED MORE STRUCTURE

The second part of the primary research question in this study, *what do students need or want from sustainable food system education that isn't currently being met or fully addressed by UBC Farm education programs?* is addressed in this section. The goal is to compile a list of student needs and wants that can be used to make suggestions for potential enhancement of UBC Farm academic programming. Participant responses and suggestions fit into a variety of themes, all of which will be discussed here.

A. UBC Farm education programs need more cognitive structure and integration with academic programming.

One of the primary themes that emerged in the evaluation and suggestions of participants was that UBC Farm academic programs needed more of a cognitive element, or more connection to theory and academic learning (Table 5, IIIA). These comments can be clarified by looking again at the model of transformative sustainability learning and at various models of experiential learning. Remember that in the TSL model learners need to be engaged at three levels in order to achieve the goal of transformation: head, the rational level, hands, the practical level, and heart, the affective level (Sipos, Battisti, &

Grimm, 2008). It has been demonstrated that participants felt that UBC Farm programs provided high levels of both practical and affective learning (Tables 3 and 4), however, these responses make it clear that participants felt that the programs are lacking in the third level, abstract/rational learning (Table 5). This theme was more relevant among the Rooted and CSL participants, and seems to demonstrate that at least in the aforementioned programs, increasing the cognitive engagement of the participants would increase the potential of providing a transformative learning experience.

Methods for increasing cognitive engagement suggested by students included ideas to have more reflection and discussion as part of the learning process (Table 5). This idea is supported by the literature on experiential learning, which describes reflection as one of the most important and most talked about elements of the learning process (Weil & McGill, 1989; Joplin, 1981; Kolb, 1984). Laura Joplin has provided a strong statement of the importance of reflection in the EL process.

Experiential programs begin with two responsibilities for their program design: providing an experience for the learner, and facilitating the reflection on that experience. Experience alone is insufficient to be called experiential education, and it is the reflection process which turns experience into experiential education. The process is often called an “action-reflection” cycle. The process is generally referred to as a cycle, ongoing and ever-building, with the later stages being dependent on the earlier stages. Most program descriptions and experiential educators hold these as “givens” in defining experiential education. (Joplin, 1981: 15)

Joplin describes the experiential learning process as a five-stage cycle, beginning with a focus on the activity, followed by the challenging action, and completed with a debrief, which could include individual reflection and/or group discussion (Figure 4). Support and feedback are the other two stages, and are present through the whole process (Joplin

1981). She describes the five stages as part of an ongoing iterative cycle where the debrief from one lesson leads into the focus activity of the next.

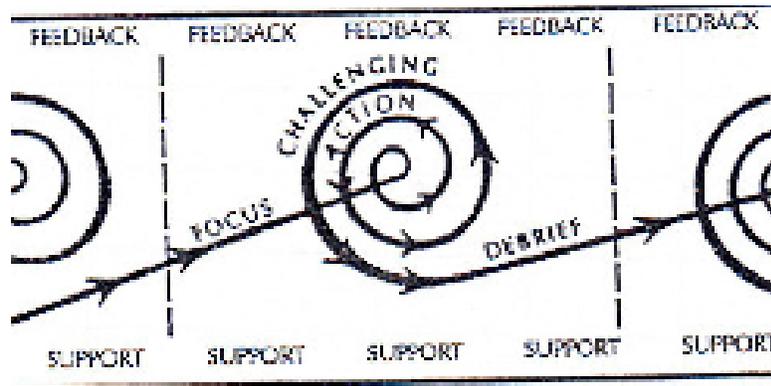


Figure 4: The five-stage cycle of experiential learning
(Joplin, 1981)

The need for reflection and cognitive structure is also supported by studies exploring what to include in a sustainable agriculture degree program (Trexler, Parr, & Khanna, 2006). In a Delphi study that rated the opinions of agricultural practitioners on what to include in an SA undergraduate major, both “practical experience that is augmented with theory and subject curriculum” and “interdisciplinary classroom discussion that challenges single subject system” rated very high alongside the suggestions for practical experience.

Some participants also mentioned under this theme a desire to have more ownership and autonomy over the learning process. These comments came from participants in the Rooted program (Table 5, IIIA), and are interesting as we discussed earlier comments from many other participants on the value of the autonomy they did have in their program

(Table 3, 1D). As discussed earlier in this chapter, student autonomy is considered an important component of both experiential (Weil & McGill, 1989; Joplin, 1981) and transformative (Cranton, 2004; Mezirow, 1991) learning theories, as it supports active participation with new skills and knowledge rather than passive acceptance.

