

**RE/LEARNING TO TEACH: THREE TEACHERS' EXPERIENCES IN AN
ENVIRONMENTAL EDUCATION INITIATIVE ON AN URBAN FARM**

by

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Abstract

“Re/learning to Teach” is a case study that explores three elementary teachers’ experiences teaching in the Intergenerational, Landed Learning Project (LLP), an environmental education initiative on an urban farm, and examines the impact of these experiences on the teachers’ professional growth and practice.

To achieve this goal, I employed a case study approach. I worked with three teachers who had participated in the LLP over a number of years. I observed these teachers as they taught lessons in their classrooms and participated in activities with their students at the farm. I also used semi-structured interviews to gain insight into the teachers’ motivations for participating, the challenges they experienced during their participation, their learning, and the ways their professional practice changed over the course of their involvement.

My study revealed that at the farm, teachers learned about food-growing, land stewardship, and the value of community learning, alongside their students. As they participated in this new educational space, the teachers experienced a number of challenges that prompted reflection and professional growth. They discovered new roles and learned teaching practices that helped them bring an environmental focus to their classroom lessons, their schools, and beyond. The findings also suggest that the people, the place, and the program of the LLP inspired the teachers to add a social action component to their lessons to motivate students to become responsible citizens and future decision makers.

Preface

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“It is not from ourselves that we will learn to be better than we are” (Berry, 2002, p. 29)

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Chapter 1 Introduction to the Study

1.1 The Problem

The concept of sustainability has been creeping into global consciousness since the early 1980s when the threat of climate change and resource scarcity first appeared on conference agendas and in policy documents. In response to the worldwide challenges of poverty, hunger, inequity, and environmental degradation, members of the international community, such as governments and non-governmental organizations, have begun to advocate for the reduction of greenhouse gases through mitigation measures, and call for sustainable development. Transnational agreements such as the Kyoto protocol, the Earth Charter, and the United Nations Education for Sustainable Development set targets to reduce the greenhouse gas effect and improve the standard of living worldwide (The Earth Charter Commission, 2000; UNESCO, 2006).

In 2005, the United Nations Decade of Education for Sustainable Development marked the beginning of a widespread awareness which recognized the necessity for an educational approach that presents, discusses, and engages with sustainability. To achieve these outcomes, curriculum developers began to incorporate sustainability concepts such as eco-literacy, global citizenship and community engagement into the curriculum (Svanstrom, Lozano-Garcia & Rowe, 2008; Tilbury & Wortman, 2008). From this research emerged a number of educational approaches that address the criteria above, such as education for sustainability (EfS), education for sustainable development (ESD), and sustainability literacy (Nolen, 2009). However, it is important to note that various

pre-existing educational approaches also addressed sustainability. For example, Sherren (2008) supported the idea that ESD is fundamentally connected to environmental education (EE). She claimed that the literature about ESD and EE does not prescribe teachers to teach specific disciplinary content but encourages them to focus on pedagogical approaches and methodologies which foster values, worldviews, and behaviour that support life on the planet. According to Sherren, the realm of the teaching of sustainability is not limited to the approach of education for sustainability but can also be part of various educational approaches including environmental education.

Discussion about what constitutes effective approaches to the introduction of sustainability into educational practices is taking place in the academic arena; however, most research conducted in the field of teaching sustainability takes place in the realm of secondary or post-secondary education. The teaching of sustainability at the elementary level remains, for the most part, un-researched (Rickinson, 2001).

Tilbury and Wortman (2008) suggest that EfS should address world problems by engaging students intellectually and emotionally to inform and inspire them to become active agents of change. They argue that the complexity of today's global environmental problems requires a holistic approach to problem solving, and identify EfS characteristics that would support this approach. The characteristics they outline define a curriculum that is interdisciplinary, learner-centred, experiential, place-based and rooted in the complexity of real life issues and events. Tilbury and Wortman note that these elements are not present in current school practices in US public schools. They speculate that part of the reason why teachers do not design lessons or teach according to these characteristics is a lack of training and experience with teaching about sustainability.

Although materials and resources for teaching about sustainability exist, there is a gap between the theory and practice of education for sustainability; between the incorporation of sustainability concepts into the curriculum and the actual pedagogy of teaching sustainability. To date, limited studies have examined teachers' experiences and efforts with integrating environmental issues and concepts into their practice (Rickinson, 2001; Rickinson, Dillon, Teamey, Morris, Choi, Saunders, & Benefield, 2004).

The research that inquires into teachers' experiences with the teaching of sustainability is in the area of environmental education. Recent literature has intensified a focus on the challenges of implementation that teachers encounter when they attempt to teach about issues of land stewardship, the connection between ecology and human well-being, and the actions that support a healthy planet (Alvarez & Rogers, 2006; Bartosh, Mayer-Smith, Peterat, & Sinkison, 2005; Johnson & Mapping, 2005; Tilbury & Wortman, 2008). These challenges can be grouped into the following four categories: (1) conceptual, (2) policy-practice, (3) institutional and (4) pedagogical.

Johnson and Mapping (2005) identify the conceptual challenges pertaining to environmental education. They emphasize that teachers should be aware of their values, beliefs and attitudes about environmental education because those will determine their choice of educational approaches to environmental education. In addition, teachers are expected to incorporate sustainability concepts into their curriculum and teach more than just environmental literacy (Svanstrom, Lozano-Garcia, & Rowe, 2008; Tilbury & Wortman, 2008). Educational researchers and practitioners urge educators to explore sustainability from social, economic and environmental dimensions, while inspiring a change in student behaviour. The difficulty of this demand is that most teacher education

does not prepare teachers to be environmental educators. Without experience or practice it is difficult for a teacher to choose an educational approach for the teaching of sustainability that reflects his or her beliefs and attitudes about sustainability. Without an informed approach, teaching about sustainability can become a fragmented process for teachers. The result may be that EE may become a low-priority addition to an already crowded curriculum.

The challenges of the discrepancies between policy and practice for teachers are outlined by Sipos, Battisti, and Grimm (2008) and Stevenson (2007) who discuss the difficulties teachers face when trying to introduce values in their classrooms that conflict with the values of current, dominant discourses in education. These authors explain that current worldviews justify actions which are detrimental to life on the planet. The authors advocate for a transition toward values that support sustainability. Dissinger (2001) discusses the policy pressures placed on teachers to increase their teaching objectives while they struggle with a lack of time to do so. Dissinger considers educational policies to be a set of idealistic demands that disregard the pragmatic problems of implementation necessary to meet these demands.

Tilbury and Wortman (2008) outline the institutional challenges of implementing environmental education. They point out how educational institutions can be a counterproductive force for teachers wishing to engage in teaching sustainability. This counterproductivity happens when the institutions themselves model or promote 'unsustainability' by not reflecting sustainability principles or practices in their operations, infrastructure, conduct, and governance.

Bartosh et. al. (2005) discuss the serious pedagogical challenge teachers face when they “[do] not feel competent in teaching environmental issues, most of which are interdisciplinary in nature and require knowledge of concepts from different subject areas” (p.2). This lack of confidence in understanding subject matter, specifically content knowledge, can make preparing to teach EE a difficult and time-consuming task for teachers.

Identifying teacher challenges with EE is important for educational policy-makers, school administrators, teacher educators, and teachers who want to focus on EE. But further research is needed. Educators at all levels need to understand what kinds of practices support and sustain teachers’ engagement with EE. Research should examine what teachers gain from engaging in practices that teach EE. More specifically, we need to know how participation in the teaching of EE can not only advance education for sustainability but also serve and support and sustain teachers’ engagement and practice with EE.

Studies exploring teachers’ experiences with environmental initiatives can help policy-makers who are looking for ways to motivate teachers to engage with issues of land stewardship, well-being and caring, and responsible behaviour in their classroom (Palmer, 1998). Land stewardship is central to the understanding and influencing of environmental issues. Furthermore, such studies can help school administrators who are looking for opportunities to involve and support their teachers in the teaching of EE.

The current study examines the experiences of three elementary school teachers who engaged in an environmental education project at an urban farm with their classes

and investigates how their multi-year participation in the program influenced their practice.

1.2 The Study

The purpose of this study is to investigate teachers' experiences in the context of an environmental education program at an urban farm in order to understand how to support and sustain the involvement of teachers who are interested in the teaching of EE. I also examine how teachers' experiences of teaching and learning in a farm-based environmental program contribute to and inform their practice. The program I study is called the Intergenerational Landed Learning Project (LLP).

The following research questions frame this study:

1. What are teachers' experiences of participating in the Intergenerational Landed Learning Project?
2. How do teachers' experiences of participating in the Intergenerational Landed Learning Project influence their practice?

To answer these research questions, I conducted a naturalistic case study (Merriam, 1998; Stake, 1995; Yin, 2003) of teachers' experiences in LLP, a year-long, field-based education program that focused on the teaching of EE at an urban farm located in Vancouver, British Columbia, Canada. The study was conducted from September 2009 to November 2009. Three teachers with long teaching experience from three different elementary schools took part in the study.

The Intergenerational Landed Learning Project is an environmental education initiative that involves schools and community members. The project partners classes of

elementary children with adults in a year long education program. Here, the children are mentored to learn about growing food using sustainable agricultural practices. The goal of this education initiative is to promote environmental stewardship, understanding, and practices, as well as personal well-being among elementary children (Mayer-Smith, Peterat & Bartosh, 2006).

For my study I observed three teachers and their classes over a three-month period (one semester) as they participated in the field and classroom-based aspects of this EE program. To answer my research questions, I collected data through semi-structured interviews and field observations of teachers and students involved in educational activities at the farm and in their classrooms. These data enabled me to understand teachers' experience in bringing an EE focus to their teaching and how their practice changed through their participation in the LLP. I draw upon multiple data sources as a way of triangulating or establishing validity to ensure the credibility of my research findings.

1.3 Terms of Reference

In this study I use some terms which I define in this section.

Environmental Education (EE): In this study, the term environmental education, as previously indicated, encompasses all educational approaches that aim to teach about the environment while instilling values of care and responsibility and fostering actions and behaviours that support life on the planet (Darner, 2009; Mapping & Johnson, 2005).

Education for Sustainability (EfS): Education for sustainability includes educational approaches which focus on the teaching of sustainability from social, ecological and economic perspectives (Svanstrom, Lozano-Garcia & Rowe, 2008). The curriculum for EfS is characterized as interdisciplinary, learner-centred, experiential, place-based and rooted in the complexity of real life issues and events (Tilbury & Wortman, 2008). The goal of this approach is to encourage students to become responsible citizens and agents of change that support the life systems on the planet, and care for the Earth (Tilbury & Wortman, 2008).

Place-based education: Place-based education is a term that Woodhouse and Knapp (2000) describe as a form of education that emerges from the socio-economic and ecological environment where it takes place. The authors outline some of the characteristics of place-based education such as having a curriculum that is multidisciplinary, experiential and reveals the interconnectedness among individuals, their community of people and species, and the place where they live. They explain that an integral part of this educational approach is to include opportunities of community service.

Multi-disciplinary education: The term multi-disciplinary education refers to teaching and learning that encompasses knowledge from across content areas (Hungerford & Volk, 2002) and academic disciplines including the sciences, social sciences, and the arts (Thompson-Klein, 1998).

Interdisciplinary education: The term interdisciplinary education refers to teaching and learning that integrates ideas, methods, practices, research, and information from a range of disciplines (Epstein, 2004) and incorporates skills for acquiring, analyzing, synthesizing, and evaluating information (Hungerford & Volk, 2002).

1.4 Significance of the Study

Currently, calls for the teaching of EE appears in educational policy documents, school agendas and teacher education programs (Kennelly, Taylor & Maxwell, 2008; Lyon Higgs & McMillan, 2006; Stevenson 2007). The expectation that teachers will teach EE concepts has motivated program developers, school administrators, in-service providers, and experienced as well as pre-service teachers to create and explore practices and programs that will support the teaching of EE and will be effective in their schools and classrooms. Research conducted to date has focused on the impact of initiatives that support the teaching of EE on student attitudes, values and behaviour (Lyon Higgs & McMillan, 2006; Mayer-Smith, Bartosh & Peterat, 2009; Svanstrom, Lozano-Garcia & Rowe, 2008).

My study examines the experiences of teachers who have sustained their involvement over a number of years in an EE initiative. An examination of teachers' teaching practice over multiple years, in an environmental education initiative on an urban farm, can provide insights about effective teaching practices for EE and how we can support and sustain teachers' involvement in similar initiatives. It can inform curriculum development and implementation in the field of EE. Further, it can contribute to an understanding of how participation in the teaching of EE may serve as a forum for

teacher professional growth. More specifically the significance of this study is that it will provide information for:

- Administrators and EE program provider, on how to best support teachers in their teaching and learning about EE.
- Practicing teachers, about how to teach EE through a food-growing and/or gardening focus.
- Pre-service teachers, regarding the pedagogical possibilities that a food and garden project can offer for teaching of EE.

1.5 Organization of the Thesis

This thesis is presented in five chapters. I begin Chapter One with an introduction of the problem and the research gap that my study aims to contribute to, and I briefly describe the study, my terms of reference, and the importance of the research for the field of environmental education. In Chapter Two, I present and summarize literature that informs my study. Chapter Three describes my research methodology, the context of the study, the methods of data analysis, and the limitations of the research. In Chapter Four, I present my findings in the form of individual teacher stories based on the data I collected regarding teachers' learning about teaching in an environmental education program on an urban farm. Chapter Five follows with my analysis of the impact of participation in the program on teacher learning, practice, and professional growth. In Chapter Six I summarize the research findings, discuss my conclusions, consider the implications of the study for the practice of teaching EE, and offer suggestions for future research and practice in educational approaches which focus on EE.

Chapter 2 Literature Review

2.1 Introduction

This is a study of three teachers' participation in the Intergenerational Landed Learning Project, an environmental education initiative on an urban farm, with a focus for lessons on environmental stewardship, understanding, and practices, as well as human well-being. This study explores three teachers' experiences in the project as they learn how to integrate farm-based EE into their classroom curriculum, and examines how these teachers' practice changed over a number of years of participating in the program.

In this chapter I review previous research and writing that support and help position my study. I begin my literature review with an overview of the philosophy of environmental education (EE), and its definitions, and consider how sustainability issues in its curriculum can also be found on the agendas of different environmental education (EE) approaches (Mapping & Johnson, 2005). This literature provides a context for my study of the Landed Learning Project as an environmental education initiative. I follow my overview of EE with an examination of some of the educational approaches to EE and issues of curriculum development in teaching EE. Then I present research on teachers' experience with teaching EE, including their motivations, the challenges they encounter, and the support they need to teach EE. This literature will illustrate the information gap that this study aims to fill. Lastly, I provide a rationale for using gardening as an approach to teaching EE and consider teachers' experiences teaching in

garden settings. I conclude this chapter with a discussion of the literature that informs my study's theoretical framework.

2.2 EE Overview

The beginning of Western environmental philosophy is rooted in ancient Greek thought, an intellectual community who “defined nature as the universe minus human beings and their culture” (Nisbett, 2003, p. 20). In the early 1800's authors such as American born Henry David Thoreau and Aldo Leopold diverged from this tradition of thought and published essays and books that focused on the inter-relationships between humans and nature (Leopold, 1949; Thoreau, 2007). The tensions between differing perceptions of nature contributed to the branching of environmental thought. One branch focused on the separation of nature into categories to be analysed; the other conceptualized nature and everything within it as a whole that cannot be divided into parts and examined individually (Orr, 1991). Both of these beliefs nourished the soil from which EE emerged, at first as an isolated practice by individual teachers, and more recently, as a collective institutional effort.

In the 1970s, EE featured for the first time on the government agendas of United Nations (UN) member countries. Some events that contributed to governmental engagement with environmental issues were the UN Conference on the Human Environment in Stockholm 1972, followed by an international workshop on EE held in Belgrade, and the Tbilisi Intergovernmental Conference on EE (Towler, 1981). From these international discussions emerged the expectation that teachers should integrate EE into their curriculum. This expectation spurred a flurry of research concerning the definition of EE, as well as its “purpose, place and practice” (Mapping & Johnson, 2005,

p. 2) in the curriculum. Investigations into these questions revealed a multitude of opinions about EE.

The diversity of opinions among stakeholder groups is reflected in the different concerns raised about the purpose of EE. For example questions that emerged include: Should EE serve the interests of any stakeholder group?. Should teachers present some or all the perspectives of an issue and allow students to make their own opinions on the subject? (Disinger, 2001). And, should the objective of EE be knowledge acquisition or advocacy promotion? Within this context of continuous scrutiny and critical analysis, educators, researchers, and policy makers developed various definitions for EE. The first definition formulated in 1969 states that “[e]nvironmental education is aimed at producing a citizenry that is knowledgeable about the biophysical environment and its associated problems, and motivated to work toward their solution” (Stapp, Brian, Fulton, Swan, Wall & Havlick, pp. 31-32). A more recent definition provides a detailed description of the prescriptive expectations of EE:

[EE] is a process that leads to responsible and group actions...[EE] should enhance critical thinking, problem solving and effective decision-making skills...[EE] should engage and motivate individuals as well as enable them to weigh various sides of an environmental issue to make informed and responsible decisions. (U.S. EPA, Office of Environmental Education, 1992, pp.47, 516)

Both of the above definitions either refer to or imply the necessity for learners to acquire a body of knowledge that can empower them to become positive agents of

change. The first definition assumes that knowledge about the biophysical environment and its related problems will suffice to motivate positive student action. The second definition, although it does not specify what type of knowledge or pedagogy would further the goals of EE, still states the expectation that students will make informed and responsible decisions as a result of EE.

As research continued to expand the area of EE, new approaches to teaching environmental issues were developed (Mapping & Johnson, 2005). An expanding web of beliefs about the purpose and place of EE in the curriculum contributed to the branching of this body of research into different specializations. Mapping and Johnson (2005) separate these perspectives on purpose into “EE for behavioural change, EE for personal change and EE for social change” (p.10) and discuss how each perspective influences the educational approach and practice of EE in different ways. Environmental Education for behavioural change supports an educational approach that engages students experientially with the intent to increase motivation for the adoption of pro-environmental behaviour. Examples of experiential EE are school gardening projects (Blair, 2009) and Environmental Service Learning (Leege & Cawthorn, 2008). Environmental Education for personal change aims to engage students emotionally to instil pro-environmental values and attitudes, as well as to empower students to become positive agents of change. Environment Based Education (Ernst, 2009) and Environmental Justice Education (Cole, 2007) are terms used for EE approaches that aim for personal change. Lastly, EE for social change advocates for a paradigm shift at the societal level; an aim that Tilbury and Wortman (2008) deem essential in the case of Education for Sustainability (EfS). According to the authors, EfS is an overarching educational approach that aims to foster

responsible citizenship by teaching students about the interdependencies among society, economy, and ecology.

All the approaches described above lead to curriculum design around a local environment and issues; however, each one has its particular focus. In this study, the teachers in the LLP encounter a program that engages them in teaching with and about place.

2.3 EE in the Curriculum

In order to understand teachers' experiences with teaching EE, it is important to look at writing and research that discusses how policy documents suggest EE should be taught. This historical examination of policy requirements will show how the teaching of EE has developed over the years and will illustrate how EE still needs to be understood.

Mapping and Johnson (2005) describe how initially, policy documents about EE mandated the addition of curriculum content that dealt with ecological processes, which the authors call an environmental literacy approach. This policy attempted to establish an association between EE and the science disciplines. The 1990s brought a shift to a multidisciplinary EE characterized by a "change in content focus from ecology, resource management, or preservation of natural environments to a social, political, and economic focus" (Mapping & Johnson, 2005, p.4). This shift was characterized by the realization that "[t]o understand, analyze and create appropriate solutions to complex environmental issues, decision makers must understand society and the processes that shape it" (McKeown-Ice & Dendinger, 2000, p. 37). A multidisciplinary approach to EE acknowledged that the social sciences and humanities also contribute useful and

indispensable lessons toward the achievement of EE objectives. Firstly, because knowledge about social processes can inform decision making, and secondly because EE relies on teaching values within cultural contexts. Cole (2007) supports a multidisciplinary approach to EE because “[f]or students to understand environmental processes and systems, [they] had to first come to terms with the human histories that contextualize, shape, and define those systems.” (p. 37).

Darner (2009) points out that the main objective of EE is to effect behavioural change that supports environmental values. This objective raises the question and pragmatic challenge of how to influence mass behavioural change. Originally, many educators believed that “if students gained knowledge about the environment, they would develop a pro-environmental attitude, which would, in turn, cause them to act in environmentally friendly ways” (Darner, 2009, p. 40). However, over the years, educators began to question this linear logic of cause and effect because research on environmental attitudes, theories of motivation and pro-environmental behaviour (Darner 2009, Shuman & Ham, 1997) revealed that there can be a discrepancy between a person’s pro-environmental attitude and their behaviour. This research challenged the assumption that knowledge will lead to behavioural change. According to the Theory of Planned Behaviour as conceived by Ajzen and Fishbein (1980), not all people who have positive attitudes towards an issue will adopt behaviours that reflect their attitudes toward that issue, because action is also affected by perceived obstacles. These obstacles are defined as “the confounding variables that may exist between a behavioral intention and the overt behavior” (76). Awareness about the flawed assumption that knowledge leads to

behavioural change expanded EE research into inquiries of teaching practices that would foster pro-environmental behaviour.

Stevenson (2007) points out that in spite of the lack of a proven educational approach that instils values of care for the environment and changes behaviours, educational policies frame educational objectives in these idealistic terms. These objectives expose the gap between theory and practice and the lack of communication between policy makers and teachers. In other words, policy documents set expectations and objectives for EE without consulting with teachers about the pragmatic aspects of implementation. To address this theory-practice gap, Stevenson calls for collaboration between all education stakeholders in the development of EE approaches that will be effective in schools.

Teachers who have been largely ignored in discussions of EE policy, curriculum, and implementation are key stakeholders who should play a central role in the collaboration proposed by Stevenson. To move EE from the margins to more mainstream practices we need to include teachers' voices in the discourse about EE implementation. Further, we need to know how teachers understand EE initiatives, because it is through teachers that EE theories, policies, and curricula are translated into practice. My study begins to address these issues by examining three teachers' experiences in an EE initiative on an urban farm.

2.4 Teacher Motivation and Involvement in Teaching EE

Understanding what motivates teachers to teach EE can shed light on their approach to EE. Some teachers engage with EE while others do not. Some do so because

of imposed initiatives by their schools and some because of personal motivations (Mapping & Johnson, 2005). Shuman & Ham (1997) proposed a Model of Environmental Education Commitment, which acknowledges a positive correlation between teachers' life experiences, the stages in their lives that these experiences occurred, and their beliefs, attitudes, and motivations to teach EE.

In a survey-based research study with 287 grades four to eight teachers in the USA, Ernst (2009) identified lack of training as one obstacle to teachers' willingness to engage with environmental education. However, she warns of the danger in believing that teacher training in EE will solve all problems with its implementation. Ernst proposes that professional development opportunities that increase teachers' motivation and commitment to teach EE might be more useful than providing teachers with resources to teach EE, because her findings suggest that a sense of motivation and commitment enabled teachers overcome obstacles of teaching EE. Furthermore, Ernst suggests that teachers should learn strategies on how to overcome obstacles to teaching EE so they have the tools and the motivation to persevere.

Moseley and Utley (2008) studied teachers' motivation to teach EE, and they identified two factors that influence teachers' EE practice: the concepts of 'self efficacy', that is, the teachers' perception of their ability to teach EE, and 'outcome expectancy' or the teachers' perception of whether their actions generate positive or negative outcomes. Based on their results the authors highlight important aspects that teacher educators should address:

Pre-service teachers need to become more aware of how their teaching beliefs shape their teaching practice, especially in the area of EE. Thus,

teacher educators need to spend time and give attention to discussing the goals of EE, the role of the educator in EE, essential practices in the field, and how learning about the environment is fostered. Teacher educators cannot assume that pre-service teachers know what EE is just because they conduct activities outdoors or model EE practices. Teacher educators need to be explicit in the objectives and delivery of EE activities and curricula with pre-service teachers (2008, p.25).