Within this theme, participants also described the need to have increased integration of UBC Farm programs with academic curricula. Sustainable agriculture education programs at other universities support the value of this integration. At UC Davis, the Sustainability Curriculum Working group is in the process of developing a sustainable agriculture major that will include experiential learning and independent study at the Student Experimental Farm, integrated into a full academic program that also includes five core courses, a sustainable agriculture internship and a host of electives (Parr & Van Horn, 2006). This integration of student farm with academic curriculum programs is also evident at other universities with sustainable agriculture education programs (Biernbaum, Thorp, & Ngouajio, 2006; Delate, 2006; Ferguson, Lamb, & Swisher, 2006; Francis et al., 2001; Vedeld & Krogh, 2005).

Participants also suggested the value of the upcoming “internship” as a tool to officially integrate the Farm with the academic curriculum in the Faculty of Land and Food Systems. The Sowing Seeds Apprenticeship has completed a successful pilot year during the 2008 growing season at the Farm. Six apprentices spent 22 hours a week at the Farm for seven months, in a comprehensive sustainable agriculture education program that balanced theory with practical field experience. Plans for the 2009 Sowing Seeds program will involve 10-12 apprentices in a nine month program (Bomford, 2007a). As was discussed earlier (Discussion, section IA), plans are developing to integrate this

Apprenticeship with a six to twelve credit capstone practicum for students in the FENV concentration in the Faculty of Land and Food Systems (Vercammen, 2008). There is also a desire expressed by the LFS Faculty to further integrate all courses in the FENV concentration with UBC Farm programming (Vercammen, 2008). Academic integration emerged as an important theme in this research, it has also been an important theme for the UBC Farm since its re-emergence as a student-run Centre for Sustainable Food Systems in 2001 (Bomford, 2007a; Quayle, 2000). More will be discussed about possible future directions for academic integration of Farm programs in Chapter 5: Conclusion.

B. The UBC Farm needs to improve its physical and informational resources

One of the goals for the Farm Ambassadors program is to improve the informational resources and outreach at the Farm (UBC Farm Ambassadors, 2007a, 2007b). As discussed earlier, the FA directed study students have compiled a database of past research and learning projects that have been conducted at the Farm, as well as other resources that will facilitate the process of student learning and research at the Farm. Plans are for the FA program to produce informational materials that will promote student learning at the Farm, and make it easier for students to get involved in academic programs at the Farm (UBC Farm Ambassadors, 2007b). My intention is for Ambassadors to use the feedback data from this study to help inform the process of developing these materials. Another major goal of the FA program is to increase the diversity of faculties and programs involved, as is also suggested by participants in this study (Table 5, IIIB).

Physical space is a challenging issue, as there is a moratorium on building at the

UBC Farm and the buildings that exist at the Farm are already taxed to their limit (Bomford, 2007a). However, there is a graduate student in the School of Architecture and Landscape Architecture (SALA) who is currently designing a new multi-functional Farm Centre as part of an MA program, scheduled for presentation in January 2009. It may be possible to build something like this at the Farm, if the Board of Governors votes to amend the OCP and remove the Future Housing Reserve designation from all or part of the current UBC Farm land base (Bomford, 2007a; CCP, 2006).

Of course, building anything or adding tools to address student needs requires funding, another major challenge for the Farm as it receives no core funding from the university, and must rely on active fundraising and the revenues from Farm sales. For context, I communicated with the coordinators of other student farms in the US and Canada about their funding picture, and received responses from the student farms at Berea College in Kentucky, Washington State University, University of California at Davis, Evergreen College in Washington, North Carolina State University, and the University of Kentucky. All six of these student farms receive some funding from their college or university, each having at least one and at most nine university funded staff and Faculty positions directly involved with the student farm. Only one of the six (UC Davis) relies, as the UBC Farm does, on funding from external grants. All six student farms report experiencing some conflict between the need to support themselves financially and their mission as centres for teaching and learning, but all report that they focus their priority on education (Barker, 2008; S. Clark, 2008; Creamer, 2008; Jaeckel, 2008; Van Horn, 2008; Williams, 2008).

C. UBC Farm education programs lack human resource support

The final theme in the area of student needs and wants was to address the perceived lack of human resources support for Farm programs. This is an area that also comes down to funding. Until 2008, UBC Farm had never had a staff position that was specifically dedicated to coordinating the activities of students and faculty, it is a role that has mostly been taken on by the Farm's Program Coordinator, Mark Bomford, on top of many other duties (Bomford, 2007a). In terms of faculty support, the professors who do support projects at the Farm do so on their own time and their own initiative. At six surveyed student farms in the US, most have a farm manager that oversees farm operations as well as academic integration, but all also have at least one Faculty with a specific appointment to oversee academic connections at the student farm (Barker, 2008; S. Clark, 2008; Creamer, 2008; Jaeckel, 2008; Van Horn, 2008; Williams, 2008). This is another area that the FA program is intended to address at UBC Farm, by having a solid program and informational support structure for faculty, and by networking with a wide diversity of professors to increase the numbers, increase the interdisciplinarity and options for diverse Farm projects (Bomford, 2007a).

A summary of the results and discussion will be presented in Chapter 5:

Conclusion.

Chapter 5: **CONCLUSION**

5.1 Summary of findings

In its attempt to assess and evaluate sustainability learning at the Centre for Sustainable Food Systems at UBC Farm, and provide a blueprint for future enhancement of sustainability learning at UBC, this thesis set out to answer the following question:

What, if any, services and advantages do academic programs at the Centre for Sustainable Food Systems at UBC Farm provide toward advancing sustainability learning at UBC, and how can these programs be enhanced and improved, according to participants in such programs?

The motivation to ask this question came from the recent growth and success of sustainable agriculture education programs throughout North America and around the world (Biernbaum, Thorp, & Ngouajio, 2006; Delate, 2006; Ferguson, Lamb, & Swisher, 2006; Francis et al., 2001; Vedeld & Krogh, 2005), and a desire to build on a recent study in Transformative Sustainability Learning demonstrating the value of such programs at the UBC Farm (Sipos, 2005).

The data collection process involved both surveys and interviews with student participants in four different academic program areas offered at the UBC Farm. The results of the research confirm that participants in UBC Farm academic programs find that the Farm provides an effective and important contribution to sustainability learning at UBC. Participants appreciate the head, hands and heart model of teaching and learning and think that they were able to acquire knowledge, skills and confidence from their program at the Farm that was not otherwise readily available at UBC. Specifically, participants were of the opinion that UBC is limited in its capacity to offer practical,

experiential learning opportunities, and that the university needs more resources, like the UBC Farm, that offer these opportunities. Participants stated that having a practical component to their education is very important and valuable, and many of them specifically engaged in a project at the Farm because of the opportunity for practical, experiential learning. A frequently stated reason that participants valued the practical learning opportunities at the Farm was that it allowed them to gain confidence and skill by taking control and ownership over their learning. Many of the participants described themselves as tactile learners and as learning best through experiential opportunities.

Similarly, participants in UBC Farm academic programs expressed the value of having a “heart” – emotional and spiritual – connection to the Farm and to their specific project. Participants stated that their learning was enhanced because the projects engaged them at the affective level, and that this affective connection was an important factor in their decision to engage in an academic project at the Farm. For many participants this emotional connection extended to a concern for the future integrity of the Farm, and that helping to demonstrate its value and maintain and enhance it at its current level of programming or beyond was a key motivator in choosing to engage in a project there.

Finally, the study found that participants had many valuable suggestions for how to improve and enhance the programming currently being offered at the UBC Farm. Primarily, the study found that participants thought that there could be more abstract-theoretical structure, ie more “head”, involved in UBC Farm programming. Participants called for more theory integration and more opportunity for reflection to round out their experiential learning programs. In addition, participants stated the need for more learning resources, both physical and textual to enhance the potential for unique and valuable

academic programming at the Farm. They also called for increasing the human resource support for students and for academic programming, which might enhance the learning potential.

The main take home message is that participants in academic programs at UBC Farm value the ability to learn by integrating all three learning domains of head, hands and heart. They further find that the Farm is unique and valuable in its ability to offer learning programs that integrate hands and heart learning, however they find that improvements could be made to UBC Farm programs in their capacity to integrate head learning. The implications and recommendations based on these findings will be offered next.