Tuncer, Tekkaya, and Sungur (2009) examined the impact of pre-service teachers' level of environmental literacy on their attitudes about environmental issues and teaching EE at a Turkish university. The research revealed that pre-service teachers' levels of environmental literacy were not positively correlated to positive attitudes toward, and concerns for, the environment. Teachers did not need to be more knowledgeable about the environment to feel the concern. However, lack of knowledge about the local environment and environmental issues was reflected in some teachers' concern about teaching of issues that were not locally or even nationally relevant. The authors suggest that an approach to EE that does not examine local issues could impact teachers' effectiveness in preparing students to be agents of change in their own communities. The authors concluded that for EE to be effective in Turkey, teacher education programs should prepare pre-service teachers to teach environmental literacy. These authors' suggestion for modifying teacher education programs to include a particular focus on EE in the teacher preparation curricula is echoed by many researchers of EE internationally (Dissinger, 2001, Gooch, Rigano, & Hickey, 2008; Moseley & Utley, 2008).

Research conducted to date has not only examined teachers' beliefs, attitudes and knowledge of the environment in relation to EE, but also explored how teachers teach EE. Gooch, Rigano, and Hickey (2008) analyzed integrated EE unit plans that were developed by pre-service teachers. They focused on unit plans, because "[t]he way in which teachers develop unit plans is significant, as different approaches lead to different learning experiences, outcomes (what students will be able to know and do) and assessment tasks" (p.175). The authors created a coding system for the integrated unit plans based on four categories: beliefs, objectives, learning experiences and assessment. Each category was coded with a number between 1- 4 depending on how effectively developed that category was in the unit plan. A coding of 1 indicated the least developed and 4 the most developed. The research results indicated that the pre-service teachers' beliefs about the environment were poorly articulated and not aligned with objectives, learning experiences, and assessment. In the assessment component of the unit plan, factual knowledge was emphasized over critical thinking. The authors suggest that pre-service teachers should be trained to understand what knowledge, skills and attitudes to teach in EE and should plan their lessons according to this understanding. Gooch, Rigano, and Hickey argue that teacher education programs could and should teach pre-service teachers how to design unit plans that move beyond the teaching of facts and focus on empowering students for action on environmental issues.

As outlined above, research has shown that teachers' motivation and engagement in teaching EE is dependent on diverse factors. Some teachers are influenced by personal life events, and others' motivation and engagement are related to educational experiences such as becoming environmentally literate. My study adds to this body of literature by

examining three teachers' participation in an EE initiative, and considering what motivated these teachers to sustain their involvement in spite of the challenges they encountered. By understanding what supports teachers willingness to engage with EE, administrators, EE program developers and teacher educators can develop services and infrastructure to better support teachers in making an EE focus part of regular classroom practice.

2.5 EE and Teaching Practice

Research on teachers' EE experiences has focused on the challenges teachers face in their engagement with EE. Researchers have grouped the challenges that teachers face in their efforts to integrate EE into their practice into four categories: 1) conceptual, 2) policy-practice, 3) Institutional, and 4) pedagogical challenges (Bartosh et. al. 2005; Cole, 2007, Dissinger 2001; Ernst, 2009, Johnson and Mapping 2005; Moseley & Utley 2008; Tilbury & Wortman, 2008).

2.5.1 Conceptual Challenges

In their integration of EE into their teaching, teachers rely on a personal belief system that influences the purpose of EE in their practice (Moseley & Utley, 2008). This belief system, whether teachers are aware of it or not, shapes their motivation and engagement with EE in their classroom. Ernst (2000) identifies how teachers' views of EE influence their attitudes toward EE. She explains that some teachers conceptualize EE as a content area, separate from other subjects. This view of EE leads teachers to believe

that teaching EE requires an addition of content to the curriculum and not an educational approach for all subjects. Teachers with this conceptualization question the relevance of EE in their classroom (Ernst, 2000).

Teachers are faced with multiple philosophical perspectives and educational approaches to EE and must choose which one to incorporate into their practice. Should they adopt the approach of Environmental Justice, where students learn about unequal access to resources and the impact of resource mismanagement on underprivileged populations (Cole, 2007)? Or, Environment Based Education? Or Environmental Service Learning, where students work on a conservation project in their community as a way to learn to be agents of change (Leege & Cawthorn, 2008)? The task of choosing an EE approach can be difficult especially since, at the time this thesis is being written, few teacher education or professional development programs include opportunities for teachers to learn about and/or experience a range of distinctive and varied approaches to EE.

2.5.2 Policy-Practice Challenges

Policy documents supporting EE call for teachers to educate students about actions that support a healthy planet. However, teachers face many difficulties when trying to change values, attitudes and especially behaviours which are damaging to the life systems of the planet. Sipos et al. (2008) and Stevenson (2007) discuss the dominant discourses of education for sustainability (EfS). The authors describe EfS as a teaching approach that values emotional engagement as a gateway to support values of interdependence, responsibility, and social engagement which honour the principles of

social, economic, and environmental care. They assert that the transition from traditional values in education to sustainability values will be difficult. Their warning also applies to an EE context, because as Sherren (2008) states, sustainability education is fundamentally linked to EE. Sipos et al. (2008) and Stevenson (2007) explain that teachers must help students ‘un-learn’ traditional education values that support rationalism, the nature of scientific evidence, and logical intelligence because these frame an understanding of the world based on principles of objectivity, certainty, universality, and predictability. The authors further state that these principles justify a world in which exponential growth, unlimited consumption, and the exploitation of people and ecosystems are acceptable. Since researchers are still looking for educational approaches which are proven to support changes in student values, attitudes and behaviours, the task of accomplishing this change can be overwhelming for teachers.

Dissinger (2001) discusses the obstacles educational policy imposes on teachers’ experience with EE. He explains that teachers are faced with teaching environmental issues that “must compete for time and space in the already crowded curricula” (p. 6). Teachers are under pressure to meet an expanding set of objectives in a static amount of time. In his review of research on environmental education perspectives in the US and their implications on practice, Dissinger found that teachers are expected to be “value-fair” in their EE teaching. They are expected to expose students to multiple and diverse perspectives and help them to critically analyze these perspectives. In practice, this expectation poses great difficulty because “[a]s competent and value fair as teachers of environmental topics may be, they rarely have the desired depth and breadth of background [in environmental issues]. Most were prepared to be science teachers”

(Dissinger, 2001, p.6). This situation implies that teachers must somehow become informed about the full range of perspectives of environmental issues. This expectation is unrealistic, given the demands of teaching and the fact that few schools are (at present) able to provide teachers with EE resources that provide this breadth of perspectives.

2.5.3 Institutional Challenges

School infrastructure, operations, and governance also contribute to the challenges of teaching EE. Tilbury and Wortman (2008) explain how educational institutions can be a counterproductive force in the teaching of education for sustainability if they promote unsustainability. The term “unsustainability” refers to actions that violate sustainability principles such as conservation, moderation, collaboration and equitability (Tilbury & Wortman, 2008). Thus, teachers’ efforts to teach EE can be subverted by institutional conduct which might not reflect ecological principles. For example, students might question why they should care about recycling if their school does not recycle.

Monroe, Scolo, and Bowers (2002) talk about logistical barriers teachers encounter in their attempt to teach EE. In their quantitative research study, the authors surveyed a random sample of US teachers about their engagement with EE and then conducted focus groups. The survey results and focus group discussions indicated that lack of planning time, administrative support, transportation, and funding are issues that block teachers’ engagement with EE.

2.5.4 Pedagogical Challenges of EE

Even if the first three types of challenges outlined above are overcome, researchers highlight another possible barrier: the pedagogical difficulties that teachers may face when they try to teach EE (Bartosh et al., 2005; Cole, 2007; May, 2000). Cole (2007) describes how when teachers have to teach about local environmental issues they have to mediate discussions between students from different socio-economic backgrounds who may hold conflicting views about those issues. She identifies a skill gap concerning teachers' ability to handle these emotionally charged debates. The author indicates that addressing this skill gap is essential for teacher implementation of EE. Cole points to Environmental Justice Education as an educational approach that can address this issue. She acknowledges that Environmental Justice Education requires a considerable amount of time in the curriculum, that it can be emotionally draining for the teacher, and that it requires teachers to be comfortable with interdisciplinary teaching. This presents pedagogical challenges because, as Bartosh et al. (2005) remind us, "teachers [do] not feel competent in teaching environmental issues, most of which are interdisciplinary in nature and require knowledge of concepts from different subject areas" (p. 2).

Engaging students in affective learning activities can influence students' future actions (Sipos et al, 2008). However, Shephard (2008), in his literature review of affective education, finds that teachers are reticent to try affective learning strategies due to perceptions that such activities constitute indoctrination or brainwashing. Further, some teachers believe that emotions are personal attributes that should not be exposed and meddled with in the classroom (Shephard, 2008).

2.6 Teacher Learning in EE

A small number of studies have examined how EE experiences contribute to teacher professional learning. Moseley, Huss and Utley (2010) explored the effects of professional development in EE on teachers' classroom practice. In their quantitative study of teachers' perceived teaching efficacy in EE, the authors found that a two week professional development course in EE (GLOBE) significantly increased teachers' perceptions of efficacy right after the program ended. However, the teachers reported only a slight increase in perception of efficacy after returning to teach for one semester. The authors found that perceptions of efficacy were influenced by the obstacles the teachers faced while trying to teach EE in their schools. This difference in perceived efficacy over time indicates that short term training, although useful for building teachers' content knowledge in EE and expanding their teaching repertoire, also needs to teach participants to overcome the challenges to implementation they might encounter in their schools (Mosely, Huss, & Utley, 2010).

Beyond this study there is limited research conducted to date that explores teachers' experiences in long term EE initiatives and the impact of such participation on teacher practice and teaching of EE. The most comprehensive study of teachers' involvement in EE was conducted by Paul Hart (2003) who interviewed North American teachers about their motivations to teach EE. Hart summarized experienced EE teachers' stories of their practice in his book, *Teachers' Thinking in Environmental Education: Consciousness and responsibility*. In his analysis of these stories of practice, Hart focuses on teacher motivation to teach EE, their philosophy of EE, and their educational

approach. However, Hart does not track the teachers' journey through their experiences and how their practice has been influenced by their involvement in teaching EE. My study begins to address this gap. By exploring three teachers' experiences in an environmental education initiative on an urban farm and extends our understanding of teachers' challenges and contributes to our knowledge of what supports teachers' development of EE practice. It also sheds light on what aspects of a program may influence teachers to change their practice, in this case, toward teaching EE.

2.7 Gardening as an EE Practice

School gardening programs are the embodiment of an environmental philosophy that envisions school and/or community gardens as catalysts that can facilitate the transition of EE theory into practice (Gaylie, 2009). Place and community feature prominently as interconnecting and interdependent components of gardening that inform and define this activity. The range of possibilities for education in the garden is enormous. For example, lessons and learning can encompass “environmental justice, community responsibility, land ethics, and human ecology” (Gaylie, 2009, p42), among others topics.

According to Chawla's (1998) review of research literature on EE, “adults who had significant and positive exposure to nature as children—experiences, often with significant adults, that socialize them to view nature in positive and meaningful ways, were more likely to be more environmentally sensitive, concerned, and active” (p.18). Smith and Williams (1999) concur with Chawla and add that in order for students to ‘care’ for the environment, they must engage in meaningful and experiential interactions.

As an educational activity, a gardening program meets the criteria for both meaningful experiential interaction with the environment and learning in a social arrangement that can foster the development of a community of practice (Wenger, 1998). Furthermore, since gardening and food-growing activities require (and foster) some degree of ecological awareness, and provide a hands-on learning experience that is rooted in a local place and community context, gardening projects provide a logical starting point for teachers who want to get involved in EE.

2.8 Teachers' Garden Experience

While to date there is no research about teacher strategies to cope with the challenges of teaching EE in a garden, there are studies that examine the nature of education and learning in a garden and teachers' garden experiences. This research reveals that teachers need administrative support, adequate gardening knowledge, and planning time in order to have a satisfying and successful experience teaching in a garden (DeMarco, Relf, & McDaniel 1999; Skeley & Bradley, 2000). A garden environment is quite different from an indoor classroom setting, and teachers must learn to adjust their practice. While exploring teachers' experiences with school gardening projects, Gaylie (2009), Grant and Littlejohn (2004), and Krapfel (1999) discovered that teachers' garden experiences challenge conventional educational beliefs about a teacher's role, pedagogy, and assessment methods.

Based on survey and interview data collected from US elementary school teachers who were recipients of grants from the National Gardening Association, DeMarco et al. (1999) discuss the three most important factors identified by teachers, that support, what

the teachers believed to be their effective use of gardening in schools. These are: 1) student and faculty commitment to integrate gardening into the curriculum; 2) availability of physical resources, and; 3) faculty knowledge and skill in using gardening as a method to enhance an interdisciplinary curriculum (p. 277). The teachers interviewed for the study highlight the importance of a principal's commitment to school gardens, the need for funding to supply equipment and materials, and the availability of teacher training in horticulture and interdisciplinary teaching. Skeley and Bradley (2000) speculate that there is a proportional relationship between the number of years a teacher spends in the garden and their ability to integrate the garden into their curriculum. The authors suggest that teachers need time to understand and take advantage of the interdisciplinary teaching opportunities a garden offers. The teachers in their study also identified what they perceived as the benefits of school gardening. They believed that the garden environment enhances academic learning, and can "expand students learning through social, recreational and therapeutic experiences" (DeMarco et al., p. 279).

In their research of pre-and in-service teachers' experiences designing and leading a lesson in a garden, Tal and Morag (2009) found that teachers have "insufficient preparation for teaching in the outdoors (in nature) and in other informal settings" (p. 246), and when teachers take their students outdoors, they become preoccupied with student safety, the environment's unknown elements, and the unpredictability of weather conditions. These concerns define roles and responsibilities for teachers that differ from their classroom roles. In out-of-classroom environments, teachers have less control over outdoor environments than indoor ones and their teaching is dependent on and must adapt to what the context provides.

According to Gaylie (2009), the garden is a place of such diversity that learning can extend to many subjects. She points out that in the garden the teacher's role becomes that of a guide and facilitator of knowledge. The teacher provides students with opportunities to make connections among knowledge from various disciplines, for example science, math, and language. To become a guide and facilitator, teachers must break the educational hierarchy and step down from the traditional 'expert' role. Grant and Littlejohn (2004) show how in the out-of-classroom environment, learning becomes a shared activity among teachers and students. In such cases, teachers do not have to be experts; the learning can be based on shared discovery, where the teacher is a co-learner with the students (p. xvi). Krapfel (1999) discusses how, in the garden, student and teacher roles begin to expand and overlap into one another's territories. In his research on a school gardening program, the author highlights an instructor's discovery that in the garden, students often taught each other, and sometimes older students shared their knowledge with younger ones. Although the garden changes a teacher's position and control in the teaching environment, Gaylie (2009) emphasizes that a teacher plays a key role in garden-based education projects. The teacher serves as a role model who demonstrates caring and respectful working relationships with their students. The teacher is responsible for facilitating connections between disciplines as well as facilitating connections among people, and between people and nature.

By redefining the teacher's role, gardening projects can affect a teacher's pedagogy (Gaylie, 2009; Grant & Littlejohn, 2004). Learning in an outdoor place is process oriented; educational activities often take longer to complete than classroom activities, because learning about natural processes in nature cannot be accelerated, it has

to follow the rhythm of the place where these processes are observed (Gaylie, 2009). The teacher must be flexible and adapt her/his teaching to the place where it occurs because in an outdoor setting, that place is always changing. Grant and Littlejohn (2004) also identify time as a factor that influences teaching and learning in a garden. Grant and Littlejohn's examination of teacher reflections on their teaching practice in a garden, reveals a pre-service teacher's realization that "students need more time for free exploration and play, and [that] this time is crucial for meaningful learning" (p. 254). In his self-study of teaching in a garden, Krapfel (1999) came to understand that classroom teaching is a homogeneous process. He discusses how in his teaching in a garden, he originally expected his students to meet all the learning outcomes, which essentially meant that everyone was expected to learn the same thing. He became aware that his teaching method was influenced by his science training as well as the school's requirement for standardized tests and measurable outcomes. He found that this kind of learning was boring for his students. Krapfel explains how, over time, he learned to allow more variation of information and discussion that strayed from the specific learning outcomes (p.57). The author discovered his change in practice by comparing his teaching in the garden with his teaching in the classroom. Krapfel's study illustrates how a garden experience can be powerful in promoting teacher reflection and change of practice. In a study of pre- and in-service teachers experiences designing and leading a lesson in a garden, Tal and Morag (2009) found that "[t]eachers are used to classroom-based teaching, to sets of objectives that are rooted in the standards and the curriculum they teach, and to definitions of learning that are related mainly to the cognitive domain" (p. 258). The teachers in their study felt disoriented at the beginning of a gardening project

because the strong hands-on and experiential components of teaching in a garden are very different from classroom teaching practices and consequently, teachers have to find alternative assessment methods.

Gaylie (2009) surmises from a study of her own experiences instructing a teacher education course in a garden that, in an outdoor classroom, “learning begins as a collective activity” (p. 136). This collective learning can create a tension for the teacher who is used to implementing evaluation practices that focus on assessing the individual student. Gaylie also discusses how learning in the garden is a collaborative and community oriented activity. She advocates for evaluation criteria that supports and reflects the values of the garden itself. Such evaluation should focus on the practical aspects of students’ garden projects. This shift in focus from evaluating a student’s performance to evaluating her/his contribution to community requires evaluation procedures that value collaboration and frame educational activities and projects as actions that have to be beneficial to a community. By measuring the impact of a student’s contribution to a community project, the purpose of education shifts from a focus on benefiting an individual (e.g. providing career preparation) to a focus on benefiting the community (e.g. building relationships that affect positive change). Gaylie emphasizes that learning in a garden should support the place and community that it is a part of.

Research has also examined teachers’ perceptions of the influence of gardens on the learning of special needs students. In Hussein’s (2010) study of teachers’ motivations for engaging their students in gardening, she describes teachers’ perceptions of the garden as a space to play, to learn, to hide, to work as a team and to experience sensory stimulation. The teachers in Hussein’s study believed that these features of garden

education contributed to positive responses from students with special needs. Hussein's study illustrates how teachers find a garden education project can help them reach a diverse community of learners and allows them to support the learning of special needs students in ways that traditional classrooms cannot.

Although a garden can be a disorienting educational environment for inexperienced garden teachers, research indicates that with time, teachers notice the teaching and learning opportunities that a garden provides (Gaylie, 2009; Takano, Higgins, & McLaughlin 2009; Nimmo & Hallett, 2008). Teachers need time to experience and learn about the diversity of physical spaces, organisms, people, types of work necessary to maintain a garden before they can teach in it, with it and about it. In addition, teachers need time to become accustomed to the unfamiliarity and element of risk posed by the environment (Gaylie 2009; Nimmo & Hallett, 2008; Takano, Higgins, & McLaughlin, 2009).

Studies discussed in this section of the literature review indicate that garden education projects can promote teachers to assume different pedagogical roles, reflect on their practice, and engage in different teaching and assessment practices. However, most of the existing literature focuses on teachers' challenges teaching in a garden, or on recommendations for teachers of how to teach in a garden or on the support teachers seek to be able to teach in a garden. No studies to date examine the experiences of teachers who have overcome the challenges of teaching in a garden. My study aims to fill this gap by exploring the story of three teachers who worked through the obstacles of teaching in an environmental education initiative on an urban farm.

2.9 Theoretical Framework

Conducting this literature review enabled me to identify and define my theoretical framework. In framing this study, I adopted a place-based pedagogy perspective that Woodhouse and Knapp (2000) and Gruenewald (2003) describe as embodying the following characteristics: a) emergent from particular attributes of place; b) inherently multidisciplinary; c) inherently experiential; d) reflective of an educational objective that is broader than learning to learn; e) connects place with self and community. While emphasizing these characteristics, place-based pedagogy recognizes the importance of content and skills, however, with a strong focus on increasing student engagement and understanding through multidisciplinary, experiential, and intergenerational learning that is not only relevant but also contributes to the well-being of community life (Gruenewald, 2002; Hass & Nachtigal, 1998; Smith, 2002; Theobald & Curtiss, 2000).

2.10 Chapter Summary

In this chapter I provide an overview of the philosophy of EE, the educational approaches in this area, and the aims of these approaches, to situate my study within a context of EE. The studies and literature I reviewed give an overview of teachers' motivations, experiences and challenges with teaching EE in outdoor, gardening initiatives. My review of the literature indicates there is a need for further research on teachers' experiences in environmental education initiatives that take place on farms. For example, little is known about why some teachers persevere and continue to engage with teaching EE in spite of the challenges that are identified by researchers who study teacher

participation in outdoor and garden learning spaces. My study aims to do that by exploring three teachers' experiences in the LLP. I identify the teachers' challenges, examine how they learn and grow through their participation and discuss aspects of the garden-based program which appear to contribute to the teachers' continued participation and change in practice. This research is significant because it can inform EE program providers and school administrators on the aspects that best support teachers to overcome obstacles with teaching of EE. It may also inspire elementary teachers to engage with EE in farms or gardens. My review of the literature concludes with a discussion of the study's theoretical framework. I selected a place-based perspective to frame my research study as this perspective reflects my belief that experiential and multi-disciplinary environmental educational experiences can inspire and inform teachers efforts to bring and EE focus to their classroom.

In Chapter 3, I outline in detail, the methodology and methods of my study, the rationale behind using a case study approach, and the limitations of the study.

Chapter 3 Methodology

3.1 Introduction

This is a study about the experiences of three teachers who participate with their classes in the Intergenerational Landed Learning Project, an environmental education program that takes place at an urban farm. The study examines the teachers' experiences in the program and the teachers' change in practice over the years of their participation in the program. In this chapter I describe the study context and the participants. I also present the design of the study, the data collection methods, and the process of data analysis used to answer my research questions. I conclude with a discussion of the ethical issues and limitations pertinent to the study.

The research questions that guide this study are

1. What are teachers' experiences of participating in the Intergenerational Landed Learning Project?
2. How do teachers' experiences of participating in the Intergenerational Landed Learning Project influence their practice?

3.2 Context of the Study

This study was conducted in three elementary schools and at an urban farm located on the margins of the Point Grey campus of the University of British Columbia. The focus of the study was an environmental education program for elementary school

children and their teachers taking place at the farm and in classrooms. The Landed Learning School Program is part of a suite of activities and programs within the Intergenerational Landed Learning on the Farm Project (<http://www.edcp.educ.ubc.ca/landedlearning/>), a collaborative school-university-community education and research initiative that began in 2003 to understand how to nurture values of community building, land stewardship, responsible citizenship, and well-being. Since working together to grow food encompasses all these values, this approach was adopted as the educational strategy for the project (Mayer-Smith, Peterat, & Bartosh, 2006).

In the LLP, classes of elementary children learn to grow food alongside senior and young adult volunteers known as Farm Friends. Teachers bring their classes to the university farm on eleven or twelve occasions where they plan, plant, tend, and harvest food crops between September and June. On these 'Farm days' children work in groups of three or four teamed with two volunteers per group. One volunteer is a senior from the community with farming or gardening experience and the second volunteer is a younger adult or a university aged student. Each Farm Friend team works together on a raised garden bed for the whole school year. The students plant seeds, weed, and water in their garden beds under the guidance of their Farm Friends. They also maintain a compost pile and engage in other activities required to maintain a garden space. In addition, during every visit, one team of students is responsible for cooking the nutritious snack for their whole class with produce harvested from their garden beds. While cooking, students learn about healthy eating.