5.2 Recommendations based on findings

Several recommendations are directly highlighted by the results of this research. These recommendations fall into two sections: recommendations to UBC, and recommendations to the Centre for Sustainable Food Systems. Each recommendation is stated and briefly discussed below.

5.2.1 Recommendations to UBC

The university needs more programming for hands and hearts-on learning

This study helped to demonstrate that many students learn best in an environment that engages them not only at the abstract-rational level but also at the level of their psychomotor and affective learning domains. Participants in academic programs at the UBC Farm feel that there are insufficient opportunities at the university to participate in a

learning environment that engages learners at all three learning domains. This is something that has been discussed at the administrative and faculty levels of the university (CIT, 2000; UBC, 2004). However, the reality is, many students still graduate feeling that they didn't receive the opportunities for practical and affective learning that they would have liked. The university should take an active role in ensuring that each of the faculties, colleges and schools at UBC is providing the opportunity for students to engage in hands and hearts-on learning. Every student in each faculty should have the opportunity and be encouraged to take on a practical learning/research project. There should be diversity and flexibility in these projects so that students can choose a subject that they are interested and passionate about, and so that students are able to take some ownership over their learning. Also, as much as is possible these projects should take place not only in a laboratory, but with some connection to the external world so that students feel like their work has some real influence. Increasing these opportunities for students can and should be supported through faculties making more of a connection with centres such as the UBC Farm, and through initiatives such as the Discover Undergraduate Research Office.

The UBC Farm should have a secure land base and funding support from the university.

A number of participants in UBC Farm academic programming mentioned that they were concerned for the future of the Farm. Some stated that the threat to the Farm was one of the things that motivated them to be involved in producing good research/learning work to show the value of the Farm. Participants also described many areas in which the Farm could improve its programming, including having more structured programming, more

access to human and physical resources, and better promotion to get more people involved. The Farm has been limited in these areas because of its uncertain tenure and lack of funding. Since the Farm was designated as a Future Housing Reserve in 1997, there has been a complete restriction on building on the site, meaning that increasing infrastructure, adding more classroom, laboratory and administrative space, has been impossible. In addition, the uncertain tenure of the Farm has led many instructors, researchers and funders to think twice about investing in UBC Farm programming. The Farm has not been able to attract the kind of long-term teaching and research projects that would allow it to fully realize its potential as a world class international centre for sustainable food systems. It has also not had sufficient funding to develop the programs and have the human resources to support them. This is all directly attributable to the lack of support and security for the land base and the lack of financial support for programming.

The university should realize the value of the UBC Farm, and provide the support it needs to realize its immense potential. To begin with, the university should provide security for the UBC Farm by guaranteeing the full 24-hectare site, in its current location, with a long-term (at least 50 year) lease. Next the university should provide the UBC Farm with the funding necessary to develop and maintain needed infrastructure, programming and human resources support, thus recognizing the value and vast potential of the Farm as a site for university sustainability learning and research. By doing these things, the university would allow the UBC Farm to realize its potential of being a world-class international Centre for Sustainable Food System learning and research.

5.2.2 Recommendations to the Centre for Sustainable Food Systems at UBC Farm

UBC Farm should expand its programming and develop more structured learning programs

Responses from participants in academic programs at the UBC Farm indicate a need for more structured programming. In particular, participants expressed a desire to have more theoretical structure in existing programs: more opportunity to discuss and reflect on what they had learned, and to make connections between what they learned at the Farm and how it applies to local and global realities. There was also an expressed desire to be involved with longer term programming so that participants could see that they were contributing to something larger, rather than simply participating in a one-time project. The UBC Farm made a great stride in this direction in 2008 by formally inaugurating the Sowing Seeds Apprenticeship. The Apprenticeship addresses many of the issues in the Rooted program that have been identified in this study. It maintains a balance between theory and practice, providing students with the theoretical background and justification for all that they are learning. Sessions where students discuss what they are learning and the relevance it has to other streams of knowledge are scheduled as part of the program. In addition, apprentices are made aware that they are part of an ongoing program that will evolve based on their experiences and feedback. The UBC Farm would do well to begin applying this kind of structure to all of its academic programs. The Farm can work with instructors in each faculty to develop ongoing programming for the courses that are using the Farm regularly. In addition, the Farm can continue to work closely with the UBC Community Learning Initiative to advance a structured Community Service Learning

program for each of the three yearly semesters. There can also be a more structured program in place for directed learning students, providing them with guidelines for projects, suggested research/learning areas, a list of resources and a full time contact for trouble shooting, discussion and reflection. All of the above would be facilitated by maintaining a full-time position for an Academic Coordinator, whose responsibility it would be to maintain and enhance academic programs and connections at the Farm.