Teachers are responsible for preparing their classes for each of the eleven to twelve different themes and planned activities of every visit. Themes include Community, Farm Cycles, the Living Earth, Preparing for Planting, Sowing the Seed, Healthy Plants, Signs of Spring, the Story of Soil, Farm Element: Water, Pollination, Nutrition, and Harvest Celebration. On one of the program days the intergenerational team activities take place in classrooms as the Farm Friends come to the children's school to work on garden planning. At the end of the school year in June, the final Farm day involves a harvest celebration, a thank you to the Farm Friends and a goodbye party. The celebration includes a meal with the produce grown in the garden during that year.

Teacher participation in the LLP is based on an application process. When a space becomes available, application forms are posted on the Project website (see Appendix A). The application inquires into a teacher's motivation for participation, her/his expectations, previous experience teaching sustainability concepts, and willingness to share her/his learning with colleagues, school, and community. The program is advertised on the webpage as a site for health, wellness and environment based education. Submissions are carefully reviewed by the program staff. During the selection process, the LLP Manager asks for evidence of a teacher's commitment to helping students make connections between human action, personal well-being, and environmental health. Also, teachers' interest in community building, lifelong learning and interdisciplinary teaching are assessed. From the applications, a few candidates are chosen to participate in an informal interview.

Participating teachers meet as a group with the program manager and staff three to five times during the program. The first meeting is held early in the school year in

September to establish school visit dates and set plans for the fall. Subsequent meetings are held throughout the school year as needed to share, evaluate, revise and expand the Farm Days curriculum. A final meeting is held in late May or June, near the end of the school year, to plan end of year activities and assess research objectives. During these meetings the teachers talk about challenges and successes in the program, brainstorm and share ideas for further curriculum integration, ask for support, and participate in the design and decision making process of the project.

In 2005, Bartosh, Mayer-Smith, and Peterat conducted a revealing case study of one teacher's experience with the integration of the LLP into her science curriculum, and her perceived challenges with the integration (Bartosh, Mayer-Smith, Peterat & Sinkinson, 2005). The research I report here is an extension of that study and provides additional insights into the complexity of teaching and learning in a farm-based EE initiative and the teacher professional development that occurs in this setting.

3.3 The Study Participants

The Teachers

Three experienced elementary teachers, Ron, Dori, and Fernando (pseudonyms) participated in the study. Each of these teachers had been participating in the LLP for more than one year, and each indicated to me that they had an interest in being part of this study.

3.3.1 Ron

Ron is a teacher at Thyme Elementary School. At the time this study was conducted, he had been teaching for 29 years, of which the first ten were spent working with special needs students. In 2004 Ron became involved with the LLP and has been coming with his classes to the farm for five years. Ron felt supported by the school principal throughout his participation in the LLP. In the 2009-2010 school year, Ron taught a class of 24 students, which included grades five and six. Ron believed his experience with special needs education has greatly influenced his teaching practice and made him aware and sensitive to the diversity of student needs in his classroom. When I asked Ron why he joined the LLP, he said he wanted to challenge himself as a teacher and try to meet the needs of all his students.

Thyme Elementary School serves 250 students of diverse backgrounds in kindergarten through grade seven. The majority of the students speak English as a second language. The school had been participating in the LLP for six years and a program legacy and connection had been established and nurtured. The school started a vegetable garden at the students' request and included an image representing the LLP in a mural art project that adorns a large wall of the school building. The principal was supportive of the school's involvement in the Program and included the project in the school's yearly activity plan.

3.3.2 Dori

Dori is a teacher of grades 4 through 6 at the Bay Leaf Elementary School, and had been teaching for 36 years when this study was undertaken. During the first eleven

years of her practice, she was a learning assistance teacher. In 2007, Dori applied to participate in the LLP with the goal of meeting the diverse learning needs of her students. She felt that her school administration was supportive of her involvement with the LLP. In 2009-2010 she had been participating in the program for three years.

Bay Leaf Elementary School is a Montessori school that enrolls 200 students in kindergarten through grade seven. The school follows the Montessori principles and approach while at the same time aims to meet the BC Ministry of Education learning standards. Students learn in mixed age classes, individually, in groups, and as a class. In Dori's 2009-2010 class, 19 out of her 23 students had already participated with her in the 2008-2009 LLP, and were participating in the program for a second year.

3.3.3 Fernando

Fernando selected teaching as a career after he gave a CPR workshop to an elementary class while he was a science undergraduate student. He enjoyed his experience working with young people so much that, upon graduation, he enrolled in the Elementary Teaching Certification Program at UBC. Twenty two years later Fernando is still teaching. Fernando had been participating in the LLP for six years. His motivation to join the program was fuelled by the hope that participating in the farm-based activities with his students would improve his science teaching. Although allowed to participate in the LLP, Fernando felt a lack of support from the school administration. In 2009-2010, the year this study was conducted, Fernando was teaching 26 grades four and five students at Sage Elementary School.

Sage Elementary School has a population of 527 students in kindergarten through grade seven. Students attending Sage Elementary come from a variety of ethnic and socio-economic backgrounds and a large majority of students (90%) do not speak English in their homes. The students in this school are identified as ‘at risk’ by the school district. Robinson (2004) refers to “at-risk” students as those who experience social and academic risk factors. Some of these factors are poverty, substance or drug association in the family, physical or mental abuse, neglect, negative school climate, dropping out of school, failing a grade, grade retention.

3.4 Methodology: Case Study Methodology

Case study was used for this research. According to Yin (2009), case study is the best method for answering evaluative questions of ‘how and why’ a phenomenon occurs. Further, a case study approach allows for rich narrative detail to describe the particularities of a case and the context. Merriam (1998) emphasizes that case studies must have boundaries, in other words “a limit to the number of people who could be interviewed or a finite amount of time for observation” (p.27). This study is bounded by the LLP and focuses on three teachers’ experiences participating in this program. Stake (1994) classifies case studies into three categories: intrinsic, instrumental, and collective. Intrinsic case studies focus on the particularities of one case, instrumental case studies use a case to better understand a phenomenon, and collective case studies compare multiple cases to provide a more complete picture of a unit of study (an event, program, organization). In my study, I consider the experiences of three teachers’ as separate cases, which places the research in the collective or multiple case study category. Merriam

(1998) attests that “the inclusion of multiple cases is, in fact, a common strategy for enhancing the external validity or generalizability of your findings” (p.40).

I designed a multiple-case study to examine three teachers’ experiences teaching in an intergenerational environment-based education program and the impact of these experiences on the teachers’ practice. Yin (2009) explains that with a multiple-case study design, a claim can be verified through replication. That is, the data for each case are collected and analyzed individually, and findings can contribute to the data collection procedures and data analysis of the subsequent cases. If for each case the same themes appear during the data analysis, then the findings validate and lend credibility to the claims (Merriam, 1998).

In my study, I compare three teacher’s experiences in the LLP looking for commonalities and differences across the cases. Khan and VanWynsberghe (2008) emphasize that comparing and contrasting cases can produce new kinds of knowledge. Although some scholars argue that case studies cannot be generalized (Peattie, 2001), Khan and VanWynsberghe (2008) support Kolodner’s (1993) theory that researchers can use the lessons learned from the combination of previous cases to suggest possible solutions about new cases. In other words, identifying connections, patterns and themes among cases can contribute new and potentially useful information for similar cases or situations. Khan and VanWynsberghe go further to explain two different approaches to cross-case study research, a variable oriented approach and a case-oriented approach. The variable oriented approach narrows down and tries to identify and investigate a single causal factor in a case. According to the authors, this approach is problematic because “social phenomena are often rooted in a complex web of causes, which are difficult, if

not impossible to isolate as deterministic” (p.3). The case-oriented approach focuses on how different stories unfold in the same bounded context. This approach informs the comparative approach between cases in the same context, and is the approach that I use here.

3.5 Methods: Data Collection Procedures

Interviews and observations were the data collection methods for this study. Merriam states that “it is necessary to interview when we are interested in past events that are impossible to replicate” (p.72). In this study, interviews were used to learn about the teachers’ perspectives on their experiences in the LLP from the first year of their participation until the current year, 2009-2010. Observations were used to triangulate the interview data. Besides increasing validity, observations of behaviour and events can be useful reference points for subsequent interviews (Merriam 1998). A timeline of my research activities is shown in Appendix B Table 1.

3.5.1 Interviews

One primary source of data for this study was a set of two interviews with each teacher. The interviews with the teachers allowed me to explore their perspectives of the LLP experience. All interviews took place in the teachers’ schools and were scheduled at a time that was convenient for the teachers. The interviews were audio recorded on a digital recorder and transcribed after each session. Participating teachers and schools were assigned pseudonyms to maintain anonymity.

All the interviews I conducted were semi-structured. The flexibility of “[t]his format allows the researcher to respond to the situation at hand, to the emerging world view of the respondent and to new ideas of the topic” (Merriam, 1998, p. 74). The questions were prepared prior to the interview, and during the interview, I asked additional questions for clarification and extension. For interview one I wanted to explore the teachers’ perception of their identity as a teacher, learn about their motives, intentions and expectations about participating with their class in an environmental education project on an urban farm. I also wanted to gain some understanding of the teachers’ level of confidence in their ability to effectively transfer what students were learning at the farm into their classroom curriculum. The final questions of interview one asked about the support and resources teachers needed to effectively teach in the program.

For the second set of interviews, I followed a semi-structured format that was similar to the one used for interview one. The purpose of this second interview was to gather more details about each teacher’s specific experiences and views of teaching within the LLP and to allow teachers to talk about aspects of the project that they saw as particularly significant for them, not only aspects that I, as the researcher, identified as salient (Palys & Atchison 2008). I formulated different follow up questions for each teacher, based on their first interview and my field and classroom observations (see 3.5.2 Observations). For example, with Fernando I asked: “In the last interview you talked about how you hadn’t noticed or realized at first the power of the Farm Friends. Can you tell me more about that?” I also asked Ron for more details: “waste free lunch, I noticed you do that. Where did that idea come about?” All the questions I asked during this second interview aimed to elicit a narrative account of the teachers’ LLP experience.

Most ended in “can you tell me a bit more about that?”. The questions that followed depended on each teacher’s responses.

Protocols for all interviews are included in Appendix C.

3.5.2 Observations

This research was informed by ethnography. Wolf (1992) states that “[e]xperience is messy...When human behavior is the data, a tolerance for ambiguity, multiplicity, contradiction and instability is essential” (p.129). One way I sought to decrease ambiguity and increase validity in my study was to include classroom and field observations. According to Wolf, observations are useful to clarify, validate or contradict interview responses. Zeidler and Lederman (1989) support the use of observations to extend and clarify further what can be found through interviews. They note that in their study of teachers’ conceptions of the Nature of Science (NOS), “[i]nterviewing does not necessarily produce a clear understanding of participants’ conceptions of NOS, even if they use the appropriate vocabulary for it. Thus, observing faculty in classroom environment enabled further explication of their conceptions of NOS” (p.774).

For my study I observed teachers on three occasions in their classrooms and twice during farm visits. Classroom observations took place between September 2009 and November 2009. The teachers chose the classroom observation dates. These were days they were teaching content they believed was directly related to the LLP. Prior to the first classroom observation, I visited each class with the Landed Learning Project manager and facilitated an activity about the farm, to introduce the students to the LLP. For this experience, I was introduced to the students as an instructor/helper. During my classroom

visits and observations, I sat in a student desk, usually on the side or at the back of the classroom, where I recorded my notes in a research journal. Classroom observations lasted between thirty minutes to two hours. I kept written notes of all my observations in a research journal.

The first classroom observation was scheduled on the day that each teacher introduced his or her class to what would be happening on the first visit to the farm. These observations were useful in revealing what the teachers viewed as important aspects of student learning at the farm and their learning objectives for students on the first farm visit. The second and third classroom observations were scheduled for school days that the teachers indicated they would explicitly be making a connection between the LLP and classroom curriculum. These observations were undertaken to learn how each teacher interpreted and worked to integrate the LLP experience into their classroom practice and pedagogy.

Observations of farm activities were scheduled for the first two farm visits of each school group. These took place between September and October 2009. During these observations, I focused on and documented the instructions the teachers gave to students and what the teachers did during the visit. I also recorded a detailed description of the events that took place that day. These observations were intended to provide insight into the teachers' perceptions of their role in the LLP. During the first farm visit, I carried my research journal with me and recorded details of all events. However, I felt that my presence as a non-participating recorder influenced teachers' performance and the class atmosphere. For this reason, during the subsequent visits, I decided to participate as a Farm Friend and record my observations in my journal at the end of the visits. A

limitation of this method was that the observations I recorded were only those I could recall. I might have missed some important information and some modified some events according to my recollections and biases.

Since there are many people at the farm site on Farm Days, such as Farm Friends, farm staff, and volunteer farm apprentices, my presence was not particularly intrusive or obvious. Further, as I was present during the first two visits at the farm and, I was just one of the many new people the students met. I dressed casually and adopted the style of others Farm Friends. However, Hammersley and Atkinson (1995) caution that “[Classroom and field observations] require dealing with issues such as the potential deception by participants being observed and the initial awkwardness of being an outsider without initial personal support in a setting” (p.43). During the classroom observation days, I was aware that my presence was more obvious than during the farm visits. To make myself less obvious and intrusive, I dressed casually for these visits, so that I would not appear as a formal authoritative figure.

3.6 Data Analysis

Once all the interview data were collected and transcribed and my field notes from observations were compiled, I read through the full set of data in digital form twice. During the second reading, I began adding my own comments and observations using the track changes tool on my computer. I then read the interview data and my field notes a third time. During this third reading of the data, I began generating a list of key words that kept appearing in the field notes and interviews. I then read the data a fourth time, and during this reading I began to make mind-maps using the key words and grouping

them into categories. This process was similar to Merriam's (1998) category construction analysis using the constant comparative method. Essentially, units of information from the data are compared to each other and grouped into categories based on their similarities. The mind mapping process was linear, because I was working chronologically through all the data. When I looked over the mind maps I realized that some categories repeated themselves and that other categories could be combined. I then wrote the categories from the mind-maps on to square pieces of paper and began sorting them to consolidate the categories as much as I could. Through this multi-step sorting and grouping process, common themes emerged. With these themes I created a table, using each theme as a row heading. I then reread the set of data. This time I cut and pasted all the quotes from the interviews and the notes from my observations into the table, in the row corresponding to its theme, until all data were organized into this thematic structure. Refer to Appendix D for the data analysis theme table.

3.7 Limitations of the Study

3.7.1 Reflections on my Role as a Researcher

Lassiter (2005) emphasizes that each author should be aware of her/his position in the research (male/female, Eastern/Western, upper/middle/lower class etc.) and how this position influences her/his observations and interpretations when doing research. While recording field notes, I included how I felt, and wrote down some of the thoughts and memories that were triggered by what I observed. This information was useful to analyze in conjunction with the field notes, because it made me aware of some biases that

appeared to influence what I recorded and my interpretation of what I observed. I came to the realization that the results of my research were sifted through many filters. Given this, it is important to share my beliefs and biases in order that the reader is aware of the lens through which this research data is interpreted.

My ideals for education shape my choice of research and my interest in the LLP educational approach. My education ideals are based on my own experiences in school and work. Coming from an ex-communist country, Romania, I consider access to free education, regardless of income or social status, to be of the utmost importance. The fact that the LLP is provided free of charge for students made the program particularly appealing to me. The education system of my past where memorization, obedience, and following instructions were emphasized, made me aware of the importance of a system where choice of expression and critical thinking were allowed. I am a strong advocate of contextualized learning where the student has some control over their engagement. Based on my worldview and my experience working at the UBC Sustainability Office and taking sustainability courses, I understand that addressing global issues requires interdisciplinary thinking and decision making. As such, I am an advocate for educational approaches that are interdisciplinary and collaborative. I also support educational aspects such as indoor lessons combined with outdoor engagement; the application of theory learned at school to a real world project; place-based learning; community service; the sharing of the teacher's role with students and community members; a diversity in teaching and learning methods; teaching methods which address a diversity of student needs; adaptability and flexibility of teaching and learning to accommodate the situation at hand; and formative assessment methods. The LLP has many of these educational

components that I value. Thus, I had to be aware of my tendency to view this program in a positive light.

3.7.2 Methodological Limitations

For this study I conducted a case study of three teachers' experiences in an environmental education program on an urban farm, and I gathered qualitative data in the form of semi-structured interviews, classroom observations, farm observations and field notes. The data collected were influenced by my interests and beliefs as a researcher and are interpreted through my lens. I bring my own biases to this research (as mentioned previously) and these biases need to be acknowledged as possibly influencing my interpretation and presentation of these teachers' cases. In other words, I have to be careful to avoid formulating an uncritical interpretation of the teachers' experiences.

Data collection is also influenced by mood and feelings. During the classroom and farm visits, I was constantly trying to negotiate my role and identity as a researcher. During every visit, different feelings surfaced. Sometimes I would feel comfortable because students acknowledged and greeted me, other times I felt like an intruder because they ignored me; sometimes I would participate in the action, other times I was more of an observer; sometimes I felt like a spy, wanting to follow the teachers around to capture their every word, other times I resisted the urge for ultimate surveillance and felt like I was missing important information and not doing my work properly.

Keeping a journal of my feelings and observations during the research process has been insightful because it revealed to me the factors that influenced my observations. In all my entries, weather conditions played a prominent role in my internal willingness to

engage with the day's activities. I noticed that if I was cold at the farm, I had difficulty focusing on what was happening around me and wished for the time to pass quickly. My level of participation also affected my mood: the more I had a defined role in the day's activities, the more comfortable I felt, and the more I could focus on observations. On some days when I did not have a defined role, I felt I was following the teacher around. My behaviour might have made teachers more self-conscious, and influenced their behaviour.

Another limitation of this study is that the findings will be case sensitive and apply to a particular context. For this particular situation, the study considers teachers' experiences with environmental education in a farm setting and the teaching of land stewardship through food-growing activities and lessons about land and community. As such, the findings are very specific to this type of context and may not apply or be useful for understanding other sustainability education initiatives.

The fact that the teacher sample is not random is also limiting. The participating teachers applied to participate in the LLP and come with their own intentions, motivations, and expectations for the program. Therefore, they are more likely to have a positive experience than a teacher who must participate in a gardening project due to pressure from the school administration. In addition, the LLP teachers might feel compelled to report their experience in the project in a positive light because they are continuing to participate in the program and may believe negative responses could jeopardize their position.

This study is not a longitudinal analysis of the teachers' practice during every year of their participation in the LLP but rather a study about the teachers' perceptions of

their practice over time. My findings are based on teachers' memories of their years in the LLP and their personal interpretations of that experience. I cannot check to see if their practice during previous years reflects their perceptions, because I only have access to current observations of their practice. Therefore, the findings of this study focus on three teachers' perceived benefits of the LLP after multiple years of participation and how these perceived benefits apply to their professional development.

3.8 Chapter Summary

In this chapter I discuss the rationale for choosing case study for this research. I situate the study in a bounded context of the Intergenerational Landed Learning Project and provide background information on the program and the participants. Furthermore, I outline the methods of data collection, analysis, and the criteria for ensuring trustworthiness of the study findings. In Chapter 4, I present the findings from the analysis in the form of case stories to address Research Question 1: What are three teachers' experiences of participating in the Intergenerational Landed Learning Project (LLP)? Then, in Chapter 5, I present the findings in the form of themes to address Research Question 2: How do three teachers' experiences of participating in the Intergenerational Landed Learning Project (LLP) influence their practice?

Chapter 4 Participating in the Landed Learning Project: Three Teachers' Stories

4.1 Introduction

In this chapter I present the stories of three teachers who participated with their classes in the Intergenerational Landed Learning Project (LLP), an environmental education initiative on an urban farm that was undertaken to promote stewardship for the earth among school children. The following stories are provided to illustrate the teachers' experiences in the project and how their involvement in this initiative influenced their thinking about curriculum and professional practice. I begin each story with a short vignette to introduce the teacher and paint a picture of their practice within the LLP. I then present the teacher's experiences and practice when they began participating in the initiative, and their experiences and practice after participating in the initiative for a number of years. The individual teacher stories illuminate the first research question of this study: What are the teachers' experiences in the Intergenerational Landed Learning Project? In Chapter 5, I aim to answer the second research question of this study: How do teachers' experiences in the Intergenerational Landed Learning Project influence their practice? To do so, I look across these three teacher cases for common themes to show how participation in an environmental education program on an urban farm that has a sustainability focus can contribute to our understanding of teacher practices and program features that support and sustain teachers' participation in the teaching of EE.

4.2 Fernando

“We will be learning a new song today,” says Fernando as he hands out to students pieces of paper with song lyrics. A hiss of yeses snakes among the group. “Don’t flip the paper over, keep it face up, the way I gave it to you,” continues Fernando, walking between rows of desks, stirring up clouds of curiosity. The class is alert: backs straight, bodies slightly rocking on chairs, smiles curving the contours of cheeks and eyes. The song is “Big Yellow Taxi” by Joni Mitchell. As the red light on the CD player flicks on, music glides into the classroom. Under chairs, legs swing to the rhythm of the tune. When the artist rounds her last note, Fernando asks his students to turn over the sheet of lyrics and scan it. Blank spots occasionally dot the page; they are fill-in-the-blank vocabulary words. As the song plays a second time, students listen attentively and write the missing words. Then, Fernando reads out the song and plucks the answers from enthusiastic volunteers whose raised hands wave and vibrate with excitement. All the students want to answer the missing word puzzle. Fernando reads out, “They took all the trees and put them in a tree _____. What’s the missing word here?” (26). “Museum” students respond. “Imagine what it would be like if there were no trees outside the school and if you had to pay to see a tree.” Murmurs run through the class. The search for words continues. “Hey farmer farmer, put away that _____ now.” Unanimous voices: ‘DDT.’ “What is DDT?” inquires Fernando. Some faces scrunch in concentration while others look blank. The teacher tells a story about how researchers discovered that the DDT used in farming was linked to a decline in the eagle population. “DDT weakens the egg shells of eagles, leaving the eggs soft and brittle, so that they would break before baby eagles

could be born. DDT is a dangerous chemical previously used for pest control. Remember the lesson on organic agriculture?" After all the missing words are identified, Fernando leans on a stool in front of the class, rests his guitar on his knee and starts teaching the song line by line. Everyone sings in unison, heads bent over the lyrics, reading intently. Suddenly, a song harmony rises from a corner of the room: "Uuuuuuu ah, ah, ah, uuuuuuu ah ah ah." Giggles ripple out into the classroom. In the corner, three animated boys sing the harmony again, faultlessly. They picked it up from the CD recording, without Fernando's help. The teacher smiles and continues singing.

Fernando began teaching 22 years ago, after completing his Bachelor of Science degree and a teaching diploma program. A passionate and accomplished musician, Fernando plays both the cello and the guitar and uses singing and the lyrics of songs in creative ways to help his elementary students engage with the school curriculum. Fernando has strong views about what practices help his students to learn. He does not assign his students regular homework of a traditional sort. Based on his experiences with teaching and from reading research articles, he believes that asking students to read at home every day is more beneficial and powerful for student learning than assigning them other forms of homework. Fernando's non-traditional views also influence other areas of his teaching. He finds that he struggles with standard evaluation practices. For example, he questions the value of giving students letter grades:

My nemesis is the letter grades. I don't like them, I really prefer not to do that... We're asked to provide letter grades and to have the students' learning assessed and everybody [is] assessing exactly the same thing, and I think it's good to have areas where you're not as tied into that kind of rigid program. (Fernando, interview, October 2009)

Fernando's love of outdoor activities and nature, and the sense of adventure these inspire, are manifest in his teaching. Whenever possible, he integrates nature study and outdoor learning experiences into his lessons.

In 2009, Fernando was in his sixth year of participation in the Landed Learning Project. He joined the project in 2004 after hearing about the program from a friend who was a UBC graduate student. He contacted the project staff and asked if he could bring his grade 7 students to the farm. After two years in the project, Fernando took a one year sabbatical from teaching, (something he had been planning to do before joining the project). The year he returned to teaching (at a new school) he immediately applied to rejoin the program. In his application letter he wrote about his passion for the project and how much he valued providing students with a food and hands-on farming experience.

Fernando describes his initial motivation for participating in the LLP as threefold. First, Fernando wanted to provide learning opportunities for his students outside of the school classroom.

[F]irst of all the idea [was] for kids to get out of the classroom. I believe it's very important. What happens in the classroom tends to be a little artificial and the more experiences they have when they're out of the class, the better. (Fernando, interview, October 2009)

Second, Fernando valued and wanted to provide direct experiences for student learning. He described and viewed learning as a process embedded in a context and believed that the more opportunities students get to learn about a subject in its context, the better the students will understand that subject. Fernando explained:

[I]f you're going to talk about food and what you need to eat, go to a place where you grow food. If you're going to be looking at discussing stars and what's going on in our solar system and planets etc you have got to go somewhere where you can see that, where there are telescopes. You have to go to the places where it's vibrant and alive, so I thought that [the LLP]

would be an opportunity to have that kind of experience. (Fernando, interview, October 2009).

Third, Fernando hoped that the LLP would enhance his teaching of the Science curriculum.

I always found teaching science...to be difficult. It takes a lot of creativity... What works the best is when the kids are doing things hands-on; they have to be doing experimentation ... I didn't really feel like I was doing as good a job as I wanted to [with science] so that's probably the subject area that I wanted the Landed Learning Project to impact. (Fernando, interview, October 2009)

Even though he was motivated by the experiential and science opportunities in the project, during his first year in the LLP Fernando felt a bit out of place and overwhelmed. Fernando realized that he did not know what to do once he was at the farm. Based on his prior teaching experiences he had naturally assumed that he:

would be more front and centre, the way you're used to as a teacher in the class. So, you know, I [thought I] would determine what we would be doing for the day kind of thing... which is not at all what it's like. (Fernando, interview, October 2009)

During year one Fernando focused on teaching science processes and concepts in his classroom that he could easily integrate with the food growing activities that his students were engaged in at the farm. One activity he did with his students was to ask them to draw objects from nature and focus on observing and representing all the details they could perceive with their senses. Fernando hoped that close attention and detailed observations would change students' awareness and perceptions of nature:

I've been trying to [get them to] hone their observation skills, [and] get them to really look at things and see what they're seeing. Not see an icon of a worm, [but that] a worm looks like this. To actually see it, to notice the sections on it, to see if it has a clitellum on it, to get over the yucky factor, to really know what they are and to look at the life cycle of the worm. (Fernando, interview, October 2009)

In another classroom assignment that focused on science, students created posters where they drew and wrote about a cycle in nature and explained how it works. Fernando also had his students collect data about the plants they grew. For example, on the first farm visit he gave students two graphs that he created: one for the temperatures of the soil and one for the temperature of the air. He then asked each student to record the temperatures for soil and air on their graphs for every farm visit until the end of the school year. After the final visit, Fernando asked the students to explain what their graphs indicated.

Over the course of his first year in the LLP, Fernando began to think about his teaching, and noticed how particular teaching practices influenced students' engagement and learning. He realized that he began the project holding the belief that it was the teacher's responsibility 'to control what every student learns'. He also began to reflect on the effects of the program upon student learning. By watching his students as they participated in the group activities of planting and caring for the soil, seeds, and food plants in the LLP, he realized that:

I don't feel like every student has to learn the same thing [or] that everybody has to come to things within the same timeline. It's made me a lot more aware that, because I don't control the interactions at the farm, and they [the students] are all learning very different things. [This is] because the philosophy there is to allow people to follow their area of interest. (Fernando, interview, October 2009)

Fernando became aware that he viewed the teacher as the controller of learning. This awareness arose from his experience of feeling challenged when he was not being able to engage all his students at the same time in learning a particular concept, because his students were spread out across the farm's growing area in small working teams.

While initially concerned about this, Fernando learned to:

let go of being responsible for everybody walking along lock-step, lock-step learning stuff and I might not know what they're going to learn exactly before they go. (Fernando, interview, October 2009)

Fernando still recognized that there were aspects of the learning and the curriculum that he needed to “control” and manage. For example, he expected that his students would learn about photosynthesis. To accomplish this he provided some direct instruction on this topic in the classroom and then assigned students projects in which they were required to explain their understanding of this biological process.

Aside from certain curricular emphases, Fernando realized that many aspects of learning in the LLP were, and needed to be, flexible and open-ended. He discovered that flexible experiences that provided opportunities for choice and individual response led to meaningful student learning. For example, Fernando provided his students with a notebook in which they were to record what happens on their farm visits. Fernando discovered that, in addition to the assigned activity, which was to describe what they did on their visit, his students also wrote about other aspects of the farm experiences that interested and influenced them in significant ways. For example, some students would write about the food they tasted; others would describe the beauty of the plants, the behaviour or appearance of insects, or their interactions with Farm Friends. Fernando showed me a student notebook where a student had taped a pressed plant to one of the pages. He pointed out that he never asked the student to do that. Experiences like this one challenged Fernando's beliefs about teaching and learning in the farm project.

There's a lot of freedom out there and my natural assumption would be that that would cause problems, and it's been the opposite. I would have assumed that because I wasn't there with my thumb on the situation, that there's going to be kids that don't learn anything or [are] goofing off, or that don't do anything and it's just not like that. [Instead], it's the most focused group when we're out there. (Fernando, interview, October 2009)

In addition to gaining insights about the role of the teacher and the importance of flexibility in the structuring of learning activities, Fernando discovered opportunities for curriculum integration. He noticed that his students' writing in their farm notebooks was improving each week they were in the program, and their entries were better than the writing he had seen from his students in previous classes. He attributed these changes to the fact that students had real and personal experiences that they could write about.

Fernando explained that at the beginning of the school year,

when they [the students] come into this class and you say, now everybody write a story, well what do they write about? They're not reading books if they're not readers, [and] there's a significant number of kids who struggle with that because their parents are not reading to them. They don't have experiences, so they get in there and they write, you know, about television. Some of them are really limited. (Fernando, interview, October 2009)

But after a few visits to the farm and working with their adult Farm Friends, "they're just overflowing with knowledge about it and they can write about it and they write about the farm" (Fernando, interview, October 2009).

Fernando also realized that because the farm is situated on traditional Musqueam territory, he could integrate aspects of First Nations' social and cultural history into his classroom curriculum. On the second farm visit in 2009, Fernando took his students on a forest tour. The forest surrounds the farm fields and is part of the UBC farm. Fernando told students about the First Nations' traditional way of living off the land, how they had to be quiet and observant when hunting, how they needed to acquire intimate knowledge of plants, and how they used this knowledge. He gave students examples of how the Musqueam used Western Red Cedar bark to weave baskets and other useful objects. He also talked about how settlers came to the area and began to cut the forest. He showed his

students the indentation marks in tree stumps and asked them if they knew where those marks came from. He explained to the students how loggers used to cut out those indents and put a wooden board that acted as a platform for them to stand on while cutting the trunk. Fernando felt inspired by the history of the land at the farm and enjoyed the opportunity to bring history teaching alive and make it more ‘real’ and tangible. Based on this experience he indicated he wanted to try to spend more teaching time on the connections between the farm and its socio-cultural history.

In addition to the curricular opportunities that Fernando found the farm project afforded, over time he also began to view the LLP as a way to provide students with valuable life skills:

You’re not just simply teaching [these] kids. Because they’re very young you’re a really important role model. So [the project] is about learning how to interact with your environment and the people you are with in a way that has meaning and so the curriculum almost flows from that. (Fernando, interview, October 2009)

Fernando recognized that as they worked beside their adult Farm Friends his students were developing important social and interpersonal skills and powerful intergenerational relationships.

When [Farm Friends] spend time with kids in smaller groups, a different relationship develops, especially if the Farm Friends are not focused on some result or product to come out of the interaction. When the students spend time weeding and digging in the garden, they can talk about themselves, kids have an opportunity to talk about their lives and can form closer relationships. (Fernando, interview, November 2009)

The development of these positive social relationships was viewed as extremely important by Fernando. He worried about the disconnect between the generations in families and the larger community and saw the farm as a space where people of all ages could re/connect and learn understanding and respect:

Society nowadays is broken, young people don't interact with older people ...I have ways I believe people should live and I teach that way... The farm is about respect and love. It's hard to argue against that. (Fernando, interview, November 2009)

Fernando learned that the LLP fostered a mentally and emotionally supportive environment. He watched the caring and supportive connections within the LLP community and recognized these as a significant contribution to his students' education:

The farm is about what matters. Here I can try to help kids to be healthy, get exercise, and develop positive relationships. (Fernando, interview, November 2009)

Fernando confessed that at first he "didn't really fully grasp the power of the Farm Friends and the impact of their relationship with the kids in such small groups" (Fernando, interview, October 2009). However, observing bonds that formed between students and Farm Friends and the beautiful gifts the Farm Friends and the students made for each other and exchanged on the last day of the program, Fernando began to understand how the project activities were teaching his students empathy, collaboration and care. Providing this caring and supportive environment is important to Fernando. He explained:

[These students] are very young, [and] there's lots of room for heavy competition and failure in the world... I like the kids to be able to be successful, and they all are when it comes to the farm. They all know what's going on and they're highly motivated because of that. (Fernando, interview, October 2009)

Fernando also learned that the LLP provided a space to expose students to a healthy lifestyle. He criticized the school system for not providing more physical activity opportunities. He pointed out that while the BC Provincial Education Ministry expected students to do daily physical activity, officials did not ensure that schools have adequate gym space to accommodate all their classes. To mitigate the lack of gym space, the

Ministry asked teachers to have students do callisthenic exercises beside their desks. Fernando associated loss of concentration with lack of exercise. Therefore he was very concerned that these recommended exercises for inside the classroom were not sufficient. When he noticed students were too restless and distracted to focus on their schoolwork, Fernando would take his students outside and ask them to run around the school twice. Fernando noticed that lack of focus was not an issue at the farm and commented how he was grateful for how the LLP environment integrated learning with vigorous outdoor work and play.

When I get to go to the farm and they [the students] spend the whole day outside with natural light, rain, snow, wind whatever it is and be physical the whole time it's worth its weight in gold. (Fernando, interview, October 2009)

Fernando was particularly concerned about the food and health habits of the children he taught.

The kids at the school here are from a community that has a lot of health problems, a lot of overeating, a lot of eating of sugar, [and] other things that aren't particularly good for them. So they have a real high incidence of diabetes and so that's something that needs to be addressed...and that is one of the reasons I was so happy to find the farm and find that way to support that part of their education. (Fernando, interview, October 2009)

While Fernando recognized that a healthy lifestyle requires healthy eating habits he conceded that he could not tell students what to eat. He was particularly worried about the number of parents who brought their children a hot MacDonald's lunch, but he acknowledged that many of his students' parents work two jobs to make ends meet and may not have much time to make lunches for their children. Realizing that the LLP could be a portal for health and nutrition education, at the farm he asks his students to try tasting the healthy snacks: "I can't force them to eat [healthy food], but I can ask them to

try it” (Fernando, interview, October 2009). Fernando was also excited by the cooking component of the LLP which he viewed as a valuable lifestyle skill that his students could take into their homes.

As he participated in LLP, Fernando’s teaching practice began to change. He began to let go of control and began to trust that his students would interact and engage in positive ways with the community. While Fernando found this easy to do at the farm, he found it more challenging to provide that same freedom and flexibility in the classroom.

I [now] try as much as I can to have the kids working independently and not be responsible for you know holding their hands throughout learning, but you know it’s harder in a class to do that. It is the way the farm works. (Fernando, interview, October 2009)

Despite the challenges, Fernando did start building more freedom into his classroom lessons by creating more open-ended assignments. For example, he started working with the students to design their own test around their learning at the farm.

I usually have them write a farm test for me, so they come up with what they think the relevant questions are. We look at what kind of questions you can ask, [and] there are questions that are fairly uni-dimensional and need a very simple answer, versus questions that require a deeper understanding, and we talk about those things. There are some questions ... that are fairly straight-forward, you know this fact or not. They like to have some of those, [but] they create a test that is, you know, quite difficult. And, they do very well and they’re excited about it. (Fernando, interview, October 2009)

Fernando also began to try out some new assessment techniques. Building on the short presentations his students make during farm visits, he began to look at students’ explanations and knowledge about “how these particular plants grow, which ones are edible, which ones are ornamental and so on” (Fernando, interview, October 2009). He also tried out a public presentation activity in which students talk about what they have learned with the larger school community. “One year I had students give presentations to

another class and teach them what they learned [at the farm]” (Fernando, interview, October 2009).

Fernando continues to learn and explore ways he can incorporate more open-ended activities and use these to extend and balance his structured classroom activities. While he was always fond of using music and song to generate an affective classroom atmosphere, he now incorporates music and songs to help his students learn and remember some of the more complex science concepts. For example, he composed a song about the process of photosynthesis (See Appendix E), and used the lyrics of Joni Mitchell’s song, “Big Yellow Taxi” to introduce and discuss social and environmental issues with his class. He continues to increase the number of farm-related writing assignments and incorporates LLP related vocabulary into vocabulary tests. And, he has begun to look at new ways students can represent their science knowledge. For example, students are asked to draw diagrams and graphs to demonstrate their knowledge of soil composition and plant growth. He also designed more group work and poster projects for his students. However, for these projects, Fernando still prefers to use a structured approach; he provides examples and advises his students on what they should include in their text and labels. In his directions, he emphasizes rigor and accuracy as he reminds students that their projects should not be only artistically beautiful but also contain accurate explanations.

These days at the farm Fernando is excited about exploring what the project has to offer his students beyond academics.

One of the things that I really like that we’ve been doing in the last few years that we didn’t do before is, the afternoon hour, and a bit [that] we’re using to work in the garden on bigger projects. (Fernando, interview, October 2009)

Fernando's decision to make this change came from the personal satisfaction he derived from doing the physical work of digging when he was at the farm; and his assumption that his students feel this too. Fernando now perceives outdoor work to be a link between students and nature: "kids get a chance to get dirty, have fresh air, be like living creatures on the earth" (Fernando, interview, November 2009). Also, by working on "bigger projects" he hopes that students are able to see the grander picture of food production; namely the amount of work and collaboration needed to maintain a farm, which is only a small part of a food production system that supplies their food. Through his time in the LLP, Fernando recognized a large and significant change in his teaching activities:

I don't have to deliver boring lessons out of a textbook anymore. I don't do that. It's freed me up. (Fernando, interview, October 2009)

4.3 Ron

"Did anyone feel something when we were walking in the forest?" asks Ron as we step out of the forest into a clearing. A flutter of hands rises in the air as students share their experiences of different smells, slimy slug trails and the feel of spider webs. Ron probes further: "Did anyone feel something different right when we walked into the forest? I'm going to give you a hint here. How was it walking from the sunlight into the dark?" Students chirp in.

This has been their first visit at the farm for this Thyme Elementary grade 4/5 class; the place where they will be coming for the next year to learn to grow food. As the tour of the farm ends and the day is wrapping up, quiet chatter gurgles among the group making its way back to the greenhouse. Suddenly an exclamation, a rush of feet and a silence thick as peanut butter, overtakes the group. A student has spotted a baby snake.

Ron runs over to the clump of students and gently picks up the snake, its silvery sides shining like a sardine. The snake moves its head from side to side, neck rubbing between thumb and finger and eyes everyone with an unblinking stare. The students gather around Ron like a fist. Only excited breathing can be heard. Ron talks calmly to the students and allows them to see and touch the snake one by one. Then he releases the snake back in the grass and continues the trek to the greenhouse. On the way he turns to me and says: “As you can see, there are so many possibilities and things we can do to integrate what happens at the farm with learning.” (Ron, field observation, October 2010)

The year 2009 marked Ron’s 29th year as a teacher, and his fifth year as a participant in the Intergenerational Landed Learning Project. Ron is a natural science enthusiast and enjoys outdoor recreation such as hiking trips. He first heard about the LLP from Fernando, a former teacher in Ron’s school who was involved with the project the year before Ron decided to apply to the program:

I had talked quite a bit with [Fernando] who had been in the program, and [learned] what it was about, and for me it was just the right fit. I really felt that you know the best learning that I’ve ever encountered has been usually what happens outside of the classroom... children being out in the open space and outdoors and hands-on learning. (Ron, interview, October 2009)

Before joining the LLP, Ron tried to incorporate hands-on science projects in his classroom teaching. Projects he explored with his students involved germinating seeds in a cup, planting them, and observing the growing process. However, Ron longed to give his students more “authentic” hands-on learning opportunities:

It’s fine to grow plants in a dish or you know, germinating seeds in a container at school but when you actually see the entire cycle [and] the

kids get to experience that in an actual learning environment, where they're actually participating ... you just can't get that out of a book, you can't get that in a classroom setting. (Ron, interview, October 2009)

Ron also believed learning needed to be linked to the 'real world'. He was looking for an

opportunity for me to make that bridge between the classroom and the real world. What all teachers are looking for are life experiences you know, and giving kids who maybe come from very challenged backgrounds a life experience that they can grow and develop, not only their knowledge scientifically but as people. (Ron, interview, October 2009)

Ron's desire to meet the needs of all his students was another factor that motivated him to participate in the LLP. He recognized a garden setting was a new and different type of environment; one that might provide a better learning space for those students who had difficulties focusing in the classroom, "sitting at a desk, looking at a book, doing paper pencil stuff or listening to a teacher talk" (Ron, interview, October 2009). When talking about his views on teaching and learning he attested that:

we all are different, we all learn in different ways, we all have different needs and we need to as educators realize that kids that are more challenged in the classroom can, you know, really truly shine depending on the type of environment you provide them for learning. (Ron, interview, October 2009)

However, once he began taking his class to the farm in his first year of participation, Ron discovered that teaching in this new environment was complex and presented some challenges. He learned that he needed to go slowly and just observe what was happening in order to understand how the program worked.

I found it kind of overwhelming because there were so many things [happening]. I was in awe of the space, in awe of the people that I met out there. (Ron, interview, October 2009)

At first Ron did not do much integration of the farm and food-growing activities with his classroom lessons, and was not quite sure how to begin.

[I was] trying to figure it all out. How was I going to fit this into my classroom? How was it going to be integrated into my curriculum. (Ron, interview, October 2009)

His initial attempts to integrate the outdoor aspects of food growing, involved making links with his science curriculum. Ron led lessons on earthworms. He and his students explored the life and physiology of worms through books, internet research projects, and worm observations. For the observations, Ron taught his class how to make ‘wormeries’, a transparent container that houses soil and earthworms and asked students to make them at farm and take them to their classroom. Over several weeks the students observed and recorded the activity in their wormeries on a daily basis and recorded observations and explanations of what happened inside the container. With the wormeries, Ron made a connection to soil science and compost. He led class discussions on the role of earthworms and other soil organisms in soil formation and showed students worm castings in the wormeries. He also taught lessons about plant growth and photosynthesis in preparation for the farm visits. To prepare his students for the farm visit where they would be hearing about how plants grow, Ron showed them a YouTube video on how xylem and phloem function. At the farm, he told students to measure plants and track their growth in a chart.

Ron found that receiving information about the farm visit themes from the program providers was not enough to prepare his class for the visits. He recognized however, that having a specific theme for every visit made it easier for him to link farm activities with school science. Each week the program coordinator provided Ron with a

package of curriculum materials on the theme of that farm visit. Ron drew upon these resources to help him plan lessons on concepts and skills that would prepare his students for their farm day visit. For example, one activity involved planning a garden plot using a seed calendar. For this activity, Ron taught his students how to read a symbol chart in the seed calendar and apply this knowledge to create their garden plan. Although he received material from the project coordinator with instructions for this activity, Ron found that he needed to adapt the information materials to his students' level of understanding.

Ron also began to experiment with different teaching approaches. He wanted to provide some organization and direction to his assignments and also allow the freedom for students to communicate their knowledge and ideas as they wished. To achieve this goal, Ron gave each student a notebook to record nature observations and also what they learned and experienced during their visits. He called this notebook a 'farm book'. The farm books provided a space for students to explore their interests in the garden through writing and drawing about what captivated their attention during the farm visits. Ron's intention was that the farm book should have:

some structure to it. Things are set in the farm book that they have to do—observations—but it's also open ended too, where they, if there is something that they have an interest in, they can record and write about. (Ron, interview, October 2009).

Over time Ron began to realize that farm activities afforded more curricular integration opportunities than solely science exploration. As he read the students' farm books he began to see a difference in the quality of writing. Like Fernando, Ron noticed that when students had experiences to draw upon, their writing was better than if they wrote about fictitious topics.

...a style of writing that we would do would be ... [where] you're in the picture. So it's about what you see, what you feel, what you hear, what you smell and then developing a piece from that. It's sort of...in the garden, what they're seeing. They sort of brainstorm all the things ..., the juicy colourful flowers, green leafy vegetables, that type of thing, just continuously what they smell you know, damp moist air, fragrant flowers, and then they write their piece based on the language that they develop. But, the language comes much more freely from them because they know what they're talking about. (Ron, interview, October 2009)

The realization that the farm experience inspired students to express themselves more fluidly and freely encouraged Ron to incorporate more writing assignments that related to the farm during his second year in the Project. One writing exercise was about the Farm Friends. Ron had his students interview their Farm Friends, take pictures of them, and write about them. In another assignment, Ron directed his students to focus on their sensory observations and experiences of farm events, such as walking in the forest, and then write a descriptive piece. Ron discovered that through these assignments, his students were gaining proficiency with a new vocabulary learned at the farm. Ron also assigned students a writing exercise where they focussed on an organism and described it in detail. This assignment not only combined science and writing, it also allowed students the space to explore their personal interests, which Ron noticed contributed significantly to the quality of their writing.

Ron also began to explore opportunities for artistic expression that the farm-based program provided. This excited him because he not only saw this as another way he could integrate the farm and classroom experiences and curricula, but also as a way he could grow as a teacher. Ron recognized that he was “not a really an experienced art teacher, but you know, the garden just lends [itself] to that” (Ron, interview, October 2009). Ron began to ask his students to produce nature drawings, leaf prints, and art about nature

cycles at the farm. As he did this he noticed that some students who were struggling with writing about what they learned at the farm excelled at demonstrating what they learned by creating detailed drawings.

In addition to opportunities for artistic expression and science discovery at the farm, Ron realized that as his students worked alongside volunteer Farm Friends they were learning more than content knowledge from their mentors. He noticed improved interpersonal and communication skills. As he observed the relationships develop between the adult Farm Friends and the students while they worked together planting and tending their crops, he realized that working in this way provided life lessons that made his students more confident in their interactions with adults and helped his students gain new communication skills.

[I am] seeing the Farm Friends as mentors and the kids who are initially nervous about meeting older people, working with older people, truly becoming friends, and improving their ability to communicate and to investigate and to be engaged in learning... Farm Friends are the vehicles that carry that through the whole program. (Ron, interview, November 2009)

Ron also realized that the farm visits could be beneficial for his English-as-a-second-language (ESL) learners. Ron noticed that students on the first few visits were shy or did not know enough English language to frame and ask open-ended questions that would permit conversation to flow. To build on this, Ron began to work with his students before farm visits to create more opportunities for dialogue. Before going to the farm, Ron asked his students to formulate open-ended questions so they could have more meaningful conversations with their Farm Friends. He observed that as the ESL students in his class worked and communicated with their Farm Friends, they were improving their spoken English skills in ways he had not anticipated.