CSFS should have better human resources support

In 2008, for the first time, the CSFS supported an Academic Coordinator staff position. This position should be made permanent, full-time, and year round if possible. In the past, there has not been a staff position that was directly responsible for the academic programming at the Farm. This has resulted in a situation where academic courses and students using the Farm are dealt with on a case-by-case basis, with little continuity and structure. A full-time Academic Coordinator would be able to address the recommendations that flow from this thesis, developing the programming and providing the structure and human support that will allow academic offerings at the UBC Farm to move from projects to programs.

CSFS should develop physical infrastructure

Currently, a UBC SALA Masters candidate is completing a graduate project, due in January of 2009, in which he is designing the plans for the new buildings and infrastructure that will be needed to efficiently house current and projected programs at the UBC Farm. His designs include a new multi-functional Farm Centre that will include

two kitchens, multiple classrooms and meeting spaces, as well as washrooms, administrative space, and offices for visiting faculty. In addition, his plans include a new integrated harvest processing and storage facility, and vehicle and equipment storage facility with designated workshop and laboratory space. Clearly, in order to actually put these planned buildings in place, the UBC Farm would require that its land base be secured and that substantial funding be made available. If the Farm is able to follow through with the plans being developed and build the infrastructure described therein, the potential to provide sustainability learning on a large scale at UBC will be greatly increased.

CSFS programming should be better promoted

Participants in UBC Farm academic programming stated the need to get more students and faculty and a greater diversity of both involved at the Farm. This is the main goal of the Farm Ambassadors program, described earlier in the Discussion chapter (section IIIB). The plan for the FA program was to have a paid coordinator who would work to establish ambassadors in each of the faculties, colleges and schools at UBC, and work to disseminate information about the academic opportunities at the CSFS. This program is being looked at again by a group of students in AGSC 350 in the fall of 2008. However, this program has never officially been established. It is a very important step in promoting the Farm in general, as well as increasing the number of students and faculty involved in its sustainability learning offerings that the FA program is officially launched, a coordinator hired, and that it be established well enough to ensure its

continuity. Ensuring that all these steps are taken should be one of the foremost tasks of a new Academic Coordinator.

5.3 Concluding thoughts

There are clear indicators that world is facing both an ecological and a food system crisis, and that the two are integrated and feed off of each other. At the same time many people are coming to realize that we also have a crisis of education. It is becoming clear that what we teach and the way that we teach it may have a direct contribution to the global crises we now face. As David Orr wrote: “it is not more education, but education of a certain kind that is required” (Orr, 2004: 8) to address the global social and ecological issues that are now a daily reality. As such, post-secondary programs delivering ecologically realistic education methods or sustainability learning have been popping up across the U.S. and Canada for decades. There are today over 60 student farms that are the centerpiece of a sustainable agriculture education program at universities and colleges throughout the U.S. and Canada (Rodale Institute, 2008). Some of these have existed for over thirty years. Today, as the food and climate change crises have reached their most critical point, UBC’s Centre for Sustainable Food Systems at UBC Farm, continuing to grow in scope and relevance, has reached a crossroads. In the next few months a decision will be made that will directly affect the future potential of the Farm. If the decision is to maintain the Farm at its current size and location and provide support for programming, the UBC Farm is poised and ready to become an internationally significant Centre for Sustainable Food System learning and research, with the potential to make important contributions to addressing the crises we now face. If the decision is to downsize and

disrupt the Farm, the CSFS will lose the momentum and relevance it has built up, and will have to start again with a much more limited potential. The administration, staff, faculty and students of UBC all have the opportunity to have influence in ensuring that UBC maintains and promotes the jewel in the crown of sustainability learning at UBC. This thesis is dedicated to creating the possibility that we all will have the foresight to do so.

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Appendix A: Survey

2007 UBC Farm Tour Survey

On a scale of 1-5 (1 is poor, 5 is excellent) how would you rate the following components/outcomes of your education tour?