Beyond the science, art, and language-related curricular opportunities that Ron discovered through taking his students to the farm to learn to grow food with their Farm Friends, he also began to see ways that the LLP experiences and learning could be extended and applied to his students' daily lives. This excited Ron because he wanted to do more than teach content. "What I teach in the classroom has to have a practical application for me" (Ron, interview, November 2009). Ron's realization that the skills and actions that students engaged with at the farm could extend beyond the classroom motivated Ron to introduce conversations and lessons about environmental issues and actions into his curriculum. For example, inspired by a discussion about lunch waste during a LLP planning meeting with the other teachers and project staff, Ron introduced the idea of Waste-Free Lunches for all the farm visits. He encouraged and challenged his students to bring food packaged in reusable containers so that they would not throw out any waste from their lunch meal. Ron then adopted this activity of waste awareness and reduction at the farm and adapted it for his classroom. He also hoped that his students would take this initiative into their homes and future high-schools.

At the farm Ron also found he could work productively with students who had trouble engaging in learning at school. He discovered that students who had behavioural problems and difficulties in the classroom were acting differently at the farm; they were engaged, working hard, and contributing in positive ways to the communal activity. These students did not misbehave at the farm, but rather had become part of a community which valued their help. Ron used this opportunity to talk about productive work habits with his students and to illustrate that their actions can make a difference in their communities. According to Ron:

For some kids [this] is an accomplishment, that they're doing something that you know is productive and they enjoy that. (Ron, interview, November 2009)

From watching children with behavioural challenges develop self-esteem through their contribution to the hands-on work, Ron realized he wanted to provide more opportunities for his entire class of students to contribute to the farm. He began to incorporate what he termed “service work” into the daily planned activities of farm visits. This involved getting his students to do farm work that went beyond what they did in their own garden beds. These ‘special’ farm chores included weeding, spreading bark mulch between the raised beds, and transporting soil and compost as needed. Service work became a regular part of every farm day. Each visit Ron asked the garden manager for jobs that his class could help with. He then dedicated the afternoon portion of his farm visit to physical service work.

Ron was extremely excited and proud about the work his students were doing at the farm. He wanted to share what his class was learning at the farm with others at his school and encourage his school community to become interested in and engaged with issues of food growing and environmental stewardship. In 2006, during Ron’s second year of participation in the project, he decided to create more connections between his school community and what his students were doing at the farm. Ron first worked with a volunteer Farm Friend from LLP and the school principal to obtain funding that led to the building of a small food garden. After a few years of participation, the impact of the Landed Learning program was evident on the culture of Thyme elementary school. The main school hallway proudly displays pictures of his students and their work at the farm. And, in 2007, Thyme students worked with an artist to design a large mural related to the

themes of food and environment on one of the school's walls. During the planning process, Ron's former students asked the artist to include scenes from their farm program.

To further build on the farm and Landed Learning Project's legacy at the school, in 2009, Ron began a pilot project with his student teacher, to assess the feasibility of having a school-wide composting program. In the year this thesis is being written, Ron's enthusiasm for melding farm, school, and community and the momentum for building community around food and farming continues to grow. The food garden Ron helped initiate is being extended with the addition of new raised beds, and his school has become involved in a farm-to-table lunch program in partnership with a local high school that has a food-catering program. Ron's enthusiasm for the program is reflected in his advice to teachers who are looking to get involved with an environmental education initiative on a farm:

Always be prepared to learn new things...I'm still learning new ways to teach, new ways to inspire kids, new ways to meet needs within a classroom. Look at the outdoor classroom and the environment where we should all have time with our kids... bring experiences back into your classroom that can be talked about and dealt with in a real way...that enriches your learning tenfold." (Ron, interview, October 2009)

4.4 Dori

"The story I am about to read to you is true. It happened." Students stretched out across the floor quietly listen and gaze at the illustrated book their teacher, Dori is holding up. Dori begins reading from *Planting the Trees of Kenya: The Story of Wangari Maathai* by Claire Nivola, occasionally stopping to show students the pictures in the book and to ask them thought provoking questions: "Why did the narrator say that the

wind and water was taking away the soil? What do animals do to the soil on a farm?" A few eager hands jut upwards as some students attempt to answer these complex questions. Dori pushes the students to make connections between what they have learned at the farm and the soil situation in Kenya: "Why do the staff at the UBC Farm move the chicken house to different locations on the farm?" This time, more hands go up. A student answers eloquently: "because chicken manure is a fertilizer for the soil." As she reads on Dori, emphasizes that Wangari, the protagonist, was brave and perseverant. She says that Wangari, a young woman from Kenya, did not wait or expect the government to help her with her idea, and that even when the government was against her she continued working toward her goal of saving agricultural lands in Kenya. Then Dori asks the class: "What did people at the Me to We Conference tell you about the government?" She doesn't wait for a response but continues: "to keep the government accountable and responsible for their actions," then presses on: "What is the connection between Wangari's work in Kenya and the Adopt-a-Village initiative our class is participating in?" (30). Eyebrows raise united in thought.

After the discussion the Dori instructs her students to take a few moments and write what they learned about soil from the story. Then she leans toward me: "the topic of soil is complex...it cannot be taught properly unless you also explain the water cycle, the weather system and geomorphology...I want the students to see the bigger picture", But Dori quietly confides that she does not know how she is going to teach her students about this without overwhelming them with information. She says this as she looks at her students, all bent over their pieces of paper, writing, drawing, creating mindmaps about soil. She looks at me in earnest: "I want students to think more deeply about soil," about how it is connected to human health, to poverty to social action. "It's interconnected, it's just realizing it, you know, not isolating it".

Dori was a learning assistance teacher for 11 years before she became a Montessori teacher. In 1985 she opted to switch to the Montessori model of education because:

[I was] dissatisfied with the way things were traditionally done and I really had trouble with the bell curve... [which 'requires' that a] given number of children should be failing in class, middle number should be getting Cs and only a few should be getting As. (Dori, interview, October 2009)

When Dori began raising her own children, she knew she “wanted something different for them” (Dori, interview, October 2009) and started to search for an education system in which all students could excel. Meeting diverse student needs has been one of the guiding values in Dori’s teaching practice. To better equip herself for reaching students with diverse learning styles, Dori reads research articles and books on child development and behaviour.

At the time this study was conducted Dori had been teaching for 35 years. This was her third year participating in the LLP project with a grade 4/5 class from Bay Leaf Elementary, a small elementary school that followed the Montessori curriculum. Dori joined the LLP because she believed it would help her better meet the needs of the diverse students in her class.

It offers children an opportunity to be outside. There are a lot of children that don’t do well just sitting in class; there are children who need to be out and about and working, and get great satisfaction from working with the land... I knew that there were some children who would benefit more, those were the ones who tended to not have the success in a traditional classroom. (Dori, interview, October 2009)

In year one, Dori discovered that reading the lesson support materials provided by the program coordinator was not sufficient for her understanding of how to integrate the farm project activities in her teaching. “It is one thing reading it and another seeing it in

action” (Dori, interview, October 2009). Feeling under-prepared and not fully in control caused Dori some unease because, here she was a veteran teacher, but in her words “[I] wasn’t quite sure what was happening all the time... [I was just] trying to get a sense of what it [the program] was about”(Dori, interview, October 2009). Dori was somewhat comforted and guided by the other teachers who had been participating in the LLP for a longer period of time and “knew a lot more because they had been through the system”(Dori, interview, October 2009). From this she realized that the way to learn to teach within this program was to “experience it”.

Initially Dori planned that she would use learning to grow food at the Farm “as a language arts kind of extension” (Dori, interview, October 2009) to her curriculum. However, by the end of her first year she realized that she had not achieved the language arts integration that she originally envisioned and intended. She asked her students to draw pictures about cycles in nature, and she gave each student a vegetable to research and then present their findings in an educational pamphlet format. And, that same year when she noticed that her class was interested in comic strips, she asked her students to draw comic strips to represent what they did at the farm.

For her second year, Dori continued with her language arts focus and included more writing activities than the previous year. One task involved students writing an introduction piece about their Farm Friends, describing their interests, work, and family life. For another project, she asked students to take pictures during farm visits, to represent certain themes (ex. collaboration), and then write a journal entry about those pictures. Dori provided the themes but allowed the students to choose what to photograph and to explain why they made those choices. She also asked students to write reflections

about their farm visits. To assist students with their written reflections, Dori provided some guiding questions.

Moving beyond the language focus, Dori began to introduce some science activities at the farm in her second year in the program. She gave students botany worksheets in which they drew pictures of the different plant parts that they learned about at the farm. The students' pictures included different types of roots, leaves, flowers and seeds on the food plants they were cultivating. To help students extend and transfer what they learned about ecology at the farm to learning in the school setting, Dori decided to start a butterfly garden with native plants at her school. The small garden area at Bay Leaf Elementary already housed some native plants, so Dori opted to add butterfly-friendly plants to the existing garden. She also invited a parent gardener to help her students identify the native plants already living in the garden. She then asked students to make plant signs that included both the common and scientific names of each plant and additional information about the different kinds of plants.

By the end of year one, Dori began to realize that not only was she thinking differently about her classroom lessons and the school curriculum, she also became aware of learning opportunities at the farm that went beyond the curriculum. Dori realized that the farm could provide ways she could engage with affective education, and she began to rethink her classroom practice.

You start to teach a concept and you realize that there are other things that children don't know before that." (Dori, interview, October 2009)

The topic of soil is complex. It cannot be taught properly unless I also explain the water cycle, the weather and geomorphology."(Dori, class observation, October 2009)

Dori recognized that learning how to grow food not only required ecological knowledge but also knowledge about nutritional health. Building upon the year one task of creating an educational pamphlet about a vegetable, she had her year two students select a vegetable to research and then find healthy recipes featuring the vegetable in the ingredient list. In year three, when my study was being conducted, Dori was looking forward to taking over the bake sales currently run by another teacher at her school and changing the menu.

We're going to do a better [bake sale] starting in January. It's going to be healthy stuff...healthy desserts, probably more like zucchini muffins, carrot muffins, banana muffins and you know, what makes it healthy? And what doesn't make it healthy? And you really need to get into which vegetables have which kind of minerals in them.”(Dori, interview, November 2009)

Furthermore, Dori had spoken with the school nurse and was planning a collaborative project related to food production and nutrition.

Dori was also keen to teach in a manner that would help her students become aware of the interconnections among social and ecological systems; she struggled with how to do this.

I want the students to see the bigger picture, but I don't know how to teach them that without overwhelming them with information. (Dori, class observation, October 2009)

While the task of teaching students ‘the bigger picture’ was challenging for Dori, she saw the merit in trying. She saw her students as future decision makers and wanted to give them a holistic understanding of world issues, because ultimately they would have to address those issues.

Once they see everything's interconnected, then they understand better the concept of sustainability and how their actions could affect people elsewhere, and how other people's decisions that were made in the past

affect them, and the decisions that they make now will affect the future.
(Dori, interview, November 2009)

Who knows that what we're teaching children in school right now is what will prepare them for the future? I mean, things are going really fast, natural instability [is prevalent]. (Dori, interview, November 2009)

Dori's ideas about how she might integrate the hands-on learning taking place at the farm with her classroom teaching continued to develop. In addition to seeing the farm as a site for a cross-disciplinary and a systems approach to teaching, she started to see ways the Landed Learning Project experience would help her bring social responsibility and social action themes to her teaching. During the second year, Dori developed classroom activities that emphasized the connection between what students learned at the farm and the real world issues related to food production. She asked a subgroup of her students to read *The Omnivore's Dilemma* (children's edition) by Michael Pollan (2009). The children were to explain in their journals what they learned from the book and how the book relates to what they were learning at the farm. The decision to assign this task to some but not all of her students was informed by the Montessori model of instruction where the teacher works individually with each student and recommends activities that would be beneficial for each student's learning. To introduce the notion of community service and activism to her whole class, Dori read aloud the true story of Wangari Maathai, a Kenyan woman advocating for sustainable agricultural practices in her country. To help her students to understand the importance of learning how to grow food, Dori would pause frequently during her reading of the story to ask her students questions about soil formation, soil health, and the relationships between soil, plants, animals, and nutrition. In sharing the story and posing questions for her students, Dori wanted to illustrate that:

Learning about soil is not simple, it is complex because everything is interconnected... I want to create those connections for the students... The story... kind of does that because it is about activism, working together to solve problems, cooperation, and doing something for the community, while learning about soil... I want students to understand the importance of soil and top soil, to make connections between the nutrients in the vegetables and realize that they come from the soil. (Dori, class visit, October 2009)

In addition to talking about food production in relation to ecology and nutritional health, Dori discussed social issues associated with food production including the issue of access to healthy food and the link between this access and poverty. To help her students think about poverty and hunger, Dori asked students to look at the Ladybug Foundation website <http://www.ladybugfoundation.ca/>. The foundation was started by an eleven year old Canadian girl by the name of Hannah Taylor who was concerned about poverty in Canada and was trying to help alleviate this issue. Dori felt that since Hannah was the same age as her students, she would be a good role model who her students could relate to and learn from.

Presenting information about social problems related to food production to her class was just a starting point for Dori. She wanted her class to become actively involved in the mitigation of these problems. To achieve this goal, Dori introduced her students to local and global projects and initiatives aimed to mitigate social problems. During her third year in the LLP, she helped her class become involved with three projects. The first project was attending a youth leadership conference with her class. The conference “From Me to We” called upon youth to take action in their communities to address local and global problems. Next, Dori’s class became involved with an initiative called “Adopt a Village”. As participants in this initiative, her students raised funds that they donated to an organization that bought livestock for farmers in developing nations. Dori was very

proud to report that her class fundraised and donated enough money to purchase and donate two goats and a pig. The third project was a local community service initiative that revolved around a small donation garden area started in the LLP in year two. Dori decided to augment her students' involvement and responsibilities in this aspect of the LLP by entrusting them with the tasks of "planning, planting, managing, harvesting and donating" a crop. For Dori, this project provided an opportunity for students to learn life skills: "It's practical life kinds of things, the application of the knowledge into the real world" (Dori, interview, November 2009). It was Dori's hope that through class discussions, activities and the donation garden, students will:

understand more about poverty, about homelessness, starting to understand a little bit better the contribution that they're making. (Dori, interview, November 2009)

Dori's desire to reach and provide for the needs of her students included wanting to help her students learn how to live their lives ethically, according to values of empathy and care, and was concerned about how decisions were being made in today's society.

There's no real moral compass, not to say that one compass is better than the other, but people are kind of adrift right now, everybody is more going their own way for themselves and I think the children are confused. (Dori, class observation, November 2009)

Dori believed that one way to address this social disconnect was by doing community service. She said "the key message [is] you've got to give back" (Dori, interview, November 2009). With her students working alongside dedicated volunteers and mentors, Dori saw the LLP as a community that fosters values of care and service. In her third year in the program, Dori's motivation to teach at the farm continues to grow:

[Growing food] is more than planting a few plants and harvesting them because that's just surface. It's the ability to learn to be self-sufficient and sustain ourselves. (Dori, interview, November 2009)

4.5 Concluding Comments

The stories of Fernando, Ron, and Dori show three teachers who were deeply inspired by their participation in environmental education on an urban farm. Although being in the Project reinforced some of the teachers' views about teaching and learning, it has also pushed and motivated them in new directions. The diverse physical conditions and emergent qualities of the farm-based learning environment created pedagogical challenges for teachers. The social learning environment within the Intergenerational Landed Learning Project challenged teachers' views of their role in the teaching and learning process.

In the next chapter I address my second research question "How do the three teachers' experiences of participating in the Intergenerational Landed Learning Project influence their practice?" as I discuss the impact of participation in the LLP on teachers' practices and explore common themes that emerged from the comparison of their experiences.

Chapter 5 The Influence of Participating in the LLP on Teaching Practice

5.1 Introduction

The current study aimed to answer the questions:

1. What are teachers' experiences of participation in the Intergenerational Landed Learning Project?
2. How do teachers' experiences of participation in the Intergenerational Landed Learning Project influence their practice?

In Chapter Four, I presented the stories of three teachers who participated in the Landed Learning Project. In presenting those stories I addressed my first research question, as I depict the teachers' experiences over a number of years in the project. Those stories provide a picture of how the teachers grew and changed through their participation in the project, and thus through those stories I also begin to answer my second research question. In this chapter I continue to address my second research question research as I look across these stories to analyze the teachers' experiences and consider how participation in the project influenced change in the teachers' practice. In my presentation of teachers' experiences and professional growth in the LLP, I discuss the following themes: re/learning to teach; exploring new teaching practices; integrating farm and classroom curricula; learning to embrace a social action focus; moving from teacher-centred to social and student-centred practices; the novelty of place as challenging and fostering teacher change; the influence of intergenerational knowledge and skill exchange on teacher change; and program design features that contributed to

teachers' professional growth. At the end of the chapter I consider how aspects of the Landed Learning Project supported changes in teachers' practices and their personal and professional growth.

5.2 Experiencing Re/learning to Teach

All three teachers in this study experienced significant disorientation and uncertainty when developing and facilitating farm-based activities during their first year in the Landed Learning Project. This happened despite the fact that these were experienced teachers who each had more than twenty years of teaching to inform their practice. For Ron, the farm presented so many opportunities for educational activities that he initially felt overwhelmed and did not know where to begin. Dori struggled in her first year because she found it difficult to establish specific learning objectives for her students when she was just learning (along with her students) about the program. She found the materials she was given useful, but she did not find reading the resource materials prepared her to address the learning potential of being at the farm. In addition, Fernando struggled with understanding his role at the farm because he was not expected to lead lessons there.

While Ron, Fernando, and Dori were not disenchanted with the project and did not express feelings of failure, they did feel insecure and uncomfortable at first when they did not know how to connect what the students were learning at the farm to their classroom learning. The teachers described how, at the beginning of their participation, they had to become comfortable with the unfamiliar experience of not being the expert pedagogue and settle into the unease of not knowing exactly what to expect. They learned to be

patient and observe their class at the farm and found that this helped them not only understand how the program worked but also prompted them to think and learn about teaching in new ways. Their ideas for classroom activities that built upon the hands-on experiences in the LLP emerged from their close observations and reflections on what they saw taking place at the farm.

Fernando came to the program with a desire to improve his science curriculum. As an outdoor enthusiast, the farm program appeared to be a natural fit for him. However, during his first year, he encountered difficulties understanding what his role should be in the program, how to prepare students for the farm visits, and what kind of activities to give his students when they were at the farm. During this year Fernando relied on the resource materials provided by the program coordinator. Having access to these materials allowed him more time to observe during farm visits and to think about classroom activities that would enable his students to apply the knowledge they were gaining at the farm. During this time, Fernando reflected on his identity as a teacher and not only accepted but also engaged with his new roles of learner and observer to inform his teacher identity. This helped him become more comfortable with his uncertainty about how to work in a setting where ‘nature was in charge’. And, over time he learned to customize the program to his class and his teaching style.

Ron also encountered hardships during his first year in the program. Although comfortable, passionate, and knowledgeable about the outdoors, he felt overwhelmed with the freedom and endless teaching opportunities the farm provided. At first, he did not know how to connect what was happening at the farm to his classroom curriculum

and was grateful for the teaching resources provided by the program coordinator. Like Fernando, he relied on these resources extensively during his first year.

During her first year, Dori was unsure about how to meld the LLP program goals with her classroom activities, and was uncomfortable because she felt she did not know the curriculum nor how the program worked. She stated that “it is one thing reading [about] it and another seeing it in action” (Dori, interview, October 2009). Like Fernando and Ron, she felt lost at first and needed time to establish clear learning objectives and ideas for her classroom activities. Also similar to Fernando and Ron, during her first year, Dori found the LLP curriculum resource materials to be invaluable. However, she believed that her ability to integrate what was happening at the farm into her classroom activities would increase naturally when she had “more experience” in the program. From taking part in the teacher planning meetings with Ron and Fernando, she learned about how they integrated the farm activities with their classroom lessons, Dori attributed their facility in melding the farm with the classroom to the teachers’ prior experience in the program. When talking about the program she referred to it as “a process, you gain knowledge as you go through it” (Dori, interview, October 2009). Dori was patient and prepared to watch and learn. She felt certain that time was the key; with time she would gain the cognitive knowledge she needed about plants and food production and practical understanding of the program’s flow and activities that would allow her to create activities that would meld farm and classroom lessons for her students.

Following an initial period of discomfort and confusion, Fernando, Ron, and Dori began to adapt, explore, and extend their practice and try new and different teaching strategies. They began to re/learn to teach; each experimenting with new ideas and ways

to teach that were conducive to the conditions at the farm and ‘fit’ the program. While Fernando was grateful for the program resources, he realized that ultimately, as a teacher,

you have to go there and make it your own, make it be what you want it to be. I might not have been ready to hear that stuff [in the first year].
(Fernando, interview, October 2009)

This realization provided Fernando with the courage to experiment with various teaching approaches, assignments, and evaluation methods. Reflecting on his experience after five years of participation in the LLP, Fernando confidently stated that “every year I get a little bit better at using what we do at the farm” (Fernando, interview, October 2009).

Similarly to Fernando, from his second year on, Ron used the LLP resources solely as guides to teaching in the program. He conceded that:

you could have a teacher’s guide for some ideas, but with the understanding that this may be changed and modified, and you can still inject your own things into it. (Ron, interview, October 2009)

Ron explained that the flexibility to adapt teaching activities to one’s own style is part of being receptive to what he terms “open-ended learning”. In other words, he found that to teach in the LLP he had to be open to creating educational activities along the way and be responsive to emergent learning opportunities, without expecting to follow pre-planned activities step-by-step.

The experiences of the teachers in the LLP support other studies that indicate teachers face challenges when they depart from their daily teaching routines. Tal and Morag (2009), in their qualitative research about pre-service and in-service teachers’ experiences teaching in an ecological garden, discovered that “teachers are used to classroom-based teaching, to sets of objectives that are rooted in the standards and the curriculum they teach, and to definitions of learning that are related mainly to the

cognitive domain” (p.258). The unfamiliarity of new activities, new environments, and new assessment methods poses the risk of failure, error, and un-safe situations for teachers who have not engaged with these aspects before.

The teachers’ willingness to persevere and stay involved with the LLP appeared to be related in part to their predisposition to embrace challenges, and to their willingness to learn along with their students and adapt to teaching in a new environment. The physical environment also appeared to be influential in sustaining the teachers’ involvement. Particularly in the cases of Fernando and Ron, it was apparent that their excitement about being in a place where they could share their love of nature helped to sustain their enthusiasm and participation. Ron explained that to teach in the LLP he had to accept becoming a learner. Furthermore, he had to be willing to embrace challenges because it was not apparent to him at first how to make connections between significant events that happened at the farm and his classroom teaching. He only began to see the connections after observing many farm visits and reflecting on those observations. Fernando on the other hand was motivated to overcome obstacles partly because of the sense of adventure he felt at the farm and his desire to share that with his students.

5.3 Exploring New Teaching Practices

As they participated in their first year in the LLP, Ron, Fernando, and Dori began to think about and explore new teaching practices. They thought about and worked in new ways with the curriculum and established new learning objectives for themselves and their students. The teachers also began to engage differently with their students as they provided students with more space for their own imaginative work. When the

teachers planned their farm activities they initially connected the farm lessons to school subjects that were most familiar and comfortable for them. However, by the end of their first year, each teacher began to see more and varied connections between various school subjects and what their students were learning at the farm.

The teachers' learning objectives for both the program and their students also changed. In the first year, teachers were concerned with their students learning new concepts and content and thus focused heavily on the teaching of subject matter knowledge. Ron and Fernando concentrated on teaching specific science concepts such as photosynthesis and soil formation. Dori was interested in promoting understanding of ecological principles and asked students to do drawings and comic strips about cycles in nature such as the water cycle.

By the end of their second year, each of the teachers continued to help students learn the subject matter but expanded their lessons to include a focus on social action. Ron started a garden at Thyme Elementary School, with the intention to connect and extend what his students were learning at the farm. He hoped that the school garden would build habits of care and land stewardship that students would carry into their homes and future lives. Similarly, Dori encouraged her class to get involved with the LLP's donation garden initiative—growing a food crop and donating it to a food bank—in an attempt to foster a sense of “giving” and responsibility for the wellbeing of the community.

All three teachers began their participation in LLP expecting the learning at the farm to be teacher-centred and controlled. However, they discovered that this structure for teaching and activity design did not suit the emergent opportunities at the farm, nor

did it allow students to develop and follow their interests. As they continued to participate, the teachers began to explore ways to provide more options in their lesson activities for students to pursue their interests. The teachers became more open to allowing students to inform and guide their lesson designs and allowed the students to give more direction to the learning.

5.4 Integrating Farm and Classroom Curricula

Ron, Fernando, and Dori each came into the LLP with specific interests, motivations, and expertise. These were the teachers' starting points for integrating the farm-based learning experiences of LLP with their classroom teaching. Dori came with expertise and interest in language arts. Her familiarity with these subjects allowed her to see her first curricular connections between the LLP and the classroom. The initial activities she designed for her students that drew upon and integrated the farm experiences included drawing comic strips and pictures about natural processes and cycles and writing about the farm in a reflection journal. Ron was a natural science lover who enjoyed outdoor recreation. His initial classroom activities that built upon the LLP activities involved science and were in line with his background knowledge of and comfort with the subject. In the first year of the program, Ron focused on natural history and nature lessons, and took his students on farm and forest tours where he would talk about the insects, birds, plants, and animals they encountered. Fernando had a passion for music and an academic background in science. His initial classroom activities that extended what happened in LLP involved teaching his students songs about nature and engaging them in scientific explorations of natural phenomena.

When the teachers joined the LLP, they were not gardening or growing food at home and their knowledge of gardening was limited. As the teachers began to learn about sustainable agriculture along with their students and the interconnectedness of food growing with ecology, health, nutrition, and issues of production and accessibility, they began to see ways they could connect the events and activities of the LLP with their teaching of school subjects. For example, Dori decided to involve her students with the donation garden initiative. This initiative was an idea that originated from and was developed during an LLP teacher and staff meeting. The aim of this initiative was to engage students in community service, by growing a food crop, such as potatoes, and donating it to a food bank. For Dori, the donation garden initiative helped her envision two new links with school subjects. First, it helped her connect the topic of food production with her social studies lessons, and gave her the opportunity to discuss food accessibility and poverty with her class. Secondly, Dori started to think about how to include math into the work her students were doing on the donation garden. Dori had never planned and organized an initiative of this kind. She decided it would be exciting for her students to try and calculate the amount of potatoes they would be able to grow during a school year. From conversations with the program coordinator she heard about ways to calculate crop yields and began to see that math calculations were needed to plan the donation garden. With this as her starting point Dori began to think about how she could include math activities in her classroom lessons that emanated from the students' work on this initiative and how she could do more "farm math" with her class on farm days.

As the teachers participated in the project they also learned about the history of the farm and the Musqueam traditional territory on which it is located, about the geology of the land and composition of the soil, and about economic development possibilities on a farm. This access to multidisciplinary knowledge broadened the teachers' understanding of the activities that could connect the learning at the farm to their classroom curricula. They began to see that activities in the LLP required skills from different subject areas such as math, social studies, art, and writing.

As their knowledge of food systems and food growing increased, the teachers increased the complexity of learning tasks they asked their students to complete in preparation for the farm visits. For example, in year one, to prepare for the Landed Learning garden design day, Ron asked his students to create a very simple garden plan that involved selecting plants from a seed catalogue. By year two, after he learned more about gardening, Ron expanded his garden planning activity. He introduced his students to the concepts of companion planting, sun exposure, and natural pest control and then asked them to create garden plans that took into account plant choices based on these concepts. After three years of participation, Fernando asked his students to make a group poster, explaining companion planting through the example of the 'three sisters', corn, beans and squash. Previously, his assignments were based on individual work such as writing personal observations about nature or doing soil experiments. However, Fernando realized that since every student was learning and exploring personal interests at the farm, a group cooperative assignment would allow each student to contribute their specialized knowledge to an assignment. He also hoped that through working together to create one unified product that required their combined knowledge, the students would learn from

one another. Dori similarly increased the complexity of her student assignments over the years. While she initially asked her students to make a comic strip that simply illustrated what they did during their farm visit, in her year three assignment, she asked for more specific content. For example, students were asked to illustrate and explain the process of soil formation in their cartoons.

Increased understanding of the food system not only influenced teachers' practices in the classroom, it also catalyzed their involvement with school gardens and composting activities beyond the schoolyard. After three years of participation, Fernando started composting at home in his backyard and brought samples of his home compost and his "red wriggler" composting worms to school for his students to examine. Ron helped initiate a food and flower garden and a trial composting program at his school, and Dori began planning a butterfly garden at her school. These activities illustrate the ways that participation in the LLP not only supported the teachers' development and implementation of activities related to food systems and sustainability but also increased their confidence and capacity to assume environmental leadership roles in their schools as well as beyond the classroom.

Tal and Steiner (2006) in their study of teacher behaviour during field trips observed that teachers tended to assume the role of passive participants. In a related study Tal and Morag (2009) found that during outdoor field experiences "teachers are more concerned about the correct trails, possible physical challenges, the students' security and safety, weather conditions, management issues, and their own insufficient scientific knowledge" (p.246) which leaves them with little time to actually teach. Although these concerns may have invariably coloured Dori, Ron, and Fernando's first year experiences,

they were able to move beyond these initial obstacles and learn new teaching approaches. Through their involvement the teachers learned that they could teach students different skills through food-growing activities, in experiential ways which would appeal to all their students, including the ones with special learning needs. This learning appeared to support and sustain their participation even though they each experienced challenges with designing activities that connected classroom learning to the learning at the farm.

5.5 Learning to Embrace a Social Action Focus

When the teachers first began participating in the Landed Learning program, their focus was on academic learning and enhancement of the school curricula. Ron and Fernando each focused on the science that could be learned through farm activities, and Dori connected farm activities with her language arts curriculum. Over time as the teachers observed the farm visits, they began to notice that students were also gaining what they called, life skills. They recognized that their students were learning about peer and intergenerational collaboration, respect, and responsibility. They also noted their students improved their communication skills and demonstrated increased confidence and ease in interactions with adults. The teachers attributed their students' learning in these areas to the program design and to the supportive and caring culture of the LLP community of staff and Farm Friends.

According to Wenger, McDermott, and Snyder (2002) a 'community of practice' is present when a group works together to uphold values that are important to the community, and to foster behaviours which uphold those values. These qualities appeared to be present in the case of the LLP community, as the staff and volunteers valued,

modelled, taught, and practised caring, collaboration, well-being, healthy eating, exercise, and environmental responsibility. Within this supportive environment, teachers saw an improvement in student behaviour. They saw that students were contributing to the common goals of food production, and that they were helping peers and farm staff wherever assistance was needed. The students' eagerness to be of help at the farm signalled social growth that the teachers attributed to their students' participation in the LLP community.

Observing their students' willingness to help with garden maintenance and chores, their openness to trying new foods at the farm, and how all students (even those who had behavioural difficulties in the classroom) were working productively and cooperatively, inspired the teachers to add a service component to their farm activities. Dori decided to extend her students' involvement in the LLP donation garden by making the food security issues a more explicit part of the classroom conversations and presenting students with resources and materials about local and global poverty issues. Fernando dedicated the afternoon portion of every farm visit to involving his students in completing chores in the garden. The students' assistance helped the garden manager with her large work load as well as provided good working conditions for all the people working in the garden. Ron started a garden at his school with the intention that students would apply the knowledge they gained at the farm and would also share their knowledge with the school community. By involving their students in these community-based projects the teachers hoped to motivate students to consider becoming involved in positive social action in their communities after they leave their classes.

5.6 From Teacher-Centred to Social and Student-Centred Practices

All three teachers initially thought that they would be the central drivers of the learning in the LLP. Fernando, Ron, and Dori believed that farm lessons would proceed similarly to classroom lessons with the exception that the activities and events would take place outside. However, the teachers quickly realized that in the LLP teaching and learning was happening on the farm in ways that were independent of their presence and involvement. They noticed that students were learning from their peers, their Farm Friends, the staff and from nature; students were also teaching and influencing one another and all other participants. Observing this, the teachers' views of the teaching and learning at the farm and in their classrooms began to change. They started to make the shift from thinking about learning as an individual activity fostered by receiving expert knowledge transmitted from one central figure, such as a teacher, to viewing learning as a group endeavour, emanating from participation with a community of people; This was a profound shift in the teachers' views of learning that led them to explore new pedagogies in their classrooms that supported socio-cultural learning.

Conteh, Kumar, and Beddow (2008) state that “[t]o view learning as socio-cultural means that we need to see it as taking place, not separately and exclusively in the individual minds of each learner in the classroom, but collaboratively, in the social spaces between teachers and learners”(p.225). As the teachers' began to view learning on the farm as a socio-cultural process, their understanding of their role in learning changed. They realized that they were not the only ones who taught the students and that they could work collaboratively with the LLP community to advance their students' learning.

The teachers confessed that at first they struggled with learning in social groupings because they found it difficult to determine what students were learning when every one of their students appeared to be learning something different. However, they each came to value a collaborative approach to teaching, where teachers, Farm Friends, and program coordinator worked together to create complementary teaching activities. Teachers talked with Farm Friends. Together they discussed what they were teaching in their teams and how the teachers could better prepare students for the farm visits to support what the Farm Friends were teaching. Fernando said that he learned to trust that learning was happening in the LLP even if he was not always able to observe it first hand. He admitted that he also had to learn to trust his students to behave and use their time productively during farm visits.

The teachers discovered they had to give up some degree of control over the timing and ordering of events and allow learning to emerge from less-structured and less formal lesson plans. Fernando viewed this as moving away from “lock step teaching” where his whole class would be engaged in one set activity to learn together at the same time. An unexpected (and positive, from the teacher’s point of view) aspect of teaching in this environment was that the teachers found they did not need to micro-manage student behaviour during farm days. This provided the teachers with opportunities and time to observe how students participated at the farm. Dori noted that her students had more personal control of what they were doing at the farm. They could choose what to focus their attention on, which, she believed, gave them more ownership over their learning. In other words, teachers became aware that it would be beneficial to let go and share their control not only with Farm Friends and LLP staff but also with students.

5.7 Teacher Professional Growth and Change in Practice in the Landed Learning Project

As evidenced above, Dori, Ron, and Fernando changed their teaching practice while participating in the Landed Learning Project. In this next section I discuss how the place, the people, and the design of the Project contributed to, supported, and sustained the teachers' professional growth and change in practice. The term "professional growth" in this study refers to teachers' increased confidence and ability in the areas of curriculum design, teaching and assessment (Slepkov, 2008) in an environmental education initiative on an urban farm that focuses on teaching about environmental care.

5.7.1 Novelty of Place: Challenging and Fostering Teacher Change

The teachers in this study identified the farm as a special place that significantly influenced their thinking about teaching and learning and supported their change in practice. Teaching outdoors on a farm presented teachers with a different environment than the classroom. The farm environment provided elements of newness, unpredictability, and challenges, as well as aspects of familiarity and constancy. When teachers talked about the farm setting they mentioned the spectrum of possible experiences it afforded and the physical, ecological, and climatic diversity of the place. Initially the teachers were intimidated by the variety of new topics and possible experiences and the diversity of the physical conditions for teaching with its abundance of 'unknowns'. As experienced teachers, it was disconcerting and unsettling to discover that they no longer knew what to plan for or what to teach their students. Their concern

about this situation was evident in their words: “I wasn’t quite sure what was happening...not familiar with the curriculum and what its goals were... trying to figure out how it should flow” (Dori, interview, October 2009), while Fernando concluded “you need time to understand how it works.... I might not have been ready to hear that [when I started]” (Fernando, interview, October 2009).

Initially, the teachers struggled with the newness and diversity provided by the place and the program’s organization and structures. The newness and diversity, while full of opportunities, were uncomfortable and difficult for the teachers, particularly during their first year in the program. Teachers felt uneasy when they, as experienced teachers, did not know how to design teaching activities that made appropriate use of the physical, ecological and climatic diversity of the conditions at the farm. Fernando, Ron, and Dori also felt that they were no longer in control when they observed that the students were learning many things at the farm that they knew little about. Thus, the potential and the possibilities of the farm place and program disturbed the teachers’ routines and made them feel insecure about how to proceed. They realized they could not teach at the farm in the same way they taught in the classroom.

The newness and strangeness that the teachers experienced in this place, while challenging, was also freeing. It enabled professional growth and change of practice in the teachers’ school-based lessons and their work with students at the farm. Because there were no traditions or defined rules for how to prepare students for their farm days or how lessons and activities had to be conducted, the teachers felt free to experiment and try new approaches and activities. In this way, the place itself acted as a catalyst for the teachers to change and adapt their practice to better fit the farm environment. During the

first four years of Fernando's participation, for the afternoon period of the farm visits, he used to plan what he called "classroomish" activities such as doing an art project or a writing assignment. However, Fernando was excited that for the past two years in the afternoon periods his students helped with bigger projects such as weeding, digging and building trellises that supported the farm areas that extended beyond their garden beds. Fernando participated in these activities along with his students and viewed working together as providing important lessons on social learning. These lessons included elements of collaboration, physical coordination and strength, authentic problem solving, and community building which he valued but found difficult to provide in his classroom-based teaching. "If we are going to do work sitting at a table, might as well do that in the class" (Fernando, interview, November 2009).

After the first year in the program, the teachers became more familiar with the physical, ecological, and climatic diversity at the farm. This familiarity helped them to view the diversity in the environment in a different way. Instead of seeing it as an obstacle to their teaching, they began to understand the array of teaching opportunities that it afforded. The forest and fields adjacent to the growing area were now seen by teachers as a space for teaching about ecology during forest and farm tours. The farms' ever-changing and unpredictable climatic conditions were viewed as providing opportunities for students to experience and learn about the water cycle through directly experiencing the weather. The variety of insects, worms, and unknown species that students 'discovered' in their digging and growing became the source of individual exploration assignments. The teachers encouraged students to learn more about their discoveries through detailed drawings, observations of nature, experiments, and research;

all of which supported the development of practical skills. Thus, teachers learned to make sense of and derive new lessons by adapting and extending familiar pedagogies within what was initially a challenging and unfamiliar place.

Learning to cope with the newness and the unfamiliar was alleviated by the teachers' recognition of, respect for, and appreciation of the variety of learning opportunities available at the farm. The teachers each came to realize that this place provided diverse learning opportunities that could be drawn upon to engage the interests of all students. For example, some students were excited to learn about nature through exploring plants and insects. Others preferred to learn about soil and farming practices through engaging in physical work like turning the compost pile. Some students were enthusiastic about hands-on food education and cooking, and others liked to talk with and learn by listening to their Farm Friends. Fernando mentioned that one of his autistic students loved rolling-up hoses and keeping them organized. As a result, Fernando always left that student in charge of organizing and caring for these important pieces of farm equipment. The teachers saw the diversity as providing an inclusive educational environment where everyone could contribute according to their abilities and interests to the common goals of food production and care for the earth.

Alongside unpredictability, the teachers learned that the farm, as an educational space, also provided aspects of constancy. These aspects became evident over time and served to guide teachers as they designed their lessons. For example, by participating over a number of years the teachers began to understand the rhythms and cycles of various processes in nature and learned to work with and adapt their teaching activities to follow these rhythms. Teachers learned that they could not rush the learning about cycles

of nature. The teachers learned how to synchronize their classroom lessons to coincide with regular events such as germination, growth, flowering, fruit development, harvesting, plants going to seed, and rotting. Teachers were able to find the constants and the familiar within the unfamiliar place of the farm; they learned that they could depend on nature for the inspiration of their lessons and activities and adapt to its patterns.

The rhythms and the regularity of farming activities that had to fit with nature's cycles served as another constant of place that helped the teachers plan and teach. Farming had its own regular patterns of physical activity that teachers found they could integrate into their lessons. Some farm activities integrated easily with the curriculum of science and social studies.

5.7.2 Intergenerational Community, Knowledge and Skill Exchange Influenced Teacher Change

People, community, and intergenerational exchange were elements of the Landed Learning Project experience that influenced teacher change. By participating in the program over multiple years, the teachers had time to get to know the program staff and volunteer Farm Friends (many of whom also returned year after year), and thus were able to build strong relationships with these individuals members. For example, a program highlight for Fernando was “working with people committed to the work not because it is their job, but because they care about it” (Fernando, interview, November 2009). The farm staff's commitment to the program was important for Fernando who felt restricted at his school by prevalent values and priorities that were different than his own:

I sit in a room with people who want to make things more efficient, who don't deal with people one on one, who don't focus on what matters (Fernando, interview, November 2009).

In contrast to his experience at his school, Fernando found that at the farm he was part of a community of people that shared his values of love and care. He could now teach according to these values:

I have ways I believe people should live and I teach that way. The farm is about respect and love. It's hard to argue against that (Fernando, interview, November 2009).

Similarly, Dori and Ron indicated they returned to the program year after year because they felt attached to the farm community's spirit and values. Within the farm's intergenerational community the teachers found a conducive environment to teach about equity, care, well-being, and stewardship.

Aspects of work at the farm lent themselves to lessons around community. Lessons emerged from the nature of the work and how the students engaged in that work. From their observations in their first year of participation, teachers noticed that students enjoyed doing physical work at the farm. Fernando attributed this enjoyment to the fact that students were able to see the result of their efforts as a tangible contribution to the community. Dori viewed the students' work on the maintenance of the garden as "giving back" to the LLP community. All teachers regarded physical work as a form of community service and were excited about how students were developing a sense of individual and community agency by participating in intergenerational farming side-by-side with peers and adults.

Rainio (2008), in her empirical case study of a young boy, examines the development of individual agency in a school context. In her discussion she describes

ways of understanding the development of individual agency from a socio-cultural perspective. According to Rainio:

agency develops gradually as the person participates in a community and thus gains understanding, experience, and knowledge of its practices as well as responsibility for the community and access to power. (p.118)

In the context of the LLP, the teachers began to view their students' interactions in the farm community as instrumental in the transformation of student behaviour in positive ways. Discussions of community service and the value of working together became a new and important theme in their lessons, activities, and discussions with students both at the farm and in their classrooms. Thus physical work at the farm also served as a novel mini-curriculum for the teachers and a source of lessons about agency, commitment, responsibility and community.

The farm's setting, the nature of intergenerational farming, and the regularity of the cycles of nature contributed to teachers' thinking about the interdependent aspects of learning. Taking cues from these aspects of place and program, the teachers began to design educational activities that acknowledged and celebrated learning within an ecological community. Teachers learned to work with the patterns of natural cycles and to depend on the help of volunteer Farm Friends to accomplish all the work to be done in relation to caring for their gardens and the successful growing of food crops. This aspect of interdependence broadened the teachers' view about their purpose in the program. They entered the program with the hope that the farm would be a place to engage those students with special learning and behavioural needs, and those students who struggled in the traditional classroom environment. However, over time the teachers understood how the farm as a space and place of learning was not just enriching their curriculum, lessons,

or supporting the learning needs of particular students. They came to realize that the farm provided lessons about the food the land could yield and how the human community was dependent on the land for its lessons just as the land was dependent on the community for its care. This sense of mutualism motivated teachers to add new lessons and conversations around community and responsibility to their school curricula. Teachers were also motivated to become active members in the LLP community as well as learners and observers. Fernando, Ron, and Dori began to engage in the same activities as their students, planning and caring for a garden bed and helping with chores. Over time this extended beyond the farm, as Dori and Ron started new gardens at their school and Fernando began to compost at home. Thus the farm as a place not only encouraged and supported the teachers in their development as educators but also encouraged new ways of participating in their communities and homes.

5.7.3 Program Design Features that Contributed to Teachers' Change in Practice

The Intergenerational Landed Learning program design included a number of structures and conditions that both contributed to and supported the teachers' changes in practice. Within the program structure, four features appeared to impact and/or influence the teachers' experiences and practice. These features were the application process, the distribution of tasks within the LLP community, the duration of the program and the opportunities for collaboration and planning. In the section that follows, I discuss each of these features individually; however, as the program operated holistically these features

were interconnected and, together with the people and the place, contributed to the teachers' professional development and changes in practice.

For teachers to participate in the LLP they must *participate in an application process*. Teachers completed and submitted a simple online application outlining their motivations for participating in the program, their teaching experience in environmental education initiatives as well as their experiences in outdoor, place-based, and food growing activities. The program staff reviewed these applications and invited teachers to participate in an interview where they visited the farm and talked about why they wanted to take part in the program. The questions on the application form and the visit to the farm introduced teachers to the goals of the program and the site. Teachers that opted to participate have articulated their views of teaching and learning in a farm-based environmental education program. This appears to be an important first step in supporting and sustaining teachers in this environmental education initiative. While the application process is not sufficient to sustain the involvement of teachers who are unable to cope with the complexities and diversity of teaching and learning on a farm, it appears to support the participation of teachers who are committed to the values of the program and prepared to invest time in learning to teach about the environment through farming, alongside their students, in a novel educational space.

The *distribution of teaching responsibilities* in the Intergenerational Landed Learning Project contributed to the teachers' thinking about their educational role and ultimately influenced how they worked with their students. During farm visits, three or four students were teamed with two adult Farm Friends to work on their garden plot. The teachers who were not formally part of any one team were free to observe, to help, or to

participate as they saw fit. During the first year, this freedom was disorienting for teachers because at the farm they were not required to lead lessons as they did in the classroom. This left them unsure and uneasy about their role. On Farm days the students spent more time with their Farm Friends than with their teachers, and the activities and learning took place in small intergenerational groups. This organizational structure was challenging for teachers because they felt they had little control or knowledge of what each student was learning when they were at the farm. But it presented a new pedagogical role that the teachers in this study learned to accommodate and embrace. As mentioned earlier in the chapter, from watching their students engage fully in observing nature, working collaboratively to plan, plant, and care for their garden plots, and listening to their adult Farm Friends, the teachers came to understand that meaningful learning was happening and this learning did not require them to be a central player in the teaching.

Since the teachers were not required to lead lessons at the farm, they had ample time to observe their students and think about teaching and learning. They began to design new activities which were in synch with the range of student interests they were seeing unfold at the farm. For example, when Ron noticed his class was interested in insects, he decided to allocate more class time for activities that taught about this group of animals. Similarly, Dori noticed that her students enjoyed cooking and sharing what they learned about cooking. Thus, in her second year of the program, she expanded one of her first year assignments which involved researching and making a pamphlet about a vegetable. In the second year, Dori asked her class to do research on a vegetable and then write a healthy recipe featuring that vegetable. The third year in the program Dori extended the assignment to include the class organizing school bake sales that featured

healthy snacks. These examples of changes in assignment design and lesson focus to reflect student interests indicates how the teachers learned to give students more control over what they were learning.