- | | | | | | |
|---|---|---|---|---|---|
| a) Overall learning experience | 1 | 2 | 3 | 4 | 5 |
| b) Learning new ideas/concepts | 1 | 2 | 3 | 4 | 5 |
| c) Thinking about life/career/education goals in new ways | 1 | 2 | 3 | 4 | 5 |

2) What was the best/most rewarding aspect of the tour?

3) How can this tour be improved? What was missing?

Appendix B: Interview Script

Exploring Sustainability Learning at the Centre for Sustainable Food Systems at UBC Farm

Interview script – June 4, 2007

Introduction

Project description - This research is part of my Master's thesis work in the Integrated Studies in Land and Food Systems program. I am working with the Centre for Sustainable Food Systems at UBC Farm (CSFS) to carry out this exciting project. I will be conducting one-on-one interviews with participants in UBC Farm programs as part of an assessment of the programs at CSFS. The goal of this assessment is two-fold: first, we want to assess the role and value of CSFS educational programs as components of the teaching and learning that takes place at UBC. Second, we hope to evaluate the current programs at CSFS in hopes that they can be improved and enhanced to increase their role and value at UBC.

Disclaimer - I am collecting this information for the purpose of a research project, and your answers for this research will not affect my affiliation with you as a UBC Farm employee who is involved in your learning experience at the UBC Farm (ie. your answers will not be used to evaluate or otherwise change our relationship). Please share the most honest answers of how you really feel. For this research to be effective, please do not tell me what you think I want to hear, or what you think would be best for the UBC Farm.

A. Warm-up

Demographic Questions

- 1) Describe your current level of education
 - a. Current UBC Student
 - i. Level? - Undergrad (what year?); master's; PhD
 - ii. Program?
 - b. Current student at another university/college?
 - i. Level? - Undergrad (what year?); master's, PhD
 - ii. Program?
 - c. Graduate of University/college
 - i. What level?
 - ii. What program?
 - d. Have not attended post secondary

(Probe: have you had any non-university experiences that you consider to be good learning experiences? Why?)

- 2) What is your age? (If uncomfortable provide ranges):
 - a. Under 19
 - b. 19-24
 - c. 25-34
 - d. 35-44
 - e. 45-54
 - f. 55 & up

- 3) Where were you born? How long have you been in Vancouver? What brought you here?

General Project Description

- 4) Please provide a brief description of the project you were involved with at the UBC Farm. (Allows participant to describe project in own words w/out pre-structure to see what emerges). (*Probe: How long? Individual or group? Part of a class?*)
- 5) Have you ever engaged in what you would consider to be a similar project/experience? If yes, please briefly describe the experience... (Allows participant to describe/compare w/out pre-conceived notions...)

B. Main Interview Body – Assessing Sustainability Learning

- 6) Was it your choice to participate in a project at the UBC Farm?
 - a. If yes: Why did you decide to participate? Was there anything specific you were hoping to get out of the experience? (*Probe: Did you hope to learn something? Did you have any learning objectives? Did you expect a certain style of learning? If yes, is that the style you experienced here?*)
 - b. If no: Who's choice was it? What was your reaction to the idea of participating in a project at UBC Farm? Did you have any expectations/objectives for the experience?

- 7) Did the experience meet your expectations and/or objectives? If yes, in what ways? If no, what was missing?

- 8) What did you find most challenging in your UBC farm program experience?

- 9) What did you find most rewarding in your UBC farm program experience?

- 10) How did your experience with this program/project compare to other university/college course experiences (*probe: interaction with the UBC Farm setting*)?

11) Do you think you will do anything differently as a result of your experiences in this program/project? Has this experience created any new ideas or possibilities in relation to your thinking about your educational, career or life goals?

12) How does your UBC Farm program experience relate to “sustainability” as you understand the concept?

***Rating Scale here*

13) Did completing the rating exercise trigger any thoughts that we haven't discussed regarding your experience with the program? (*Probe about understanding of sustainability; new ideas, goals, potential new behaviours; application of real world problems; integration of disciplines; comparison to other course experiences.*)

14) Overall, how would you rate the program as a learning experience? (From 1 to 5, with 1 poor and 5 excellent?)

15) What changes would you recommend for future programs such as this one? Is there anything you feel is missing from UBC Farm educational programming?

16) Thank you very much for giving me your time and for contributing to this important research project. Is there anything else you'd like to tell me about your UBC Farm program experience – anything we didn't cover? How can this interview process be improved – please provide any feedback you have? Do you have any final questions about the research project? (interested in results?)