Another program feature that appeared to influence the teachers' practices was the *duration of their participation*. Each year, the program began in September and continued until the end of June. The three teachers made a total of 11 to 12 visits to the farm during this timeframe each year they participated. The length of the program and the opportunity to return on subsequent years provided time for teachers to learn about the food system along with their students. This helped them develop confidence with the new concepts and enabled them to design classroom activities that supported their students' learning of the food system, plant growth, ecology, and health and additional related topics. During their first year in the program, the teachers all stated that they did not feel confident teaching their students about plants and planting and caring for food crops. They also found that there were many questions students asked them about food production that they were unable to answer. However, because they were able to return and participate in the program with new classes of students each year, the teachers had the opportunity to learn alongside their students and gained first-hand experience in the garden space with food growing and with teaching in an outdoor environment. This experience enriched the teachers' content knowledge and helped them acquire the confidence to introduce new activities about the food system and its links to sustainability and health in their classrooms. Fernando talked about his surprise when he realized how much he learned about food-growing in the program:

I brought people from the school here and I still felt like I didn't really know anything about gardening and I'm explaining something to them or talking

and I realize that actually I do know quite a bit, I know a lot more than I used to know. (Fernando, interview, October 2009)

The *collaborative planning meetings* were another feature of the program that appeared to contribute to a change in the teachers' thinking about teaching and learning and their professional growth. The planning meetings, organized by the program coordinator, were held three to four times each year. At these meetings the program staff and the three teachers came together to plan, share resources, discuss scheduling of events, review the upcoming farm day themes and materials, and discuss issues related to the program. During the meetings the teachers were encouraged to discuss activities they tried in their classrooms that relate to the farm, including materials or resources they found useful for instruction and the evaluation methods they used. The teachers also shared their challenges and discussed ways to manage and/or address those challenges. For Fernando, these meetings were an opportunity to "think of things in a different way, like in another point of view" (Fernando, interview, October 2009). The teachers mentioned that these meetings removed the isolation that they felt in the classroom and made them part of a team of collaborators.

Fraser, Kennedy, Reid, and McKinney (2007) in their study of professional learning and development discuss the importance of collaborative teams in supporting teacher professional learning. Their survey findings suggest that teachers draw strength, encouragement and motivation from a team of collaborators to overcome obstacles in their teaching. My study confirms Fraser et al.'s findings and illustrates that the teachers found the collaborative aspect of the

LLP planning meetings provided a supportive environment for the teachers to learn to teach in new ways.

5.8 Chapter Summary

In summary, Fernando, Ron, and Dori developed new ideas about teaching and learning and changed their practice over the course of their participation in the Intergenerational Landed Learning Project. This change happened gradually over time. Teachers had to learn to manage this new learning environment called the farm. While initially challenged by the diversity and novelty of this place, all three teachers were able to locate and identify certain elements of the program that aligned with their areas of curricular expertise. This served as their starting point. Working within a caring and supportive community inspired the teachers and gave them confidence to explore new curriculum activities that connected the knowledge students were learning at the farm to school subjects. They then drew upon and worked with other features and constants of place. They learned to depend upon the cycles of nature and the community of people that were always present and supportive.

A number of program attributes appeared to play a role in the teachers' professional growth and change. The application process seemed to create an atmosphere of commitment. The distribution of tasks among Farm Friends and staff freed teachers from leading farm lessons and gave them more time to observe, participate in food-growing, and learn alongside their students. The opportunity for long-term participation helped foster and support the teachers' confidence to experiment with curriculum

development and to build relationships in the LLP community. Finally, the collaborative planning meetings served as space for exchange of teacher knowledge that contributed to the development of new activity ideas. These findings suggest that the program supported teachers through their challenges, fostered teacher learning, and provided a safe environment for experimentation with curriculum development and practice in the teaching of EE.

In the next chapter, I provide a summary of the study. I discuss the findings in light of the literature on teachers' experiences during place-based environmental education programs, I outline some of the implications of the findings on teaching practice and research and I offer directions for future research.

Chapter 6 Summary, Implications, Further Research, and Conclusions

6.1 Introduction

My research investigated three experienced elementary teachers' participation in the Intergenerational Landed Learning Project, a farm-based environmental education initiative for elementary students that uses a food growing focus to teach and promote stewardship for the earth. In this final chapter I present an overview of the study, followed by a summary of the findings germane to my research questions and the issues that emerged in relation to the literature I reviewed. Then I discuss the implications of my findings on teachers' experiences in an EE initiative and outline a number of recommendations for program developers and school administrators who want to support teachers in the teaching of EE. The last section of this chapter looks forward toward possible extensions of this research to further our understanding of how to advance the teaching of environmental education.

6.2 Summary of the Study

This study explores three elementary teachers' experiences in an environmental education initiative that took place on an urban farm and examines the impact of these experiences on the teachers' professional growth and practice. The study focused on answering two research questions:

1. What are teachers' experiences of participating in the Intergenerational Landed Learning Project (LLP)?
2. How do teachers' experiences of participating in the Intergenerational Landed Learning Project (LLP) influence their practice?

To answer these questions, I employed a case study approach, which examined each teacher's experience as a separate case within the boundaries of the LLP. I observed the teachers in their classrooms and at the farm and used semi-structured interviews to provide insight into the teachers' motivations for participating, the challenges they experienced during their participation, their learning, and the ways their professional practice changed over the course of their involvement.

My study revealed that at the farm, teachers learned about food-growing, land stewardship, and the value of community learning alongside their students. As they participated in this new educational space, the teachers experienced a number of challenges that prompted reflection and professional growth. They discovered new roles and learned teaching practices that helped them bring an environmental focus to their classroom lessons, their schools, and beyond. The findings also suggest that the people, place and program inspired the teachers to add a social action component to their lessons to motivate students to become responsible citizens and care-givers of life on the planet.

Research Question 1: What are teachers' experiences of participating in the Intergenerational Landed Learning Project (LLP)?

The diverse physical conditions and emergent qualities of the farm-based learning environment created pedagogical challenges for teachers. Dori, Ron, and Fernando

experienced pedagogical challenges while participating in the LLP, especially in their first year, but they overcame those challenges and were enthusiastic to continue participating in the program. The teachers found the farm to be a place full of unpredictable emergent events that made it difficult to plan, teach, and evaluate learning. The physical, ecological, and climatic diversity of the place initially made teachers feel ill-prepared and uneasy as they did not know how to design activities that took into consideration this diversity. The challenges of planning lessons that could accommodate regular, unforeseen eventualities prompted teachers to rethink and re-imagine learning, and this, in turn, supported the acquisition of new pedagogical skills. Dori, Ron, and Fernando realized that they had to teach differently at the farm than they taught in the classroom and learned to be flexible in their planning and comfortable modifying and adapting their conventional practices.

Tal and Morag (2009) documented similar challenges that in-service and pre-service teachers faced when teaching in an ecological garden. They found that teachers were accustomed to classroom practices that focused on cognitive learning and thus, they struggled to teach in a garden. In my study, the teachers were able to overcome the challenges of teaching on a farm. They adapted and re/learned to teach in the new environment of the farm.

The social learning environment within the Intergenerational Landed Learning Project challenged teachers' views of their role in the teaching and learning process. The distribution of teaching responsibilities among farm staff, Farm Friends and teachers also presented a pedagogical challenge. In the LLP, teachers were not the central drivers of

the learning process. The social and distributed learning that was taking place at the farm disrupted the conventional teacher-centred instructional approach with which many teachers are most familiar. This freedom was at first disorienting as teachers realized that they could not know what every student was learning. But the teachers found that this learning environment afforded them the time and chance to observe, reflect, and learn. They came to understand that while students who were working in intergenerational groups were having different learning experiences, these experiences were achieving similar learning outcomes. The teachers learned to let go of their control over the learning and designed activities that allowed students to explore their interests while also engaging them in structured group learning.

These findings support Anderson, Lawson, and Mayer-Smith's (2006) conclusions that "teachers should play different roles, rather than traditional ones, in order to function in out-of-school settings" (p.347). I found that with time, the farm and the environmental education program offered there became a catalyst that motivated the teachers to assume different roles and to experiment with different activities and adapt their practice.

Research Question 2: How do teachers' experiences of participating in the Intergenerational Landed Learning Project (LLP) influence their practice?

Participation in the LLP contributed to teachers exploring new pedagogical roles and practices both at the farm and in their classrooms. The farm experience led the teachers to reflect on what it means to teach with and about the environment on a farm, and this in

turn supported their exploration of new practices. Teachers tried out new roles such as being observers, learners and collaborators. The teachers became more open to allowing students to inform and guide their lesson designs and allowed the students to give more direction to the learning. Their teaching activities shifted from teacher-centred to student-centred practices. Teachers also learned to structure activities in such a way that students would have the freedom to learn from the farm environment and worked closely with the LLP community to facilitate social learning.

Through their participation in the LLP teachers learned how to bring the values and ideas of EE into their classrooms to integrate EE across the disciplines. Teachers learned to integrate EE with their classroom curricula and prepare lessons and activities that require students to use skills and knowledge from various disciplines. Their initial focus on teaching subject matter was augmented with a new focus on fostering social action. Taking cues from nature, the teachers began to design educational activities that acknowledged and celebrated the physical, climatic, ecological and social diversity on the farm. As teachers learned along with their students about sustainable agriculture and the interconnectedness of food growing with ecology, health, nutrition, and issues of production and accessibility, they began to see ways they could connect the events and activities of the LLP with their teaching of school subjects.

DeMarco, Relf, and McDaniel (1999) found that teachers identified knowledge and skill about food-growing as a key factor in their ability to teach an interdisciplinary curriculum in a school gardening initiative. Similar to the teachers in the study by DeMarco, the teachers in my study experienced an increased understanding of the

multidisciplinary nature of food production as they gained knowledge of the food system and experience with growing food. With this knowledge, they were able they were able to see more connections between the learning at the farm and school subject matter. The teachers were then able to draw upon this knowledge to develop cross-curricular environmental education activities for their students that addressed learning outcomes in math, social studies, art, writing, and science.

Participation in the LLP supported teachers in extending the focus of their teaching beyond content knowledge to include social action. Initially the teachers' activities focused on the learning of subject matter. With time, the teachers felt inspired by the values and dedication of the LLP community and started to use the farm as a medium to teach lessons about agency, responsibility, and community. They started by engaging their classes with physical work and garden maintenance chores, because they wanted to give their students the experience of serving the LLP community. Then by having students work on a donation garden and take a pledge to try for waste-free lunches, they hoped to inspire students to adopt values of care and land stewardship and motivate them to engage in positive social action in their homes and communities outside of school.

Teachers' professional growth and change were supported by the people, the place, and the program design of the Landed Learning Project. My analysis of the teachers' experiences suggests that features of LLP supported teacher participation in the project, their learning, and their professional growth and change. The application process for the LLP fostered a sense of commitment to the program which appeared to sustain teachers'

motivation when dealing with challenges in a new educational program. The opportunity for long-term participation in the program also seemed to be influential in the teachers' exploration of teaching.

As the teachers participated in the program over several years, they began to distinguish constants in the farm environment beside newness and unpredictability which acted as their guides in curriculum development. The teachers began to understand that they could rely on the rhythms and cycles in nature for the flow and inspiration of activities. Over time, they began to appreciate the physical, ecological, and climatic diversity as an endless source of teaching ideas. Furthermore, the teachers' increase in understanding and adaptation over time indicates the cumulative nature of learning. It appears that every year the teachers gained new food system knowledge and insights about teaching and learning which they then applied to the design of their curriculum activities.

The collaborative planning meetings also had an impact on the teachers' practice and motivation to continue in spite of difficulties. Fraser, Kennedy, Reid, and McKinney's (2007) research also attests to the benefits of collaborative teams. These researchers view teams as a source of inspiration, motivation and encouragement. The collaborative planning meetings in the LLP removed teachers' sense of isolation in the classroom. They provided a space and forum for teachers to share curriculum development ideas, and they gave teachers the chance to talk about their challenges. The collaborative teacher meetings were a place where new teaching ideas emerged.

6.3 Implications for Teaching

This study provides evidence that a farm-based, environmental education initiative can support changes in teaching practice and can foster the teaching of EE in classrooms. However, my research also suggests that even motivated teachers who participate in a field-based EE initiative may experience unease, disorientation and struggle in their initial stages. Learning to teach EE inside and outside of the classroom takes time, and teachers need support. Teachers will need to be open to and able to accommodate change in their practice. They will need to be able to adapt to the challenges of new learning environments; and they should not expect to teach outdoors in the same way they would teach in a classroom.

My findings indicate that teaching in a farm or garden-based EE program that has focus on food-growing can be difficult even for teachers who have been teaching in the classroom for many years. Teachers require time to understand and experience a food-growing environment before they can design curriculum activities to integrate with classroom lessons. The acquisition of practical knowledge about food-growing and participation across the seasons appears to assist teachers in designing activities for their students that connect learning of subject matter to learning about a food system.

My findings also suggest that working within an intergenerational community of people who share the goals and values of teaching EE can influence teachers' practice and motivation to experiment with new teaching approaches. Teachers may feel inspired by actions they see in this community to implement EE projects in their schools. Teachers also have the opportunity to exchange ideas and experiences when working within a community. This can help them reflect on their ideas and consider new points of

view about the teaching of EE. This in turn has implications on how pre-service and in-service teachers are prepared.

6.5 Recommendations for EE Program Providers and School

Administrators

Based on the findings of this study, I provide some general recommendations for EE program providers and school administrators who wish to support and sustain teachers in learning to teach environmental education.

EE Program Providers should:

1. Include an application process to create an atmosphere of commitment.
2. Provide teachers with long-term opportunities for participation.
3. Provide a collaborative planning structure.
4. Recruit and involve in the program volunteers of all ages with expertise in the area of EE who can support the teachers as they learn how to teach EE.
5. Structure the program in such a way that it gives teachers time during the program to observe and learn.

School administrators should:

1. Support and encourage teachers' long-term involvement with the teaching of EE.
2. Encourage teachers' participation in hands-on, EE programs that involve food-growing as their focus (on school grounds or off site).
3. Provide teachers who want to teach EE with opportunities for collaboration with like-minded teachers and educators

6.6 Future Research

This study of teachers' experiences, professional growth, and change in practice in the Intergenerational Landed Learning Project has shown that learning to teach about EE in a food-growing environmental education initiative is an emergent process. The findings of my study also point to a number of issues that warrant further investigation. Discussions with the teachers in this study about their practice over the years, led me to wonder whether the program had as large an impact on their personal lifestyles, as it did on their professional practice. This raises the question of whether teaching and participating in an EE program situated on a farm influences a teacher's environmental behaviours and actions.

Another issue worthy of investigation is the experiences of student teachers participating in a food-growing initiative during their practicum where they are being mentored by teachers who have participated in the program over multiple years. Such research can provide insights for teacher educators on how to support student teacher learning in environment education and food-growing initiatives and how to prepare them to teach EE.

This study investigated three teachers' experiences in a food-growing initiative. A larger study of teachers' experiences in a variety of gardening initiatives may explore the influence of different physical and ecological environments as well as different program structures on teachers' experiences. Such studies could explore age, gender, years of teaching experience and cultural background as additional factors to be examined.

6.7 Conclusion

This study of three elementary teachers' involvement in the Intergenerational Landed Learning Project illustrates the possibilities for learning when teachers engage in environmental education in settings beyond the classroom. My findings also illustrate some of the challenges teachers face when participating in these kinds of initiatives and speak to the need for support if we hope to see teachers introduce environmental education in their schools and classrooms. These challenges of learning to teach environmental education can be managed and addressed if teachers are supported by giving them the opportunity for long-term engagement in environmental education initiatives and by providing them with a collaborative teaching and learning environment. The findings from my study also illustrate how participation in an environmental education program can serve as a catalyst for teachers' professional growth and the adoption of new pedagogical practices.

Preparing young people to care for life on the planet is a global imperative. The ways to teach EE are as diverse as the environments and cultures that we aim to sustain. No standard set of lesson plans or curriculum materials can prepare teachers around the world for this task. Teachers have to become "creatures of the earth" themselves and experience their local environments before they can teach with them. Nevertheless, school administrators and program developers can help teachers to develop their teaching of EE by implementing support strategies and designing program features which foster professional growth in this area.

Bibliography

- Ajzen, L., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior*. New Jersey: Prentice-Hall.
- Alvarez, A. & Rogers, J. (2006). Going “out there”: Learning about sustainability in place. *International Journal of Sustainability in Higher Education* 7(2): 176-188.
- Anderson, D., Bethan, L., & Mayer-Smith, J. (2006). Investigating the impact of practicum experience in an aquarium on pre-service teachers. *Teaching Education* 17: 341–353
- Bartosh, O., Mayer-Smith, J., Peterat, L. & Sinkinson, S. (2005). Integrating science and environmental education on the urban farm: A Teacher’s story. Proceedings of the *National Association for Research in Science Teaching (NARST) Annual Meeting*, Dallas, TX: [Paper #206984, CD].
- Beckford, C. (2008). Re-orienting environmental education in teacher education programs in Ontario. *Journal of Teaching and Learning*, 5(1): 55-66.
- Beckman, L & Smith, C. (2008). An Evaluation of inner-city youth garden program participants’ dietary behaviour and garden and nutrition knowledge. *Journal of Agricultural Education* 49(4): 11-24.
- Bell, G. and Friedman, S. (2010). The Photosynthesis Song. In J. Mayer-Smith, & L. Peterat, (Eds.), *Get growing! Activities for food and gardening learning. A teacher resource for elementary and middle grades*. (p. 160). Vernon: Really Small Vernon Press.
- Berry, W. (2002). *The Art of the Commonplace: The agrarian essays of Wendel Berry*. N. Wirzba (Ed). Washington DC: Library of Congress Cataloguing-in-Publication Data.
- Blair, D. (2009). The child in the garden: An evaluative review of the benefits of school gardening. *Journal of Environmental Education*, 40(2): 15-38.
- Bloom, H. (2001). Global brain: *The evolution of mass mind from the Big Bang to the 21st century*. New York: Wiley.
- Cartea, Pablo A. M. (2005). In praise of environmental education. *Policy Futures in Education* 3(3): 284-295.
- Chawla, L. (1998). Significant life experiences revisited: A Review of research on

- sources of environmental sensitivity. *The Journal of Environmental Education* 29(3): 11-21.
- Cole, Anna G. (2007). Expanding the field: Revisiting environmental education principles through multidisciplinary networks. *Journal of Environmental Education*, 38(2), 35-45.
- Davis, B., Sumara, D. & Luce-Kapler, R. (2008). *Engaging Minds: Teaching and Learning in Complex Times*. NY: Routledge.
- Darner, R. (2009). Self-Determination theory as a guide to fostering environmental motivation. *Journal of Environmental Education*, 40 (2): 39-49.
- DeMarco, L. W., Relf, D., & McDaniel, A. (1999). Integrating gardening into the elementary school curriculum. *HortTechnology*, 9, 276–281.
- Desjean-Perrotta, B., Moseley, C. & Cantu, L. E. (2008). Pre-service teachers' perceptions of the environment: Does ethnicity or dominant residential experience matter?. *Journal of Environmental Education*, 39(2):21-32.
- Dillon, J., and Scott, W. (2002). Editorial – Perspectives on environmental education-related research in science education. *International Journal of Science Education*, 24(11): 1111-1117.
- Disinger, J. F. (2001). K–12 education and the environment: Perspectives, expectations, and practice. *The Journal of Environmental Education*, 33(1), 4–11.
- Epstein, M. J. (2004). Teaching a “humanistic” science: Reflections on interdisciplinary course design at the post-secondary level. *Current Issues in Education* 7(3): 1-14.
- Ernst, J. (2009). Influences on US teachers' use of environmental-based education. *Environmental Education Research*, 15(1): 71-92.
- Foran, A. (2005). The Experience of pedagogic intensity in outdoor education. *Journal of Experiential Education* 28(2): 147-163.
- Gaylie, V. (2009). *The Learning garden: Ecology, teaching and transformation*. New York: Peter Lang Publishing.
- Gooch, M., Rigano, D. & Hickey, R. (2008). How do primary pre-service teachers in a regional Australian university plan for teaching, learning and acting in environmentally responsible ways?. *Environmental Education Research*, 14 (2):175-186.
- Gough, A. (2002). Mutualism: a different agenda for environmental and science education. *International Journal of Science Education*, 24(11): 1201-1216.

- Grant, T. & Littlejohn, G. (2004). (Eds). *Teaching green the middle years: Hands on learning in grades 6-8*. Gabriola Islands, BC: New Society Publishers.
- Gruenewald, D. (2002). Teaching and learning with Thoreau: Honoring critique, experimentation, wholeness, and the places where we live. *Harvard Educational Review*, 72(4), 515–541.
- Haas, T., & Nachtigal, P. (1998). *Place value*. Charleston, WV: ERIC Press.
- Hammersley M. & Atkinson P (1995) *Ethnography: principles in practice*, 2nd ed. New York: Routledge.
- Hart, P. (2003). *Teachers' Thinking in Environmental Education: Consciousness and responsibility*. New York: Peter Lang Publishing.
- Hungerford, H. R., & Volk, T. L. (2002). *Twenty-five years after Tbilisi: Where are we?* Retrieved February 12, 2007 from <http://147.46.106.62/~enviedu/plus/board/table/colloquium/ipload/Hungerford-25Yrs.doc>
- Hussein, H. (2010). Using the sensory garden as a tool to enhance the educational development and social interaction of children with special needs. *Support for Learning* 25(1): 25-31.
- Jickling, B. (1991). Environmental education and environmental advocacy: The Need for a proper distinction. *To See Ourselves/To Save Ourselves: Ecology and Culture in Canada*, in R. Lorimimer, M. McGonigle, J.-P. Reveret & S. Ross (Eds.) Montreal: Association for Canadian Studies, pp.169-176.
- Johnson, E. and Mappin, M. (Eds.) (2005). *Environmental Education and Advocacy: Changing Perspectives of Ecology and Education*. Cambridge: Cambridge University Press.
- Jones, D. (2000). *Sustainability education handbook: Resource guide for K-12 teachers*. Retrieved June 4, 2010 from <http://www.urbanoptions.org/SustainEdHandbook/EvaluationCriteriaChart.htm>
- Kennelly, J., Taylor, N. & Maxwell, T. (2008). A student teacher' s pathway to education for sustainability. *Australian Journal of Environmental Education* 24 (1): 23-33.
- Khan, S. & VanWynsberghe, R. (2008). Cultivating the Under-Mined: Cross-Case Analysis as Knowledge Mobilization. *Forum Qualitative Social Research*, 9(1): 1-21.
- Krapfel, P. (1999). Deepening children' s participation through local ecological

- investigations. *In Ecological Education in action: On weaving education, culture and the environment*. G.A. Smith & D.R. Williams (Eds.). Albany: State University of New York Press.
- Lassiter, L.E. (2005). *The Chicago Guide to Collaborative Ethnography*. Chicago: University of Chicago Press.
- Leopold, A. (1949). *A Sand County Almanac, and Sketches Here and There*. New York: Oxford University Press.
- Lewis, E., Mansfield, C. & Baudains, C. (2008) Getting down and dirty: Values in education for sustainability. *Issues in Educational Research*, 18(2):138-155.
- Lyons Higgs, A. & McMillan, V. (2006). Teaching through modeling: Four schools' experiences in sustainability education. *Journal of Environmental Education*, 38(1), 39-53.
- Mapping, M. & Johnson, E. (2005). (Eds.) *Environmental Education and Advocacy: Changing Perspectives of Ecology and Education*. UK: Cambridge University Press.
- May, T. 2000. Elements of success in environmental education through practitioner eyes. *Journal of Environmental Education* 31, no. 4: 4–11.
- Mayer-Smith, J., Bartosh, O, & Peterat, L. (2009). Cultivating and Reflecting on Intergenerational Environmental Education on the Farm. *Canadian Journal of Environmental Education*, 14: 107-121.
- Mayer-Smith, J., Peterat, L., & Bartosh, O. (2006). Growing Together To Understand Sustainability: An Intergenerational Farming Project. In W. Leal Filho (Ed.) *Innovation Education And Communication For Sustainable Development*, (pp 361-378), Frankfurt: Peter Lang.
- McKeown-Ice, R., & Dendinger, R. (2000). Socio-political-cultural foundations of environmental education. *The Journal of Environmental Education*, 31(4), 37–45.
- Merriam, S.B. (1998). *Qualitative Research and Case Study Applications in Education*. San Francisco, US: Jossey-Bass Publishers.
- Monroe, M., Scollo, G. & Bowers, A. (2002). Assessing teachers' needs for environmental education services. *Applied Environmental Education and Communication* 1: 37–43.
- Moore, J. (2005). "Barriers and pathways to creating sustainability education programs: Policy, rhetoric and reality". *Environmental Education Research*. 11(5), 537-555.