Appendix C: Rating Scale

Rating Scale Exercise

At this point, I would like to hand you a sheet of paper with eleven statements that relate to your experience with the project at UBC Farm. Please read through each statement carefully, and rate your feeling about the statement with the response that **best applies to you** from the scale below. This exercise is rated on a 5-point scale, with the following range of possible responses: 1) Strongly agree, 2) somewhat agree, 3) Undecided, 4) somewhat disagree, 5) strongly disagree.

Please take your time and rate each statement to the best of your ability. Please do not put your name on the exercise sheet. We will keep the responses anonymous by identifying all information by code only. When you are finished with the exercise, we will slide it into this un-named envelope.

- a. This project effectively **integrated** a variety of university elements in the learning process (eg. Research, teaching, learning, university operations, collaboration with the community).
- b. I feel that this project effectively combined different learning disciplines and ways of learning (streams of knowledge) in the learning process.
- c. This project allowed me to approach problems from a “big picture” perspective, making connections between my learning experience here and external forces and factors influencing food and agriculture.
- d. This project helped me to understand what sustainability means, and how I can contribute to it.
- e. As a result of participating in this project, I have developed some new ideas about my life goals.
- f. As a result of participating in this project, I have decided I will change something in my life.
- g. I feel this project was effective in allowing me to work on and learn from real world problems.
- h. Throughout the project I was encouraged to reflect on how the problems we were dealing with relate to my own life.
- i. I feel the project was effective in allowing me to work on local problems that have relevance in our local community and context.
- j. This project helped to develop my ability to collaborate and cooperate with others.
- k. This project allowed me to work on real local issues, and helped my understanding of how these issues can serve as a model in understanding larger – regional, national, global – issues.

Appendix D: Introduction Letter

Dear UBC Farm program participant,

This letter is to invite you to participate in a research project entitled *Exploring Sustainability Learning at The Centre for Sustainable Food Systems at UBC Farm*. The research is part of my graduate student work at the University of British Columbia (UBC), and I am working with the Centre for Sustainable Food Systems at UBC Farm (CSFS) to carry out this exciting project. Through this study, we hope to gain a better understanding of the role and value of educational programs at CSFS in the context of sustainability learning at UBC, and provide an evaluation of current programs at CSFS, with suggestions for improvement and enhancement.

CSFS is one of many centres and institutions worldwide providing access to a variety of experiential, service and place-based educational opportunities to complement adult learning at an institute of higher learning like UBC. It is important to assess these centres and educational programs in terms of their role and value toward advancing sustainability learning at universities and colleges.

This project seeks to assess the programs at CSFS in terms of their role and value as components of the teaching and learning that takes place at UBC. In addition, we hope to evaluate the current programs at CSFS in hopes that they can be improved and enhanced to increase their role and value at UBC. To achieve these goals we will be observing and reviewing programs as case studies and conducting one-on-one interviews with participants in UBC Farm programs.

It's our hope that the study results will provide information about the value of programs for experiential learning like those provided at CSFS, as well as a framework with which to develop and improve upon such programs.

Please find as an additional attachment a consent form with more details about the study. Feel free to keep this letter for your records. If you are interested in learning more about, or participating in, this study, please contact me within a few days of receiving this letter. You can be assured that your identity will remain strictly confidential. Please feel free to contact me with any questions you may have about this research project. Thank you for your time, I look forward to talking with you!

Sincerely,

Gavin Wright
MSc Candidate
Faculty of Land and Food Systems
University of British Columbia

Appendix E: Informed Consent

Consent Form

Exploring Sustainability Education at The Centre for Sustainable Food Systems at UBC Farm

Principal investigator: Art Bomke, Associate Professor, Faculty of Land and Food Systems, University of British Columbia (UBC)

Co-investigators: Gavin Wright, MSc candidate, Faculty of Land and Food Systems, UBC; Dr. Alejandro Rojas, Senior Instructor, Faculty of Land and Food Systems, UBC; Dr. Shannon Binns, Assistant Professor, Faculty of Land and Food Systems, UBC

Purpose of study: The purpose of this research is two-fold. First is to provide an assessment of the role and value of educational programs at the Centre for Sustainable Food Systems at UBC Farm (CSFS) in the context of sustainability learning at UBC. Second is to provide an evaluation of current educational programming at CSFS, and make suggestions for improvement and enhancement

Educational programs are defined as any program at CSFS that includes as one of its objectives to provide learning for adult participants. Educational programs include, but are not limited to: university courses using CSFS as part of their curriculum; student directed studies projects using CSFS; interns at CSFS; participants in the CSFS volunteer program. You are being asked to participate in this study to share the valuable information you have as a participant/stakeholder in one or more of these programs.