- Moseley, C. & Utley, J. (2008). An exploratory study of preservice teachers' beliefs about the environment. *Journal of Environmental Education* 39(4): 15-29.
- Mosley, C., Huss, J. & Utley, J. (2010). Assessing K-12 teachers' personal environmental education teaching efficacy and outcome expectancy. *Applied Environmental Education and Communication* 9(1): 5-17.
- Nolen, V. (2009). Preparing sustainability-literate teachers. *Teachers' College Record* 111(2): 409-442.
- Orr, D. (1991). "What is education for?" *Trumpeter*, 8(3): 99-102.
- Palmer, J. (1998). *Environmental education for the 21st century: theory, practice, progress, and promise*. New York: Routledge.
- Palys, T. & Atchison, C. (Eds) (2008). *Research Decisions: Quantitative and qualitative perspectives*. 4th ed. US: Thomson Canada Limited.
- Peattie, L. (2001). Theorizing planning. Some comments on Flyvbjerg's rationality and power. *International Planning Studies*, 6(3), 257-262.
- Plevyak, L. H., Bendixen-Noe, M., Henderson, J., Roth, R. E., & Wilke, R. (2001). Level of teacher preparation and implementation of EE: Mandated and non-mandated EE teacher preparation states. *The Journal of Environmental Education*, 32(2), 28-36.
- Pollan, M. & Chevat, R. (2009). *The Omnivore's Dilemma: The secrets behind what you eat*. (young readers edition). USA: Dial Books.
- Rickinson, M. (2001). Learners and learning in environmental education: A critical review of the research. *Environmental Education Research*, 7(3), 207-320.
- Rickinson, M., Dillon, J., Teamey, K., Morris, M., Choi M. Y., Sanders, D., & Benefield, P. (2004). *A review of research on outdoor learning*. Shrewsbury, UK: National Foundation for Educational Research and King's College London.
- Robinson, N. (2004). Re-defining "At-Risk" to Meet the Needs of the Contemporary Classroom. *Action, Criticism and Theory for Music Education* 3(3): 2-12.
- Sheffield, B.K. (1992). The Affective and cognitive effects of an interdisciplinary garden-based curriculum on underachieving elementary students. PhD Dissertation. University of South Carolina, Columbia.
- Shephard, K. (2008). Higher Education for Sustainability: Seeking Affective Learning Outcomes. *International Journal of Sustainability in Higher Education* 9(1): 87-98.

- Sherren, K. (2008). A History of the Future of Higher Education for Sustainable Development. *Environmental Education Research* 14(3): 238-256.
- Shuman, D. & Ham, S. (1997). Toward a theory of commitment to environmental education teaching. *Journal of Environmental Education*, 28(2): 25-33.
- Simmons, D.A. (1989). More infusion confusion: A Look at environmental education curriculum materials. *Journal of Environmental Education*, 20(4): 15-18.
- Sipos, Y. and Battisti, B., & Grimm, K. (2008). "Achieving transformative sustainability learning: Engaging head, hands and heart." *International Journal of Sustainability in Higher Education*. 9(1): 2008, 68-86.
- Skelly, S.M. & Bradley, J.C. (2000). The Importance of school gardens as perceived by Florida elementary school teachers. *Hort Technology*, 10: 229-231.
- Slepkov, H. (2008). Teacher professional growth in an authentic learning environment. *Journal of Research on Technology in Education* 41(1): 85-111.
- Smith, G. (2002). Place-based education: Learning to be where we are. *Phi Delta Kappan*, 83, 584-594.
- Smith, G.A. & Williams, D. R. (1999). (Eds.) *Ecological education in action. On weaving education, culture and the environment*. Albany, NY: State University of New York Press
- Stake, R..E. (1994). Case Studies. In N.K.Denzin and Y.S. Lincoln (eds) *Handbook of Qualitative Research*. London: Sage Publication, 236-47.
- Stapp, W.B., Bennet, D., Brian, W., Fulton, J., Swan, J., Wall, R. & Havlick, S. (1969). The concept of environmental education. *The Journal of Environmental Education*, 1(1): 30-41.
- Stevenson, R. (2007). "Schooling and environmental/sustainability education: From Discourses of policy and practice to discourses of professional learning." *Environmental Education Research* 13(2), 265-285.
- Svanstrom, M., Lozano-Garcia, F. & Rowe, D. (2008). Learning outcomes for sustainable development in higher education. *International Journal of Sustainability in Higher Education*, 9(3), 339-351.
- The Earth Charter Commission (2000). *The Earth Charter*, The Hague.
- Theobald, P., & Curtiss, J. (2000). Communities as curricula. *Forum for applied research and public policy*, 15(1), 106-111.

- Thompson-Klein, J. (1998). The discourse of interdisciplinarity: Perspectives from the Handbook of the Undergraduate Curriculum, *Liberal Education*, 84(3), 4-11.
- Thoreau, H.D. (2007). *Excursions*. J.J. Moldenhauer (Ed.). Princeton, NJ: Princeton University Press.
- Tilbury, D. & Wortman, D. (2008). "Education for sustainability in further and higher education." *Planning for Higher Education*. 36(4), 5-16.
- Tuncer, G., Tekkaya, C. & Sungur, S. (2009). Assessing pre-service teachers' environmental literacy in Turkey as a mean to develop teacher education programs. *International Journal of Educational Development*, 29(4): 426-436.
- UNESCO (2006). UNESCO Expert meeting on ESD: "Reorienting education to address Sustainability." Retrieved June 4, 2010, from <http://www.unescobkk.org/index.php?id=4223>
- Vancouver School Board (2009). Graham Bruce Elementary School Plan. Retrieved from <http://www.vsb.bc.ca/sites/default/files/school-files/03939109.pdf>.
- Vancouver School Board (2009). John Henderson Elementary School Plan. Retrieved from <http://www.vsb.bc.ca/sites/default/files/school-files/03939106.pdf>.
- Vancouver School Board (2009). Tyee Elementary School Plan. Retrieved from <http://www.vsb.bc.ca/sites/default/files/school-files/03939119.pdf>.
- Wenger, E. (1998). *Communities of practice, learning, meaning, and identity*. Cambridge, UK: Cambridge University Press.
- Wolf, M. (1992). *A Thrice Told Tale: Feminism, postmodernism & ethnographic responsibility*. California: Stanford University Press.
- Woodhouse, J. & Knapp, C. (2000). Place based curriculum and instruction: Outdoor and environmental education approaches. *ERIC Clearinghouse on Rural Education and Small Schools*. Charleston, WV.
- Yin, R.K. (2009). *Case Study Research: Design and Methods*. (4th edition). USA: SAGE Publications.
- Zeidler DL, Lederman NG (1989) The effects of teachers' language on students' conceptions of the nature of science. *Journal of Research Science and Teaching* 26(9):771-783
- Zull, J.E. (2002). *The art of changing the brain: Enriching the practice of teaching by exploring the biology of learning*. Sterling, VA: Stylus.

Appendix A Teacher Application 2007-2008

Opportunity for Grade 4-6 Teachers in
the Landed Learning Program at the UBC Farm

Are you a Grade 4, 5, or 6 teacher
who is...

**PASSIONATE ABOUT EARTH STEWARDSHIP AND
EXPERIENTIAL LEARNING?**



The Landed Learning Program **currently has an opening for one grade 4, 5, or 6 class from Vancouver School District #39** in the 2007-2008 school year to join our farm-based environmental education project. Participating classes attend 12-15 UBC farm visits throughout the school year where cooperative student groups work with community volunteers ("Farm Friends") through all stages of the growing cycle to plan, plant, care for, and harvest food crops in their own garden beds.

The **Intergenerational Landed Learning on the Farm for the Environment** Program is a unique research project of the Department of Curriculum Studies, UBC, that brings together

children, educators, and retired local farmers to explore how holistic experiences in a farming/gardening project on an urban farm can foster understanding of and respect for land-food-human connections.

Participating teachers maintain on-going communication with members of the Landed Learning team from the Faculty of Education, UBC, to develop holistic, school- and farm-based curricula. Three to 5 planning meetings and related activities will occur at your school and the UBC farm during the 2006-2007 school year.

For more information on the project, please see our website at
<http://www.cust.educ.ubc.ca/landedlearningproject/index.htm>

Landed Learning Teacher Application, 2007-2008

Thank you for your interest in our project! We honour your commitment to social and environmental education. It is strongly recommended that interested teachers visit the UBC Farm before applying.

This application is due **Friday, July 14, 2007**. **Please e-mail or fax.** Feel free to complete your answers on this form or use a separate page. All applicants will be contacted by July 28. Although we can only accept one class this year, there may be opportunities for participation in the future.

Teacher's
name _____

Email _____ Phone _____

School
name _____

School
Address _____

Grade(s) you will teach
2007/08 _____

*Can you commit to 3-5 meetings throughout the year to collaborate and share ideas as part of the Landed Learning team?

*Would you be able to transport your class to the UBC farm? How?

THE CORE VALUES OF THE LANDED LEARNING PROJECT:

Holistic Learning, Community, Sustainability/Health, and
Joy/Wonder/Gratitude.

1. Describe any work you are currently doing or would like to do in your classroom that relates to the **values** of this project.

2. Describe how you would use 12 afternoons (October-June) at the UBC Farm to integrate the garden and your classroom curricula.

Appendix B Timeline of Research Activities

Table 1 Timeline of Research Activities at Thyme Elementary School

Events	Event 1 Classroom Visit #1	Event 2 Farm Visit #1	Event 3 Farm Visit #2	Event 4 Interview #1	Event 5 Classroom Visit #2	Event 6 Interview #2	Event 7 Classroom Visit #3
Description	Classroom observation	I participated as a Farm Friend during the farm visit and recorded observations	I participated as a Farm Friend during the farm visit and recorded observations	Conducted first interview	Classroom observation	Conducted second interview	Classroom observation
Thyme Elementary School	Sept. 28, 2009	Sept. 30, 2009	Oct. 14, 2009	Oct. 27, 2009	Oct. 27, 2009	Nov. 5, 2009	Nov. 12, 2009

Table 2 Timeline of Research Activities at Bay Leaf Elementary School

Events	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7
	Farm Visit #1	Classroom visit #1	Interview #1	Farm Visit #2	Classroom Visit #2	Interview #2	Classroom Visit #3
Description	I participated as a Farm Friend during the farm visit and recorded observations	Classroom observation	Conducted first interview	I participated as a Farm Friend during the farm visit and recorded observations	Classroom observation	Conducted second interview	Classroom observation
Bay Leaf Elementary School	Oct. 1, 2009	Oct. 6, 2009	Oct. 13, 2009	Oct. 15, 2009	Oct. 26, 2009	Nov. 3, 2009	Nov. 6, 2009

Table 3 Timeline of Research Activities at Sage Elementary School

Events	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 7
	Classroom visit #1	Farm Visit #1	Farm Visit #2	Classroom Visit #2	Interview #1	Classroom Visit #3	Interview #2
Description	Classroom observation	I participated as a Farm Friend during the farm visit and recorded observations	I participated as a Farm Friend during the farm visit and recorded observations	Classroom observation	Conducted first interview	Classroom observation	Conducted second interview
Sage Elementary School	Oct. 6, 2009	Oct. 7, 2009	Oct. 21, 2009	Oct. 26, 2009	Oct. 29, 2009	Nov. 10, 2009	Nov. 13, 2009

Appendix C Interview Protocol

The following set of questions was used as a guide in the first semi-structured interview.

Interview #1

1. How many years have you been a teacher?
2. What people, experiences, events influenced your teaching?
3. Why did you choose to participate in the LLP?
4. How many years have you participated in the LLP?
5. What was your experience in the first year of the project?
- How was it to teach within LLP? Why?
6. How did you teach in the first year of the program?
7. How do you teach now?
8. Has your teaching changed? How? Why?
9. Where do you get your ideas for teaching?

The following is a set of sample questions I designed before the interview based on my observations of each teacher's classroom and farm visits. Some of these questions seek clarification of previous interview answers, others inquire into the teachers' reasons for certain activities and others are more general to allow teachers to express their experience without being guided.

Interview #2

Ex: 1. In the last interview you talked about how you hadn't noticed or realized at first the power of the Farm Friends. Can you tell me more about that?

2. I noticed that you organize waste free lunch for your class. Where did that idea come about?"

3. Can you describe a special memory or experience at the farm for you?

4. Why did you choose these assignments as exemplary student work in LLP? (I asked teachers to choose a few exemplary assignments that students completed related to the LLP and show them to me at the second interview).

Appendix D Data Analysis Themes

Table 4 Data Analysis Themes

Themes	Quotations
Teaching challenges	<p>“I found it kind of overwhelming because there were so many things [happening]. I was in awe of the space, in awe of the people that I met out there” (Ron, interview, October 2009)</p> <p>“[I was] trying to figure it all out. How was I going to fit this into my classroom? How was it going to be integrated into my curriculum” (Ron, interview 2009)</p> <p>“It is one thing reading [about the program] and another seeing it in action...[I] wasn’t quite sure what was happening all the time... [I was just] trying to get a sense of what it [the program] was about... trying to figure out how it should flow” (Dori, interview, October 2009)</p> <p>“I want the students to see the bigger picture, but I don’t know how to teach them that without overwhelming them with information” (Dori, class observation, October 2009)</p> <p>“you have to go there [the farm] and make it your own, make it be what you want it to be. I might not have been ready to hear that stuff [in the first year]” (Fernando, interview, October 2009)</p>
Re/learning to teach	<p>“I’ve been trying to [get them to] hone their observation skills, [and] get them to really look at things and see what they’re seeing. Not see an icon of a worm, [but that] a worm looks like this. To actually see it, to notice the sections on it, to see if it has a clitellum on it, to get over the yucky factor, to really know what they are and to look at the life cycle of the worm” (Fernando, interview, October 2009)</p> <p>“I [now] try as much as I can to have the kids working independently and not be responsible for you know holding their hands throughout learning, but you know it’s harder in a class to do that. It is the way the farm works” (Fernando, interview, October 2009)</p> <p>“I usually have them write a farm test for me, so they come</p>

Themes	Quotations
	<p>up with what they think the relevant questions are. We look at what kind of questions you can ask, [and] there are questions that are fairly uni-dimensional and need a very simple answer, versus questions that require a deeper understanding, and we talk about those things. There are some questions ... that are fairly straight-forward, you know this fact or not. They like to have some of those, [but] they create a test that is, you know, quite difficult. And, they do very well and they're excited about it" (Fernando, interview, October 2009)</p> <p>"I don't have to deliver boring lessons out of a textbook anymore. I don't do that. It's freed me up" (Fernando, interview, October 2009)</p> <p>"It's fine to grow plants in a dish or you know, germinating seeds in a container at school but when you actually see the entire cycle [and] the kids get to experience that in an actual learning environment, where they're actually participating ... you just can't get that out of a book, you can't get that in a classroom setting" (Ron, interview, October 2009)</p> <p>"Things are set in the farm book that they have to do—observations—but it's also open ended too, where they, if there is something that they have an interest in, they can record and write about" (Ron, interview, October 2009).</p> <p>"[I am] seeing the Farm Friends as mentors and the kids who are initially nervous about meeting older people, working with older people, truly becoming friends, and improving their ability to communicate and to investigate and to be engaged in learning... Farm Friends are the vehicles that carry that through the whole program" (Ron, interview, November 2009)</p> <p>"Always be prepared to learn new things...I'm still learning new ways to teach, new ways to inspire kids, new ways to meet needs within a classroom. Look at the outdoor classroom and the environment where we should all have time with our kids... bring experiences back into your classroom that can be talked about and dealt with in a real way...that enriches your learning tenfold." (Ron, interview, October 2009)</p> <p>"You start to teach a concept and you realize that there are other things that children don't know before that...The topic</p>

Themes	Quotations
	<p>of soil is complex. It cannot be taught properly unless I also explain the water cycle, the weather and geomorphology.” (Dori, interview, October 2009)</p> <p>“[Growing food] is more than planting a few plants and harvesting them because that’s just surface. It’s the ability to learn to be self- sufficient and sustain ourselves” (Dori, interview, November 2009)</p> <p>“you could have a teacher’s guide for some ideas, but with the understanding that this may be changed and modified and you can still inject your own things into it [the activities at the farm]” (Ron, interview, October 2009)</p> <p>“If we are going to do work sitting at a table, might as well do that in the class” (Fernando, interview, November 2009)</p>
Change in practice: curriculum expansion	<p>“they’re just overflowing with knowledge about it and they can write about it and they write about the farm.”(Fernando, interview, October 2009)</p> <p>“You’re not just simply teaching [these] kids. Because they’re very young you’re a really important role model. So [the project] is about learning how to interact with your environment and the people you are with in a way that has meaning and so the curriculum almost flows from that” (Fernando, interview, October 2009)</p> <p>“The farm is about what matters. Here I can try to help kids to be healthy, get exercise, and develop positive relationships” (Fernando, interview, November 2009)</p> <p>“When I get to go to the farm and they [the students] spend the whole day outside with natural light, rain, snow, wind whatever it is and be physical the whole time it’s worth its weight in gold” (Fernando, interview, October 2009)</p> <p>“a style of writing that we would do would be ... [where] you’re in the picture. So it’s about what you see, what you feel, what you hear, what you smell and then developing a piece from that. It’s sort of...in the garden, what they’re seeing. They sort of brainstorm all the things ..., the juicy colorful flowers, green leafy vegetables, that type of thing, just continuously what they smell you know, damp moist air, fragrant flowers, and then they write their piece based on the</p>

Themes	Quotations
	<p>language that they develop. But, the language comes much more freely from them because they know what they're talking about" (Ron, interview, October 2009)</p> <p>"not a really an experienced art teacher, but you know, the garden just lends [itself] to that" (Ron, interview, October 2009)</p> <p>"Learning about soil is not simple, it is complex because everything is interconnected... I want to create those connections for the students... The story... kind of does that because it is about activism, working together to solve problems, cooperation, and doing something for the community, while learning about soil...I want students to understand the importance of soil and top soil, to make connections between the nutrients in the vegetables and realize that they come from the soil" (Dori, class visit, October 2009)</p>
<p>Change in practice: from content knowledge to social action</p>	<p>"When [Farm Friends] spend time with kids in smaller groups, a different relationship develops, especially if the Farm Friends are not focused on some result or product to come out of the interaction. When the students spend time weeding and digging in the garden, they can talk about themselves, kids have an opportunity to talk about their lives and can form closer relationships" (Fernando, interview, November 2009)</p> <p>"Society nowadays is broken, young people don't interact with older people...I have ways I believe people should live and I teach that way... The farm is about respect and love. It's hard to argue against that" (Fernando, interview, November 2009)</p> <p>"One year I had students give presentations to another class and teach them what they learned [at the farm]." (Fernando, interview, October 2009)</p> <p>"One of the things that I really like that we've been doing in the last few years that we didn't do before is, the afternoon hour, and a bit [that] we're using to work in the garden on bigger projects" (Fernando, interview, October 2009)</p> <p>"For some kids [doing physical work] is an accomplishment, that they're doing something that you know is productive and they enjoy that." (Ron, interview, November 2009)</p>

Themes	Quotations
	<p data-bbox="513 233 1391 485">“We’re going to do a better [bake sale] starting in January. It’s going to be healthy stuff... healthy desserts, probably more like zucchini muffins, carrot muffins, banana muffins and you know, what makes it healthy? And what doesn’t make it healthy? And you really need to get into which vegetables have which kind of minerals in them.”(Dori, interview, November 2009)</p> <p data-bbox="513 527 1391 705">“Once they see everything’s interconnected, then they understand better the concept of sustainability and how their actions could affect people elsewhere, and how other people’s decisions that were made in the past affect them, and the decisions that they make now will affect the future.” (Dori, interview, November 2009)</p> <p data-bbox="513 747 1391 884">“I hope students will understand more about poverty, about homelessness, [will] start to understand a little bit better the contribution that they’re making” (Dori, interview, November 2009)</p>
Program features: distribution of tasks	<p data-bbox="513 968 1391 1146">-“I thought I would be would be more front and center, the way you’re used to as a teacher in the class. So, you know, I [thought I] would determine what we would be doing for the day kind of thing... which is not at all what it’s like. (Fernando, interview, October 2009)</p> <p data-bbox="513 1188 1391 1440">“I don’t feel like every student has to learn the same thing [or] that everybody has to come to things within the same timeline. It’s made me a lot more aware that, because I don’t control the interactions at the farm, and they [the students] are all learning very different things. [This is] because the philosophy there is to allow people to follow their area of interest” (Fernando, interview, October 2009)</p> <p data-bbox="513 1482 1391 1619">“ I learned to let go of being responsible for everybody walking along lock-step, lock-step learning stuff and I might not know what they’re going to learn exactly before they go” (Fernando, interview, October 2009)</p> <p data-bbox="513 1661 1391 1873">“There’s a lot of freedom out there and my natural assumption would be that that would cause problems, and it’s been the opposite. I would have assumed that because I wasn’t there with my thumb on the situation, that there’s going to be kids that don’t learn anything or [are] goofing off, or that don’t do anything and it’s just not like that. [Instead], it’s the most focused group when we’re out there”</p>

Themes	Quotations
	(Fernando, interview, October 2009)
Program features: duration of participation	<p>“you need time to understand how it works”(Fernando, interview, October 2009).</p> <p>“I brought people from the school here and I still felt like I didn’t really know anything about gardening and I’m explaining something to them or talking and I realize that actually I do know quite a bit, I know a lot more than I used to know” (Fernando, interview, October 2009)</p>
Program features: collaborative planning	<p>“value the work that the [the program coordinator] does and [the garden manager] and the Farm Friends. I mean it’s just amazing...The lessons plans were invaluable” (Dori, interview, October 2009)</p> <p>“you tend to work in isolation in the classroom a bit. Schools are full of kids, full of teachers and no time to be together with other people and so any time I get to do that it’s a nice change and it makes me think of things in a different way, like in another point of view” (Fernando, interview, October 2009)</p> <p>“the wastefree lunch is something we talked about at the planning meetings... something I saw that would be a good extension, that I could take back in the classroom and really develop” (Ron, interview, November 2009)</p>

Appendix E The Photosynthesis Song

(Bell, G. & Friedman, S. © Mayer-Smith & Peterat (eds), 2009, by permission)

(sung to the tune of *Spinning Wheel*, by Blood Sweat and Tears)

Xylem goes up; phloem goes down

Chloroplasts streaming ‘round

Water and some nutrients on the run

Energizing turn yourself towards the sun

CO₂ and H₂O

Photosynthesizing and away we go

Add a little sunlight and some chlorophyll

Oxygen and sugar I can never get my fill

Do you find that it warms your mind when the sun is shining on you?

Don't you wish you could energize...Sun in your eyes...photosynthesize?

Too baaad that you don't have chloroplaaaaaasts!

Plants and people do what they do

You need me and I need you

On our own we can't survive

It's because of plants that we are happy and alive

Xylem goes up; phloem goes down

Chloroplasts streaming 'round

Water and some nutrients on the run

Energizing turn yourself towards the sun