Study procedures: This research will involve one-on-one interviews with participants in UBC Farm educational programs; these interviews will be conducted by Gavin Wright. Please contact Gavin within a few days of receiving the introductory letter to discuss your possible participation in this study. If you agree to participate, an interview time will be scheduled.

Interviews may vary in length but will generally take forty-five minutes to 1.5 hours. Interviews will be audio recorded for transcription purposes, but if you don't feel comfortable with this, you may request that your interview not be recorded by checking the box at the bottom of this form. The interview will take place at UBC Farm, or at a place of your convenience.

There are no known risks to participating in this study. We hope that the results of this research will give CSFS and other adult education centres information that will help in designing effective educational programs and centres for experiential learning. However, we cannot guarantee that you personally will receive any benefits from this research.

Confidentiality: You can be assured that your identity will be kept strictly confidential. All questionnaires and interview transcripts will be identified only by code number, and all study documents will be stored in a locked filing cabinet. Computer files containing

subject data will be password protected and not exchanged via e-mail. The four investigators – Art Bomke, Gavin Wright, Alejandro Rojas and Shannon Binns – will have access to the data. Mark Bomford at the Centre for Sustainable Food Systems at UBC Farm will have access to copies of questionnaires and interview transcripts which have had identifying information removed.

Participants will not be identified in any reports of the completed study. However, if you would like to give permission to have your comments attributed to yourself (rather than remaining anonymous) in any publications, please check the box at the bottom of the form.

Contact for information about the study: If you have any questions or would like more information about this study and its procedures, you may contact Gavin Wright

Contact for concerns about the rights of research subjects: If you have any concerns about your treatment or rights as a research subject, you may contact the Research Subject Information Line in the UBC Office of Research Services.

Consent: Your participation in this study is entirely voluntary. You may refuse to participate in the study, and you may withdraw from the study at any time without jeopardy to your relationship with the University of British Columbia or the Centre for Sustainable Food Systems at UBC Farm.

Your signature below indicates that you have received a copy of this consent form for your own records.

Your signature indicates that you consent to participate in this study.

- Please check this box if you do not want your interview audio recorded.
- Please check this box if you give permission to have your comments attributed to yourself (rather than remaining anonymous) in any publications.

Subject Signature

Date

Printed Name of the Subject

Appendix F: BREB Approval



The University of British Columbia
 Office of Research Services
Behavioural Research Ethics Board
 Suite 102, 6190 Agronomy Road, Vancouver, B.C. V6T 1Z3

CERTIFICATE OF APPROVAL - MINIMAL RISK

PRINCIPAL INVESTIGATOR: Arthur A Bomke	INSTITUTION / DEPARTMENT: UBC/Land and Food Systems	UBC BREB NUMBER: H07-00162
--	---	--------------------------------------

INSTITUTION(S) WHERE RESEARCH WILL BE CARRIED OUT:	
Institution	Site
N/A	N/A
Other locations where the research will be conducted: N/A	

CO-INVESTIGATOR(S):
 Gavin M. Wright
 Shannon Cowan
 Alejandro Rojas

SPONSORING AGENCIES:
 N/A

PROJECT TITLE:
 Adult Sustainability Learning: Exploring Educational Programs at The Centre for Sustainable Food Systems at UBC Farm

CERTIFICATE EXPIRY DATE: May 15, 2008

DOCUMENTS INCLUDED IN THIS APPROVAL:	DATE APPROVED: May 15, 2007
---	---------------------------------------

Document Name	Version	Date
Consent Forms:		
Participant Consent Form	#2	May 14, 2007
Letter of Initial Contact:		
Letter of Introduction	#2	May 14, 2007

The application for ethical review and the document(s) listed above have been reviewed and the procedures were found to be acceptable on ethical grounds for research involving human subjects.

Approval is issued on behalf of the Behavioural Research Ethics Board
 and signed electronically by one of the following:
