

Kids Growing: Implementing School-Community Gardens in Ontario

Martha Sunday Harrison-Vickars

Supervisor: Rod MacRae

Date of Submission: July 29, 2014

A Major Paper submitted to the Faculty of Environmental Studies

in partial fulfillment of the requirements for the degree of

Master in Environmental Studies,

York University, Ontario, Canada

Student Signature

Supervisor Signature

Kids Growing: Implementing School-Community Gardens in Ontario

Abstract

Cultivating land surrounding schools provides opportunities for children and youth to experience growing, tasting and preparing fresh food. This creates openings for deeper understanding of environmental and social sustainability and can transform early learning. The literature supports evidence of a variety of social and educational benefits of school gardens.

School gardens are recommended in policy frameworks but are not actually supported in practice in the province of Ontario, Canada. This paper reviews gaps between policy and practice. Using Social Cognitive Theory, this paper contributes to the discussion of benefits to students and to teachers, and barriers to implementation of school gardens. It is situated in wider discussions about food literacy and environmental literacy in school-based interventions.

In the comparative case study, teachers in two schools discuss the benefits of school gardens and barriers relating to implementation. Teachers' attitudes are compared with the literature. Teachers in one of the two schools have the assistance of a community-based non-profit partner helping to create, maintain and support teaching in the school garden. Teacher attitudes towards policy and practice in each school are examined in a collaborative inquiry, with the researcher as participant through founding the community-based group.

The paper concludes that school food gardens can be pivotal to the practice of a rich, multilayered and transformative pedagogy in the face of climate change, economic polarization and urbanization. If education for sustainability is to have more traction in Ontario, the means must be fostered by a more universal and intentional approach from a young age. School gardens

present an opportunity to realize benefits for the whole community across intersecting indicators: health, including physical and mental health, sustainability education and authentic academic learning. However, to more adequately and equitably realize their benefits, efforts to bridge gaps in training and resources must be stepped up.

This paper intends to support policymaking regarding school gardens, by examining the conditions required for success. Recommendations for pathways to implementation are included in the Efficiency-Substitution-Redesign matrix.

Foreword

My Plan of Study, titled Food and Sustainability Education Practice, includes a detailed analysis of school gardens and their place in sustainability education. This Major Paper contributed to my understanding of this topic through comparative case studies (interviews with teachers in two schools) and discourse analysis of policy frameworks and policies, including curriculum, which impact on school gardens. Sustainability education means teaching ourselves to maintain healthy soil, air and water, and learning how to live in harmony within nature's limits. Food production is a key element connecting human and natural systems. I argue that school gardens present an efficient manner in which to approach this goal – efficient in the sense that they are useful across a wide range of age groups, ethnicities, urban/rural and socio-economic conditions, and that they teach us all, including the teachers, on school grounds within easy access of both students and the wider community. Policy relating to school grounds has supported Ontario school gardens in principle but not in practice – thus, implementation gaps are the focus of my research within the broader frames of sustainability education practice, education policy, and food system analysis.

Acknowledgements

Thanks to Rod MacRae, my supervisor, for reviewing this paper and providing steady guidance. Thanks to Frehiwot Tesfaye, my advisor, for asking great questions and being available at critical times. Thanks to Timothy Leduc for including my work in the Policy Enactments and Sustainability Education project. Thanks to Elise Houghton, MES, for her careful review and insightful comments on the paper, and for recommending the MES program. Thanks to my husband Joe Durand for always having time to discuss the subject at hand, and for supporting garden projects at work and home. Thanks to the wonderful staff and volunteers at Green Thumbs Growing Kids who closed the gap at work while I completed this academic work, and to all of our associates in the Imagine a Garden in Every School campaign, and the Ontario Edible Education Network.

Kids Growing: Implementing School-Community Gardens in Ontario

1. Introduction: Research questions, position of researcher	8
2. Literature Review	14
2.1 History of school gardens	15
2.2 School garden literature	18
2.2.1 Partnership research	23
2.2.2 Teacher Attitudes	24
2.3 Summary	27
3. Methodology and theoretical frameworks	28
3.1 Case Study	28
3.2 Validity	29
3.3 Study design and procedure	30
3.4 Theoretical frameworks for analysis	
3.4.1 Social Cognitive Theory	35
3.4.2 Efficiency, Substitution and Redesign	36
3.5 Description of schools and community partnership	38
3.6 Units of analysis	40
4. Teacher perceptions about school gardens at two schools	42
4.1 Interview Guide	42
4.2 Teacher Responses	
4.2.1 Benefits of school gardens	43
4.2.2 Curriculum, extra-curricular and cross-curricular connections to gardens	45
4.2.3 Types of Support Needed	52
4.2.4 Barriers to using a school garden	54
4.2.5 Policies that enable school gardens	59
4.2.6 Policies that discourage gardens	61
4.2.7 School Culture/Ecoschools	62
4.2.8 Importance of Food Production	64

4.2.9	Teacher affect	67
4.3	School garden surveys	70
4.3.1	Two online school gardening surveys	71
4.3.2	Teacher survey – Green Thumbs Growing Kids	73
5.	Policy landscape for school gardens	74
5.1	Environmental Education (EE)	74
5.1.1	EE curriculum in school gardens	77
5.2	Comprehensive School Health	79
5.3	School Food and Food Literacy	82
5.4	Toronto District School Board (TDSB) Garden Policies	85
5.5	Summary	85
6.	Discussion	87
6.1	School-community garden partnerships: results from case study	88
6.2	Assessment and Policy Recommendations	96
6.2.1	Healthy Schools Policy	98
6.2.2	Environmental Education Policy	100
6.2.2.1	Ecoschools as environmental education assessment	101
6.2.3	Assessment and Standardized Testing	103
6.2.4	School Board Policy	105
6.3	Implementation Recommendations	105
6.3.1	Efficiency-Substitution-Redesign Framework	106
7.	Conclusion	
7.1	Summary	111
7.2	Limitations of the current study	117
7.3	Research gaps and recommendations	117
7.4	Reflections as a practitioner-researcher	120
7.5	Final thoughts	121

Bibliography	122
Appendices	
Appendix A – OEEN & IGES Surveys	138
Appendix B – GTGK Teacher Survey	146
Appendix C – Consent Letter	151
Appendix D – Ethics Approvals	152

1 Introduction

Given alarming obesity and diabetes rates among children in the US and Canada, school gardens are an increasingly popular intervention to increase children's access to fruits and vegetables (Ratcliffe et al. 2011). They are also considered to be an academic and environmental learning site, whether food is produced or not (Blair 2009). Other benefits are asserted, such as experiential learning (Waliczek et al. 2003), differentiated instruction (addressing various learning styles and special needs) (DeMarco et al. 1999), and improvements in social, cognitive and affective domains (Libman 2007).

School gardens are described in the literature of the past 20 years as: supporting academic performance, especially in science but in other subjects as well (Williams & Dixon 2013); providing access to “nearby nature” in the schoolyard (Thorp 2001, citing Kaplan & Kaplan 1989); place-based learning (Green 2007); school bonding and attachment (Ozer 2007); providing land-based and indigenous knowledge sharing (Godlewska 2010); providing a site for health promotion, nutrition education and increased physical activity (Bell & Dymont 2006, 2008); and facilitating interdisciplinary and inquiry-based learning (Chiarotto 2011).

Proponents argue that school gardens are an intervention that can change our society's relationship to food and to the environment in kinesthetic, immediate/seasonal ways and thus contribute to a re-emergence of ecological harmony between humans and the natural world upon which we depend.

School garden research – identified by Ozer in 2007 as sparse – is more fulsome now, with longitudinal studies underway on some of the benefits outlined above. Given the generally positive research on school gardens, and their wider practice and acceptance within policy initiatives in other jurisdictions, this study focuses on some of the practical barriers to implementation in Ontario, both from “above” and “below” in policy and practice. Teachers, as

the primary actors determining whether children have access to a school garden, are the key players to implement policies and to establish best practices relating to garden-based learning.

This study draws from the following sources: a brief review of the literature relating to school gardens, a descriptive case study consisting of interviews with teachers in two schools with gardens who have used or intend to use the gardens for student instruction; a review of the policy landscape relating to environmental education, health promotion and school gardens; and direct observation through participation in school gardens. The methods included a literature search, interviews with teachers, discourse analysis of policy documents from various levels of government, and self-reflection as a practitioner.

Specifically, the research questions are:

1. How do teachers in two schools perceive school gardens?
2. How do their perceptions match the literature?
3. Are there differences between them because one has a long-time community partner?
4. How does Ontario and school board policy impact on school garden implementation in these schools?
5. Given the data we have, how could school gardens be more widely and effectively implemented?

Identified gaps in the research will be examined in this paper. For example, the factors leading to longevity of school gardens have not been elucidated. Quantitative data on numbers of school gardens and operating length is sparse, even in California where research is more robust. Other gaps in the research include the many strategies for taking care of the garden over the summer when school is not in session, and the role of community partners throughout the year. These questions are captured by Blair (2009): “Other productive future research would be (a)

studies of reasons for garden failure and (b) reports on creative means of maintaining gardens over time and moving the workload away from teachers.” (p. 36)

This paper explores implementation of school gardens within a community partnership model. I approached my research as collaborative, phenomenological inquiry and as a long-time community-based practitioner, informed by 15 years of practice developing school-based and children’s gardens. With other like-minded people, I formed an organization to partner with schools and other public institutions to support children’s gardening. Our goal was to connect children to nature through food, and connect children to food through nature. Falling broadly under the heading of environmental and sustainability education, our work increasingly focused on schools and at the intersection of education, food politics, environmental issues and social justice. We found ourselves engaging youth and adult community members, as well as teachers and education professionals, in a complex set of relationships. New programs and services have developed from these relationships. A rich and deep soil of community engagement has produced a relatively healthy, if pioneering, organism in the form of a non-profit group which supports four school gardens and a greenhouse program, summer programs with youth employment, and teacher training for school gardening.

As an action-researcher, I theorized that schools with a community partner were better able to face the challenges of maintaining children’s gardens on school grounds, and that multi-ethnic school-community partnerships in school gardens can draw on the strengths and “funds of knowledge” (Gonzalez, cited in Richardson 2011) in the community, while supporting the goals of public education insofar as they pertain to the development of a healthy democracy (Richardson 2011).

My observation as a practitioner is that structured partnerships are important to the longevity of school gardens. However, research on longevity is sparse. Much of the school garden research is conducted over a single season. According to some sources, school gardens, particularly in lower-income communities, are relatively short-lived at 3-5 years.

Because the gardens are on school property, for the majority of the year it is teachers who are central to generating school and community benefits from them. This paper examines the attitudes of teachers about the benefits and barriers they perceive, and reflects on the role and value of a community partner in the organizational execution of school gardens, ensuring that the garden is maintained over the summer, and co-ordinating garden-based learning (GBL) during the school year.

Policy documents relevant to school gardens in Ontario are reviewed in this study. School gardens as venues for environmental education and health promotion are implicated in international agreements and declarations onto which Canada has signed. Provincial and school board policies are also relevant to school garden implementation. School curriculum is provincially mandated and forms a type of *de facto* policy also, determining what children are to learn and when they are to learn it.

Policy supports: up the food chain

In recent years, public policy and implementation of school gardens, particularly in the US, has been driven to a large extent by concern about preventable conditions such as obesity and diabetes, both of which are reaching epidemic proportions among children and youth. Ontario, also facing epidemic diabetes, overweight and obesity rates, is under pressure to address this crisis, particularly since the release of *No Time to Wait* (2013), the report of the Healthy Kids Panel appointed by the Ontario government, which focused largely on obesity prevention.

National agreements mandate ministries of education and health to co-operate under the banner of Comprehensive School Health.

Environmental education in Ontario is supported by a policy framework, *Acting Today, Shaping Tomorrow* (2009), which embraces school gardens in theory if not explicitly. At the end of the UNESCO-declared Decade of Education for Sustainable Development (2005-2014), countries including Canada are assessing the state of environmental education within their jurisdictions.

This paper includes a comparative case study which illuminates both the food-and-health aspect and the environmental learning aspect of school gardens, in relation to the research data, and in relation to policies and policy frameworks. The role of the community in partnership with schools to implement gardens is examined as part of a collaborative inquiry with teachers. Pathways to wider implementation will be proposed, based on the study's findings. Finally, this paper will highlight directions for future research.

Chapter 2 focuses on literature pertaining to school gardens generally. This is oriented to student impacts and outcomes in the following four categories: a) science learning and school achievement; b) ecological and environmental awareness and responsible behaviors; such as recycling and composting; c) knowledge about food systems and nutrition, and healthy eating, especially consumption of fresh fruits and vegetables; and d) positive youth development (Ratcliffe, Goldberg, Rogers, & Merrigan 2010). The literature pertaining to teachers' attitudes and opinions about school gardens is highlighted and summarized.

Chapter 3 outlines the study's methodology and procedures: the descriptive and comparative multi-case study interviews with teachers, and the discourse analysis of policy

documents. Two theoretical frameworks are used; Social Cognitive Theory (SCT) and Efficiency-Substitution-Redesign (ESR), in approaching the five research questions.

Chapter 4 presents empirical data from a descriptive cross-case and comparative study consisting of interviews with teachers in two schools (n=11), and reviews this data in relation to the literature. Supplementing this data are recent surveys of school garden projects (n=21 and n=34) and an organizational evaluation survey of teachers (n=9).

Chapter 5 reviews the policy landscape in relation to school gardens in Ontario.

Chapter 6 analyzes and synthesizes the data presented in Chapters 4 and 5, and discusses the results of the study.

Chapter 7 presents summary conclusions, identifies limitations of the current paper, and recommends future research directions.

Chapter 2 – Literature Review

Peer-reviewed literature for this review was sought using York University databases and Google Scholar™. The author's own collection of books and 'grey' literature was also used. Unpublished doctoral and masters manuscripts were obtained through Academia.edu, York University, and Google Scholar™. Search terms used were "school gardens" and "school community partnerships".

The literature pertaining to school gardens is focused mostly on outcomes for students in elementary schools (Ozer 2007, Blair 2009, Williams & Dixon 2013). Research on school gardening in other jurisdictions, particularly the U.S., is more fulsome; there is considerable practice in Ontario that is unreported by the academic community.

There are a number of questions raised by school gardens. Are school gardens primarily curricular and science-based? Or are they cross-curricular, relating well to a number of required subjects? Or, are they largely extra-curricular projects? And what outcomes are most important? How important is food production and yield? Are school gardens a venue for environmental education? As the professionals who determine whether or not school gardens are used by students, what do teachers think? Teacher attitudes and beliefs about the benefits of school gardens comprise only a fraction of the school garden literature.

Where should advocates position school gardens? Are they part of the local/sustainable food movement, tied to school food provisioning and culinary projects, or part of the environmental and green movements, including urban planning and community revitalization? Are these in fact arbitrary distinctions, in other words, can school garden advocates keep one foot in each camp, and thus better connect the two?

While obviously this paper cannot fully answer all these questions, a tour through the literature should help contextualize them. School garden research has been characterized as lacking rigor (Williams & Dixon 2013, Blair 2009, Ozer 2007). Many studies have been conducted with small samples, no controls, inadequate length of intervention, and inadequate research time. The difficulty of researching student impacts over a growing season when the children might plant in one grade and harvest in the next, presents one, among many, practical difficulties for research design. Funding for practice and for research has fallen short of meeting fulsome objectives. Nonetheless, the research appears to support the efficacy of school gardens relative to their intended goals, and some research results have been replicated, particularly in relation to nutrition education and gardening.

2.1.1 History of school gardens

The history of school gardens in the so-called West traces back to John Comenius (1592-1670) who wrote that every school should have a garden where students can observe trees, flowers, and plants and be able to always hear and see something new (Nowatschin 2014, citing Marturano 1999) and followed by Friedrich Fröbel (1782-1852), the man credited with creating pre-school learning centres known as “kindergarten”, which described a children’s program largely centred around gardening (Nowatschin 2014). Maria Montessori (1870-1952) believed in the power of experiential learning and used gardens to support children’s development of patience, responsibility and stewardship ethics. John Dewey (1859-1952), was considered “the most influential educational theorist of the last century” (Kolb, 1984, cited in Nowatchin 2014) and wrote frequently on the subject of school gardens, proposing progressive ideas that included blurring the boundaries between a student’s classroom learning and contact with the natural environment, and connecting academic and practical elements (Dewey, 1900, cited in Nowatchin

2014). Thus, Dewey is considered the progenitor of Progressive education, which is still largely embraced today, although seriously challenged by a curricular shift towards a globalized, market orientation. (Giroux undated)

Much of the literature on school gardens is from the United States, the United Kingdom and Australia. National organizations, such as Canada's Evergreen and UK's Learning Through Landscapes have supported the development of research and practice alongside the US, which has developed the largest body of peer-reviewed research. This does not mean that school gardening is only practiced in the industrialized nations; on the contrary, there are perhaps many more school gardens throughout the global South. UNESCO and the Food and Agriculture Organization (FAO) of the United Nations have published school garden guides and analyses, notably Desmond, Grieshop and Subramaniam (2004). The FAO publication, *A New Deal for School Gardens* (2010), outlines the history of this global phenomenon, hinting at some of the differences in its expression between North and South. The authors note that "some countries have long-established policies of associating school gardens with school food and improving children's nutrition and eating habits." Desmond, Grieshop and Subramaniam (2004) discuss examples in Cuba, Ethiopia, Niger, and Bolivia of far-reaching school garden policies and practices, and note that:

Jose Martí, the nineteenth-century Cuban revolutionary, expressed a similar idea – to connect nature with a child's education and learning activities – quite simply:

"Y detras de cada escuela un taller agricola ... donde cada estudiante sembrase un arbol."
[And behind every school is found a garden ... where every student plants a tree.]

(Martí, n.d., Cuba, on the cover of a Cuban student garden journal) (p.43)

In Cuba, school gardens are deeply woven into the fabric of school and community life. Bucher (2010) notes: "Since 1959, school gardening in Cuba has reflected ideas and values

embedded in revolutionary ideology. Today, Havana educators have the benefit of a national school garden policy instituted after the economic crisis of the 1990s that brought greater attention to the pragmatic value of local and sustainable agricultural practices.” (p. 161)

In Canada, school gardens appear to have been the norm up until the mid-twentieth century. Nowatschin (2014) refers to a pamphlet published by the Canadian Department of Agriculture in 1916, entitled *The School Garden: As Regarded and Carried on in the Different Provinces*. Nowatschin (2014) notes that even urban settings such as Edmonton, Alberta had school gardens, and that the pamphlet described school gardens located in almost every province. Subramaniam (2002) states: “Youth gardening became a national movement and by 1918 every state in America and every province in Canada had at least one school garden (Sealy, 2001, cited in Subramaniam, 2002)

School and home gardens were part of a domestic strategy for cost reduction and self-sufficiency during the two World Wars. Funded by the war department in WW1, the United States School Garden Army was a significant moment for school gardens. The goals were to increase food production and to train children in thrift, industry, patriotism, and responsibility (Nowatchin 2014). During WW2, Canadian children were encouraged to participate in “victory” gardens at home or school. School gardening declined after WW2 and did not resurface until the seventies as part of a new era of critical awareness of food and environmental systems under threat from industrialization. From then until the mid-90s, school gardens struggled on the margins of education theory and practice.

Interest in school gardening began to grow in the 1990s, in response to environmental concerns and children’s disconnection from nature. For the first time in history, more people live in cities than in the countryside. Leading thinkers in environmental education, Sobel (1998,

2004) Orr (2004), and Gruenewald (2003), elucidated the value of place-based and experiential outdoor learning as pedagogy that connects the learner to the real world, and thus to nature, both in cities and outside of them. Louv (2005) captured popular attention with what became a meme – “nature deficit disorder” – and rekindled a movement to reconnect children and nature.

Concurrently, the emergent local/sustainable food movement has focused attention on school gardens as a means to reclaim food production and teach the value of local and organic food to the young, arguably the most susceptible to the promotion of unhealthy foods, and the population most at risk for long-term health effects from inadequate nutrition.

Williams & Dixon (2013) describe “two overlapping strands of public interest”, the first around obesity, health and food insecurity, and the second a response to the notion of “nature-deficit disorder. ... As an antidote to the No Child Left Behind Act of 2001, seen as narrowly defining curriculum and restricting children, a No Child Left Inside Coalition (2009) has emerged. School gardens are seen as common denominators for children to gain *outdoor* learning experiences on school grounds.” (Williams & Dixon 2013: 212) (Emphasis in original). It is this latter strand that motivated these researchers to determine the impact of garden-based learning on academic outcomes. They also highlight changes in public opinion towards school gardens in 2012. With images of First Lady Michelle Obama planting vegetables with children from local public schools at the White House, the school garden movement in the United States is becoming “validated and reenergized”. (Williams & Dixon, 2013:212).

2.2 School garden literature

School gardens are researched from a variety of perspectives and disciplines. The peer-reviewed studies, largely published in health and environmental journals, are categorized here based on outcomes as Ratcliffe et al. (2010) delineated: a) science learning and school

achievement; b) ecological and environmental awareness and responsible behaviors; such as recycling and composting; c) knowledge about food systems and nutrition, and healthy eating, especially consumption of fresh fruits and vegetables; and d) positive youth development (Ratcliffe, Goldberg, Rogers, & Merrigan, 2010). Quantitative and qualitative studies are reviewed briefly below.

Desmond, Grieshop & Subramaniam (2002) describe garden based learning (GBL):

GBL can be defined simply as an instructional strategy that utilizes a garden as a teaching tool. The pedagogy is based on experiential education, which is applied in the living laboratory of the garden. This simple definition, however, is misleading in that it does not take into account some of the powerful elements of the garden experience. It overlooks the relationship of these experiences to educational reform and to the transformation of contemporary basic education from a sedentary, sterile experience to one that is more engaging of the whole child. It also misses the elements of the garden experience that contribute to ecological literacy and sustainable development. (p. 20)

A fairly well-rounded evidence base has been established in regards to academic achievement supported by GBL. Science achievement has been studied and generally found to be improved through GBL (Graham et al. 2005, Waliczek, Logan & Zajicek 2003, Dirks & Orvis 2005, Lieberman & Hoody 1998, Klemmer, Waliczek & Zajicek 2005, Miller, D. 2007, Boynton 2010, Pigg, Waliczek & Zajicek 2006, and Smith & Motsenbocker 2005). Blair (2009) conducted a meta-analysis and found 9 of 12 studies revealed a positive difference in test measures between gardening and non-gardening students. School gardening increased the science scores in all reported studies (Blair 2009).

Williams & Dixon (2013) synthesized research conducted between 1990 and 2010 on the impact of garden-based learning on academic outcomes. The subject of academic performance is critical to school garden legitimacy, “since gardens are on school grounds, there needs to be

justification for their academic value.” (p. 212) This study found that science outcomes experienced the highest positive effects, with 14 (93%) of the 15 resulting in improvements to test scores. “Furthermore, 80% of the direct academic outcomes in mathematics and 72% in language arts had positive outcomes. (...) the only study that examined social studies found a positive effect. Of the 170 reported outcomes, 140 (82%) were positive, 3 (2%) reported negative effects, and 26 (15%) indicated no impact.” (p. 219). The results of the studies show overwhelmingly that garden-based learning had a positive impact on students’ grades, knowledge, attitudes, and behavior (Williams and Dixon 2013:225).

The impact of school gardens on children’s diets is of importance from health promotion and health equity perspectives. Ozer (2007) evaluated the literature at that time and found that most studies were promising. Morris and Zidenberg-Cherr (2002), Morris, Neustadter & Zidenberg-Cherr (2001), and Lineberger & Zajicek (2000), examined nutrition knowledge, attitudes and behaviour and reported positive outcomes. Bell & Dymont (2006, 2008) detailed school ground projects’ positive impacts on health and physical activity in Canada.

Langellotto and Gupta (2012) examined newer studies in their meta-analysis, finding validity in those concluding that gardening increased children’s fruit and vegetable consumption (Davis et al, 2011; Heim et al, 2009; Lineberger & Zajicek, 2000; McAleese & Rankin, 2007; O’Brien & Shoemaker, 2006; Parmer et al., 2009; and Ratcliffe et al., 2011).

Recent studies have found increased nutritional knowledge and consumption of fruits among children who garden (Batuk 2013), increased consumption of vegetables (Namenek Brouwer & Benjamin Neelon 2013), increased consumption of both fruits and vegetables (Wang, Rauzon, Studer et al. 2012, Meinen, Friese, Wright & Carrel 2012), and increased consumption of vegetables in the lunchroom (Cotugna, Manning & Didomenico 2012). Interest and

willingness to try new fruits and vegetables increases with use of gardens in instruction (Libman 2007, Morgan et al. 2010, Ratcliffe et al. 2011). Details about the agro-biodiversity present in school gardens and the nutritional benefits arising from that was recently measured by Guitart et al. (2014); through a colour classification system, they found that all gardens grew fruits and vegetables from at least four food colour groups and 75% grew plants from all seven colour groups.

Environmental education appears to be among the top motivations for starting a school garden (Skelly & Bradley 2000). Research points to increased environmental awareness through gardening (Miller, M. 2007, Skelly & Bradley 2000, Malone & Tranter 2003, Cross 2013, Bucher 2012, Laaksoharju 2012, Moore 1995, Skelly & Zajicek 1998, Waliczek & Zajicek, 1999), and benefits of early childhood environmental education (Duhn 2012, Lineberger & Zajicek 2000, Miller, D. 2007). Research highlights the benefits of starting young to instill pro-environmental attitudes in children (Chawla and Cushing 2007, Laaksoharju 2012, Lekies & Sheavly 2007, Hart and Nolan 1999, Skelly and Zajicek 1998) and this is also supported by the Tbilisi Declaration (UNESCO 1977).

Much of the literature on place-based education is highly relevant to school gardens (Gruenewald 2003, Chatterjee 2005, Green 2007). Discussion about the environmental impacts of the food system and the value of local food are specific examples of environmental education in the school garden (Kozak 2013). Soil science is of critical importance in understanding agriculture and horticulture, and Williams & Brown (2012) use learning about soil as a metaphor for the larger project of sustainability education. When teaching and learning about what sustains humans, soil life is largely unseen but critical (Williams & Brown 2012):

The soil that constitutes the physical ground of learning gardens is home to plant, animal, and microbial life ... making it an exquisite entry point into teaching about relationships

by breaking down ontological barriers that divide nature from culture, humans from non-humans, and food from soil. (x)

Newer conversations are taking place around the role of indigenous land education in environmental education (Tuck, McKenzie & McCoy 2014, Calderon 2014, Paperson 2014, Sato, Silva & Jaber 2014). These offer a critique of environmental education, that it mystifies or glosses over colonialism, thereby continuing the harms of colonialism. Indigenizing environmental education (Korteweg & Russell 2012, Scully 2012, Kapyrka & Dockstator 2012) has impacts that extend into the remaking of (at least) science and social studies curricula.

In a benchmark research study, Ozer (2007) “draws on ecological theory to conceptualize school gardens as systemic interventions with the potential for promoting the health and well-being of individual students in multiple interdependent domains and for strengthening the school environment as a setting for positive youth development.” (Ozer 2007) Systems thinking in relation to GBL has been examined by Krasny & Tidball (2009), who tie urban gardening programs to resilience thinking in cities. While urban agriculture is on the rise in Toronto and other Ontario cities, connections between the practice of urban agriculture and educational institutions are just beginning. Post-secondary courses in food policy, nutrition and environmental studies support school gardens through internships, connecting older youth to the garden projects.

Positive youth development and the effect of school gardens on students have been examined by researchers. Danish researcher Wistoft (2012) looks at students’ desire to learn, finding that students have a desire to learn that may be connected to “enjoyment-based learning” (Wistoft 2012). Skinner et al. (2012) build on self-determination theory and conclude that students’ perceived autonomy, competence and intrinsic motivation uniquely predicted their engagement in the garden, which in turn, predicted learning in the gardens and achievement in

school (Skinner et al. 2012). Canadian researcher Dutt (2012) finds that nature-based school grounds design with both gardens and forest as play environments leads to a sense of freedom, joy, social cohesiveness and aesthetic pleasure among students (Dutt 2012). UK researchers Bowker & Tearle (2007) utilized and studied global pairing to learn empathy through gardening internationally (Bowker & Tearle 2007).

Canadian author Veronica Gaylie teaches teachers to use school gardens. Gaylie (2009) notes that “measuring the measurable only scratches the surface of the deeper, potentially transformative value of school gardens.” (p. 19) Affective impacts are difficult to describe, after all, the impacts are felt with all of the senses and this is difficult to convey with words on paper.

2.2.1 Partnership research

Community partnerships not only animate the summer season, but provide much needed support to teachers during the school year (Graham 2005, Smith 2005, Miller 2007, Fisher-Maltese 2013, Blair 2009 citing O’Callaghan 2005, Miller 2013, Hammond 2000, Thorp 2003, Richardson 2011, Ozer 2007, Somerset & Markwell 2008, Robinson & O’Brien 2009, Martin 2011). However, I was not able to find any studies that specifically focused on community partnerships and compared schools with community partners with those without, or examined issues of longevity relating to these partnerships. Many partnerships are alluded to in the research, especially from the U.S., where Master Gardeners and Agricultural Extension agents, as well as AmeriCorps volunteers, are regularly involved in school gardens. There are also many community-based non-profits like our own. Martin (2011), in her case study of two schools in Michigan, details the impact of the school with a “garden champion” in the form of a community-based non-profit. She finds that “having garden champions constantly promoting Garden-based Nutrition Education was a factor that facilitated teacher’ participation.” (p. 98).

Multi-ethnic school-community partnerships using gardens and food are named as a way past ‘touristic’ approaches to multiculturalism and sustainability education (Richardson 2011).

We turn now to our case focus, how teachers interact with garden projects at their schools.

2.2.2 Teacher Attitudes

Teachers hold the key to implementation of school gardens, and research with teachers “provides a window into the interplay among context, policy, pedagogy, and actors” (Bucher 2010). Research focused on teacher attitudes is less common than studies on impacts on students.

Table 2.2.2.1 summarizes studies and findings.

Table 2.2.2.1 Teacher Attitudes to School Gardens

Author, year	Indicator/ Measure	Intervention/Sample	Result/Findings
Alexander, North & Hendren (1995)	Open-ended interview, value of school garden	Teachers (n=5) of Grade 2 & 3 in 1 school in Texas	Cross-curricular, moral development, academic benefit. Master Gardeners partnered with school.
Dobbs et al. (1998)	Survey, whether horticulture or gardening used in classroom, what would encourage incorporating into curriculum	Teachers (n=337) (34% response rate) via random selection of 100 schools x 10 questionnaires/school in Virginia	High level of interest (88% of respondents), not interested 13% ¹ . Materials for lesson plans rated highest need (90-95%), volunteer support eg Master Gardeners 86%, additional training 78%
DeMarco, Relf & McDaniel (1999)	Survey, list top 5 of 18 success factors. Interviews, sort 30 factors choose top 5. Top subject	Teachers (n=236) from 42 states plus 28 interviews. Teachers chosen from experienced school garden educators	Educators who incorporate school gardening into their curriculum report that school gardening is a somewhat successful (35.2%) or very successful (60.6%) teaching tool that enhances the learning of

¹ Authors note that non-response bias is a limitation of the study, and note that 30% of the 1000 surveys sent out were returned by teachers with a pre-existing interest in using horticulture or gardening in the classroom.

	areas taught in garden.	(grant recipients).	their students. Most (92%) teachers surveyed requested additional school gardening education for themselves.
Waliczek et al. (2000)	survey via internet re benefits of school gardening for children in adult's minds	Teachers (n=61) and other adults (n=320) USA	Importance of food production: 54.1% vs. parents 74.7%. "Socializing with gardening friends" 16.4% (parents 4.5%) and "learning about plants" 24.6% (parents 8.7%)
Skelly & Bradley (2000)	Questionnaire, close-ended & partially close-ended questions, importance of school gardens & how used.	Teachers (n=71), via school garden competition, Florida	Environmental education ... 97.1% Helps students learn better...84.3% Experiential learning..... 72.9% Personal love of gardening.. 67.1% Encouraged by administration..... 54.3%
Thorp & Townsend (2001)	Qualitative, phenomenological understanding of agricultural education in school garden	Teachers (n=5) in one school with low test scores, also 40 students	"School garden programs should include a dedicated volunteer outside of the school hierarchy to work with teachers and children in the garden. Teachers do not have the time to adequately manage the demands of a garden without additional help." "Do not limit the possibility of the garden by tying it to curricular constraints"
Graham et al. (2004)	Survey, how teachers use gardens	Teachers (n=70) in 3 schools participating in Farm to School Connections, California. 59% response rate to a distributed questionnaire aimed at all teachers (n=118)	Science 90% Nutrition 71% Language Arts 64% Environmental Studies 60% Health 59% Agricultural Studies 57% Math 56% Perceived barriers: lack of time & lack of curriculum linked to standards, but not lack of teacher interest, training or knowledge of gardening. The schools had a paid

			garden co-ordinator.
Graham & Zidenberg-Cherr (2005)	Questionnaire re: perceived attitudes and barriers, purpose and use of school gardens, in relation to nutrition and academic performance	Teachers (n=592) of grade 4 (36% response rate from N= 1665 distributed) in California	Most frequent reason: enhancement of academic instruction 72% Science instruction 65% Nutrition 47% Environmental studies 43% Language Arts 42% Math 40% Edible produce 38% Agricultural studies 27% Biggest barrier = time Healthy eating: 43% thought garden helped; 46% thought garden not effective or slightly effective at enhancing the school meal program.
Dirks & Orvis (2005)	Open-ended post-only qualitative study, gardening indoors in classrooms	Teachers (n=9) of grade 3 used Junior Master Gardener program, also 277 students	Improvements in student interest and excitement to learn science, 50% used classroom helper/volunteer, 50% used garden program daily, most enjoyed it, new outdoor gardens were started because of it.
Bucher (2010)	Qualitative & comparative, two cities	35 teachers in Phila & 26 in Havana plus numerous informal and conference meetings	Phila school gardens rich learning spaces but marginal, not supported by policy, vulnerable and often dependent on just one teacher. Havana has official policy support for school gardens, and good examples but would benefit from collaborations and more teacher pre-service education.
Fisher-Maltese (2013)	Qualitative interviews: How teachers use informal learning context	4 teachers, 2 nd grade, affluent school, garden-based learning	Very positive feedback from teachers for action/researcher's program. Barriers to implementing garden-based curriculum – lack of time and content knowledge.

2.3 Summary

While it is difficult to generalize about teacher attitudes towards school gardens because of the wide variety of research designs and instruments, as well as a variety of garden-based learning programs used in the research, some common threads appear. As in Bucher (2010), school gardens are generally perceived as rich learning spaces but are often marginal, not supported by policy, vulnerable to system changes and often dependent on just one teacher. Not all teachers are interested or feel capable of teaching outdoors. Teaching outdoors is not mandated, and issues of efficacy arise for teachers. Time for the garden is often cited as a barrier, as well as lack of gardening knowledge and curriculum resources. Academic achievement, particularly in science, appears to be a primary motivator. Less important to teachers is food production and health instruction, although it is a primary motivation for the establishment of many school gardens, and the focus of a large percentage of the published literature. The primary benefits described include student engagement and science achievement, and among the primary barriers described are lack of time, lack of knowledge and inadequate curriculum.

Chapter 3 – Methodology and theoretical frameworks

My research methodologies include a descriptive and comparative case study using interviews with teachers in two schools about the schools' gardens, policy discourse analysis and self-reflection as a practitioner. My inquiry included five questions, three of which focused on the lived experience of teachers in the two schools, in order to examine their perspectives on the gardens in their schools and how they planned to use them or had used them in the past.

3.1 Case study methodology

Yin (2014) defines the case study paradigm this paper reflects:

A case study is an empirical inquiry that

- Investigates a contemporary phenomenon within its real-life context, especially when
- The boundaries between phenomenon and context are not clearly evident.

...(and it)

- Benefits from the prior development of theoretical propositions to guide data collection and analysis. (p. 16-17)

Yin (2014) also describes case study research as a way to “*describe* an intervention and the real-life context in which it occurred. ... [and to] *enlighten* those situations in which the intervention being evaluated has no clear, single set of outcomes.” (p. 20) (*Emphasis in original.*) School gardens are a dynamic phenomenon with multiple outcomes, so this method seemed well suited to studying them, in my mind.

My research questions are: how do teachers in two schools perceive school gardens? How do their perceptions match the literature? Are there differences between them because one has a long-time community partner? How does Ontario and school board policy impact on school

garden implementation in these two schools? Finally, given the data we have, how could school gardens be more widely and effectively implemented?

A basic hypothesis informing my research design was that while all schools with gardens present opportunities for positive student engagement during the school year and community engagement in summer, schools with structured relationships with community partners to support their gardens have advantages over those who do not. I wished to test this hypothesis by examining the basis for it in my teacher interviews and in the peer-reviewed literature. I included some ‘grey’ literature, including some contributed by my own organization, in the form of surveys and interviews conducted by the organization.

3.2 Validity

The data collected from this study are only generalizable to this population because of the specificity of the sites, populations and current applications of garden activities. However, the study could be replicated in similar situations, such as other elementary schools with gardens both with and without community partnership support.

Since teachers self-selected to participate, and all participants indicated that they wished to use the gardens or had used the gardens, results cannot be generalized to any other teachers within each school.

The study’s findings on teachers’ perceived benefits of school gardens may be confined to urban areas. Because of the paucity of prior research, especially in Ontario, on the longevity of school gardens, and the role of community partners, this study would need replication to carry external validity. The types of support provided by community partners could vary, so generalizations are not possible beyond this case.

Comparative data between schools has limited validity because of the small sample sizes.

3.3 Study design and procedure

To begin my school study, I requested that each school’s principal forward information about my study to all teachers. My request was stated as follows: “I would like to interview teachers who have or who would like to use gardens to teach. The 30-40 minute interviews with teachers will consist of open ended questions on using gardens to teach various subjects and to learn about environmental sustainability.” From this request I was put in contact with 6 teachers at one school and 5 at the other. The teachers and school details are below.

Using an interview guide developed from my practice in the field, informed by my research questions and the peer-reviewed literature, I interviewed teachers (n=11) at two schools, which I’ve given the pseudonyms Edgewater and Newcombe Public Schools. The grade range taught by these teachers is K-5. In these grades, students are generally with the same teacher for most subjects, excluding Physical Education, Library, French, and HSP/Special Ed. Table 3.4.1 shows the school, teachers, grade level, and years of service. All teacher names are pseudonyms.

Table 3.4.1 School, Teacher, Grade Level, Years of Service

School	Teacher	Grade Level	Years of Service
Edgewater	Anna	1 / 2	12
Edgewater	Indira	K	12
Edgewater	Ines	1	4
Edgewater	Laura	1 / 2	4
Edgewater	Naomi	5	12
Edgewater	Yvonne	3	4
Newcombe	Edward	3	20

Newcombe	Evelyn	K	6
Newcombe	Marie	1	11
Newcombe	Nora	Library, Spec. Ed., 1-6	8
Newcombe	Tanya	3	18

The interview guide (see Chapter 4) was revised slightly after the first interview, as new questions arose within that interview and the timing (roughly 30 minutes) was established. The interview questions were semi-structured, open-ended except for one close-ended question. With a few small exceptions, all teachers responded to the same questions, although the order and emphasis varied between conversations, in the emergent process, which encourages continuous learning on the part of participatory researchers (Greenwood, Whyte and Harkavy 1993).

Research ethics protocol included each teacher signing a consent form including their right to withdraw from the study at any time. Interviews were transcribed word-for-word including pauses and laughter.

Responses were first manually coded using Microsoft Excel spreadsheets, grouping the responses by theme. I analyzed the responses from each school separately, one after the other, within each theme. New themes emerged from the responses which were also manually coded.

The transcripts were then input into NVivo 10 software to code the themes digitally in order to be able to link the coding to the literature. I used words or short phrases to code both the transcribed interviews and the literature into ‘nodes’, within the identified themes and also to add new themes arising from the interview content. This process produced nodes with relevant content from the interviews, the literature and the policy documents.

Because of my prior knowledge of the school gardens and some of the teachers, I interviewed teachers I did not know first, so I would be more likely to listen closely and keep to the structure of the interview. The process of setting up a microphone and asking them to sign the consent form signified my clear intention to have a formal, recorded conversation. I quickly assigned pseudonyms to the teachers in the transcribed interviews, to create more psychological distance for myself from those who I knew better, during the analysis phase.

While I endeavoured on the one hand to maintain a distance from the research, I also embraced the role of practitioner and used my prior knowledge and relationships to gain access to the research subjects with whom I engaged in the collaborative inquiry process. Pedlar (2004), in his inaugural editorial of the journal *Action Learning: Research and Practice* (2004), states that the field will benefit from straddling the gap between research and practice, as this paper intends:

Writing from practice; for practice

We have sympathy with those who, faced with some practical difficulty, complain that although there are lots of theories around, ‘none of them tells me what to do!’ Useful knowledge helps a person act successfully in a specific local context in a living involvement with other people. Much of the literature on individual and organisational learning has virtually excluded the voice of the practical author—the person who ‘authorises’ their own action and learning. There is much written about them, but we hear little from them. Part of this may be that writing from theory is easier than writing from practice. One can describe a theory, and delineate it, but practice always defies full exposition. Writing from practice is messier. Theorising is vital, but no one theory fits adequately or explains all that happens. Rigour comes through being honest about this, and we will welcome this openness. (p. 5-6)

Throughout the course of the research project, I endeavoured to find a mental space where I could have a phenomenological as opposed to a prescriptive approach to the subject. I

saw this as distanced or neutral space, a different kind of space from the one I regularly inhabit both as a garden educator and as an advocate. In treating my research as collaborative inquiry, I intended to give voice to teachers with whom I have worked and with whom I may work in future. I sought to understand and record their motivations for gardening with their students, when clearly gardening does fall outside of the expectations – of which there are already a great many – of what they are supposed to do at work.

Kemmis et al. (2013) have developed the argument for critical participatory action research, in which tradition this paper stands:

Some in the research literature think that being an insider involves a penalty – not being able to see things in a disinterested or ‘objective’ way. By contrast, we believe that insiders have special advantages when it comes to doing research in their own sites and to investigating practices that hold their work and lives together in those sites (...) (p. 5)

Critical participatory action research (...) rejects the notion of the ‘objectivity’ of the researcher in favour of a very active and proactive notion of critical self-reflection – individual and collective self-reflection that actively interrogates the conduct and consequences of participants’ practices, their understandings of their practices, and the conditions under which they practice, in order to discover whether their practices are, in fact, irrational, unsustainable or unjust.

In critical participatory action research, far from being ‘disinterested’, participants are profoundly interested in their practices, in whether they understand their practices and the consequences of their practices, and in whether the conditions under which they practice are appropriate. (p. 6)

In developing my research methods and research design, I read and found preparation for the interviews helpful from the work of Janesick (2004), action research and coding techniques (Esterberg 2002), participant observation (Jorgensen 1989), and collaborative inquiry (Torbert 1981) where “the researcher’s activities are included within the field of observation and

measurement, along with the study of other subjects.” Thorp (2006, p. 134-136) proposes ‘signposts’ that validate the results found by participatory action researchers summarized by the following points:

- Triangulation: ‘counterpatterns’ as well as convergences; the teacher who does not have time for the garden, the student who thinks it’s a dumb idea
- Reflexivity: how have my ‘working theories’ changed along the way?
- Aesthetic merit: is it beautiful? Readable? Not boring?
- Understanding. Groundedness, embeddedness. ‘A quality that points to identifying critical elements and wringing plausible interpretations from them’ (citing Wolcott, 1994).

Catalytic validity, or “the degree to which the research process reorients, focuses, and energizes participants toward knowing reality in order to transform it” was a strength of the study (Lather, 1986, p. 272). Teachers in both schools expressed a genuine interest in seeing their gardens highlighted and used to discuss policies and pathways to better implementation.

Finally, on questions of validity regardless of method, Reason (1981) quotes Rogers (1961):

Scientific methodology needs to be seen for what it truly is, ‘a way of preventing me from deceiving myself in regard to my creatively formed subjective hunches which have developed out of the relationship between me and my material.’

This study made use of my own prior, expert knowledge and my awareness of current thinking and discourse about the study topic (Yin 2014: 159). In my interviews I sought contrary viewpoints to my presupposition about the importance of community partners. In analyzing my knowledge from the field, I looked for counter-examples of my hypothesis. Specifically, I looked for examples of long-term school gardens, in research literature or in my own experience and knowledge base, that did not have an external partner. I found one example, in a high-income

school in Toronto. This finding caused me to revise my hypothesis, that perhaps school income level is (also) a determining factor in school garden longevity. Two studies (Stewart 2013, Turner 2014) support this hypothesis, but clearly much more research is needed, locally as well as internationally. I did, however, find plenty of examples of schools with gardens and no external partner. None of them had been going for more than five years (where data was available).

3.4 Theoretical frameworks for analysis

3.4.1 Social Cognitive Theory

At the level of individual teachers, as well as their schools, the theoretical framework I use to describe the process by which school gardens influence behaviour and create social change is Bandura's (1986) *social cognitive theory* (SCT). SCT promotes an understanding of three equally important factors affecting human agency, that is, internal personal factors, behaviour, and the external environment, in a "reciprocal triadic relationship" (Bandura 1986). Teachers who model engagement with a garden on school property are demonstrating to children that hands-on learning is valuable, and that garden-based learning is valid; that knowledge gained in the garden is of value. A school garden where programming is geared to maximize self-efficacy and is fun for students, is more likely to have the desired effects noted in the literature (increased academic achievement, better nutrition knowledge, more pro-social behaviour, etc.) Bandura (1977) also developed ideas about self-efficacy and collective efficacy that have been important to many of the children's garden researchers. Self-efficacy is described as one's belief in one's ability to succeed in specific situations (Bandura 1977). Direct learning from relationships with positive role models, for example around fresh garden foods, may lead to more effective and long-term behaviour change than other less direct ways of

learning (Hale 2011, citing Bandura 1986). Furthermore, “a teacher’s sense of self-efficacy is one of the few variables that is consistently related to student achievement.” (Hoy 1998).

SCT is used by many researchers in the fields of health and education to frame the outcomes for students, particularly those using school and children’s gardens (Graham 2005, Williams 2013, Childs 2012, Morris 2001, French 2003, Poston 2005, O’Brien 2006, Ratcliffe 2011, Robinson & O’Brien 2009, Heim 2009, Hazzard 2010, Morgan 2010, Delgado & Noguera 2011, Hale 2011, Kararo 2011, Martin 2011, Evans 2012, Gatto 2012, Langellotto & Gupta 2012, Meinen 2012, Tsevreni 2011) as well as in school nutrition and health policy documents (World Health Organization 2009, Centers for Disease Control 1996). I use it here to frame the teachers’ self-efficacy in gardening with their students, and the impact that the reciprocal triadic relationship of environment, social and personal factors has on the school garden, with teachers as the subject.

Bandura (1986) also analyzed self-efficacy in terms of mastery modeling, which includes breaking distant goals down into a series of manageable subgoals (Bandura 1986). This has echoes both in the garden, as a practical approach, and in the political realm, where garden advocates wish to influence policy. In breaking down a large political goal, Hill & MacRae (1995) use a framework called Efficiency-Substitution-Redesign: the second theoretical tool used in this study.

3.4.2 Efficiency-Substitution-Redesign

In describing agricultural interventions, Hill and MacRae (1995) bring clarity and practicability to intervention analysis with their framework of Efficiency-Substitution-Redesign, a conceptual framework to aid in transitioning from conventional to sustainable agriculture. Efficiencies are created within the existing policy framework and require minimal changes, and

in fact are positive changes that are achievable and can even save money or other scarce resources. Substitutions require a higher degree of acceptance from decision-makers of the intervention, in place of another element. Substitution requires re-allocation of existing resources, so may not be costly but may not save money, either. This requires a shift in priorities. Redesign is the goal, however, it is likely the most difficult to achieve. But by articulating the larger vision, one is better able to identify the pathways; in Bandura's terms, distant goals are broken down into manageable subgoals (Bandura 1986). My recommendations for school garden implementation using this framework are proposed in Chapter 6.

3.5 Description of schools and community partnership

Newcombe, located in an older downtown Toronto residential neighbourhood with mostly modest single family duplex homes, ranks around the bottom one-third mark on the Toronto District School Board's Learning Opportunities Index (LOI: ranking of external challenges that includes indicators such as socioeconomic status by postal code, length of time in Canada and whether English or French are spoken in the home), meaning that about two-thirds of TDSB schools are needier than Newcombe. The student population at Newcombe is about 400, about 30% of whose primary language is not English. Teachers (n=5) participating in my study collectively teach approximately 35% of the students in the school.

In contrast, the student population at Edgewater is about 640, with over 85% whose primary language is not English, representing about 50 language groups. Edgewater is ranked around the top 25% neediest schools on the LOI. The school is surrounded by high-rise buildings built in the 1960s, with few amenities but many larger units. The neighbourhood has become a gateway community for newcomers to Canada, primarily from South Asian countries, and is said to have upwards of 25,000 people living in a 6-square block radius. Teachers (n=6) participating in my study collectively teach roughly 27% of the students in the school.

Edgewater is one of four schools where my organization Green Thumbs Growing Kids (GTGK) supports the school gardens. GTGK has been partnering with the school for eight years, helping to develop and animate two garden sites on school property over that time. Each garden site can accommodate one class of 25-30 students at a time. Two of the teachers I interviewed, Naomi and Anna, have been teaching there for eight years or more. All of the teachers I interviewed at Edgewater have participated in voluntary garden-based programming with our

organization free of charge, and most have also brought their students into the gardens on their own as well.

Garden programs offered by Green Thumbs Growing Kids provide each class with small-group breakout activities; usually three or four small groups each staffed by a volunteer, intern or paid employee, with hands-on activities for each small group. Each group has a different theme, such as a Tasting Tour through the garden (ex. Stevia, 40 times sweeter than sugar; Garden Sorrel, sour and lemony; mint, greens) compost exploration (worms + bugs) and applying finished compost to beds ('feeding' plants), watering, planting seeds or transplanting seedlings, harvesting, etc. (seasonal activities), and mulching paths (using wood chips, wheelbarrow, shovels and rakes). When booking the class garden workshop, teachers may request that the activities relate to a curriculum unit currently being studied by the students. Often the hands-on activities are the stimulus for writing and art activities in the classroom. Math, for example, has been explicitly taught in the garden at Edgewater using an inquiry-based process to build raised beds and profiled in a curriculum guide (Chiarotto 2011).

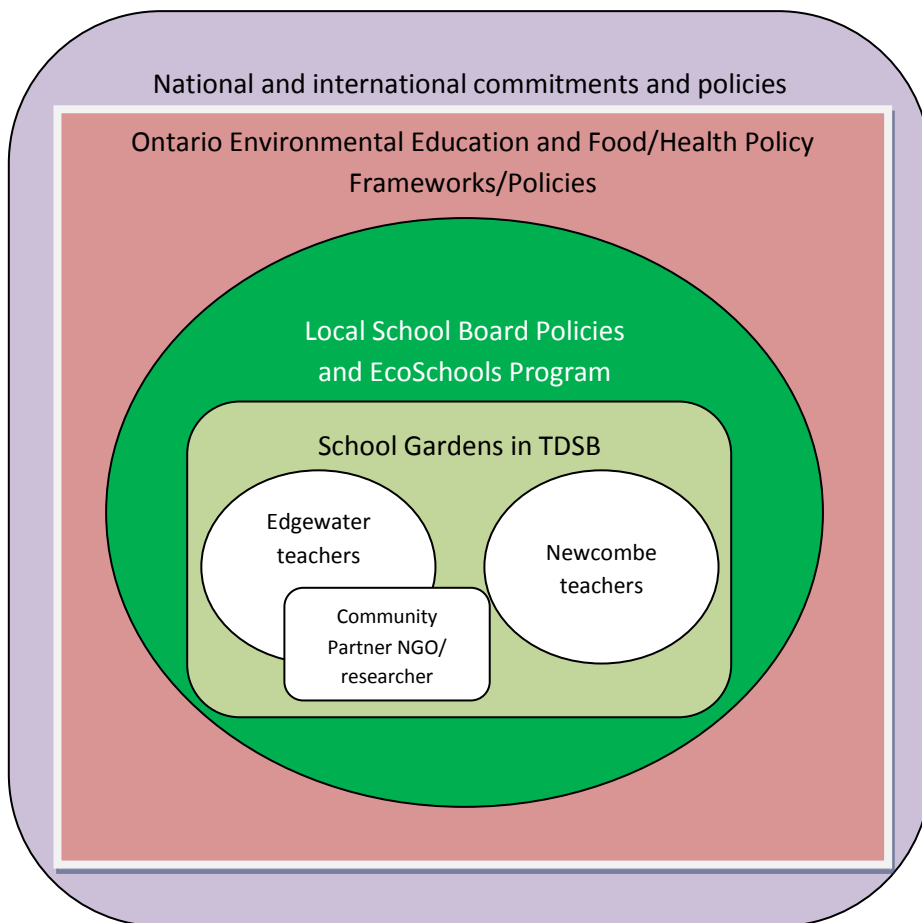
At Newcombe, one teacher is both a colleague and a friend. Tanya teaches Grade 3 and is relatively new to the school, and helped organize the group of teachers who participated in this study as we agreed to work together to support the school's second year of gardening. As well as participating in one-to-one interviews, Newcombe teachers in the study brought their classes on a field trip to our greenhouse program (delivered at a City of Toronto facility), and planted seeds for the garden in March. The plants grew under glass until May when I delivered the seedlings, along with a 'lunch and learn' session about the next steps, encouraging teachers to collaborate with one another and their classes to get the plants in the ground and to continue with their school garden project, building on their initial successful year in 2013.

Both schools have been recently certified as Platinum Ecoschools, the highest level of achievement in this annual voluntary environmental certification program. However, their respective demographics and the built environment of the school are different. Specific research criteria and inquiry are centred around teachers' perceptions of benefits, barriers, areas for support and professional development, policies that support or discourage gardening, and the importance of food production.

3.6 Units of analysis

Figure 3.6.1 provides a visual reference for the units of analysis in my study.

Fig. 3.6.1 Units of analysis



Units of analysis: In the outer frame, national and international commitments to environmental education form part of the policy landscape, echoed by provincial and board-level policies. The phenomena of school gardens in the Toronto District School Board, the largest school board in Canada, expressed in two cases, one of which is closely linked to an external partner. The researcher is linked to the external partner.

Chapter 4 Teacher perceptions about school gardens at two schools

“...they’re not just learning in one way.... in the garden, because it always has the hands-on component. It pretty much can engage any student ... give(s) them access to the curriculum from multiple points of view and different ways of demonstrating their knowledge.”

Naomi, Grade 5 teacher, Edgewater

The descriptive case study includes interviews with teachers in two schools with gardens who have used or intend to use the gardens for student instruction. Teachers were selected based on their own interest, referred by their principal to me. The interviews took place over the late winter and early spring of 2014.

4.1 Interview Guide

In semi-structured interviews, the following interview guide was used:

1. What benefits do you feel that the school garden has for your students?
2. What subjects in the curriculum do you feel most strongly connect to the garden?
3. Are the benefits curricular, or extracurricular? What if you had to choose?
4. What is the value to you of a cross-curricular approach to teaching in the garden?
5. What supports would/do you need to realize the benefits you’ve described?
6. What do you feel/imagine the barriers to using the garden are/would be?
7. Would professional development be helpful? If so, what would that look like?
8. Are there policies that you are aware of that support school gardens?
9. Are there policies that you are aware of that discourage school gardens?
10. Would you say that the school culture here supports the gardening? If so, how?
11. How concerned are you about the ratio of adults to children when teaching outdoors in the garden?

12. How important is food production as part of the garden project here?

The questions touch on all three of Bandura's (1986) Social Cognitive Theory elements: personal motivations, social relations and the gardens, and the overall environment in which the gardens exist. Some of the questions were worded slightly differently depending on if the teacher had actually used a garden before, as indicated by the alternative wording. Most teachers had in fact used a garden in their teaching in the past, if not at their current school, at a previous school.

4.2 Teacher Responses

4.2.1 Benefits of school gardens

In answering this open-ended question, teachers named as many benefits as they could think of – and as the first question, there was no particular sense of time pressure. In starting on a positive note, describing the benefits they perceived for their students, they remembered good times in the gardens with students, and many were clearly transported back to that time and to the sense of it being special. The most cited benefit was in regards to student affect and engagement, across the cases. There were differences between the two schools in responses to this question, which will be later explored.

Most Edgewater teachers (5/6) prefaced their answers by referencing the high-rise community around the school as “a concrete jungle,” “built up,” “very little green space,” “dense urban setting,” and “students live in apartment buildings,” suggesting that their perception of the benefits was place-based; very tied to the physical context of the school and its gardens.

Teachers identified a total of 32 benefits (avg. 3.7 per teacher). Table 4.1.1 shows the benefits teachers listed, by order of importance:

Table 4.2.1.1 Benefits listed by teachers (N=11) Note: percentages are not cumulative; they reflect multiple category use.

Benefit category	N	%
Affective, character-related, student engagement, social interaction	6	55%
Contact with soil, nature	5	45%
Food-related	5	45%
Environmental stewardship	5	45%
Real-life experience	4	36%
Seasonality, observing passage of time	2	18%
Students get outside	1	9%
Aesthetic	1	9%
Different view of urban life	1	9%
Plants and systems	1	9%
Pride – cultural background, gardening	1	9%

Ines, a Grade 1 teacher at Edgewater, has taught primary grades there for 4 years:

I think for me it was just that the children are always engaged when they're out there and the behaviour management piece falls away. So that's the thing I always notice, this especially with kids who have a hard time being still in the classroom you get them into the garden ... and everyone's calm and they're listening and more focused as well. So that piece is just— for me it's great to see that engagement piece.²

Newcombe teachers also prioritized student engagement, particularly Marie, who had initiated the garden the previous year:

² Interview, March 3, 2014

... sheer excitement and joy, you know in seeing something grow. We did it, you know, obviously in the spring and then there were kids that came back all through the summer that were here with daycare and just—they got so into it and so excited... It was just so nice to see the kids excited and interested in producing something, seeing it grow day by day we watch. We go out every day and water it ...³

The teachers' emphasis on student engagement is supported by the literature (Blair 2009).

Blair (2009) listed this first in her evaluative review of key studies titled *The child in the garden:*

An evaluative review of the benefits of school gardening:

1. All seven studies reported that students were delighted and highly motivated by the pleasures of gardening and the opportunity to get dirty outside and were excited by exploratory learning framed in a garden context (Alexander, North, & Hendren, 1995; Brunotts, 1998; Brynjegard, 2001; Canaris, 1995; Faddegon, 2005; Moore, 1995; Thorp & Townsend, 2001). (cited in Blair 2009, p. 21)

Contact with soil and nature was clearly a primary benefit for Yvonne. As a Grade 3 teacher at Edgewater, she connected the benefits to the urban situation:

...because we're situated in such a highly-populated area with very little green space I think it's an excellent experience for the kids to have—to be out there in our gardens, you know, touching the soil, handling the soil, learning about the soil and also the plants and all the systems that sort of bind everything together. So it's a really valuable opportunity for them to have.⁴

4.2.2 Curriculum, extra-curricular and cross-curricular connections to gardens

When asked what curriculum subjects connect most strongly to the garden for their program, eight out of 11 (73%) listed “science” first, and all 11 (100%) included science in their

³ Interview, February 18, 2014

⁴ Interview, April 3, 2014

answer. All together, 49 curriculum subjects were identified by the teachers (avg. 4.5/teacher).

Table 4.2.1 shows the answers in order of frequency (n=11):

Table 4.2.2.1 Percentage of respondents indicating that a particular subject connects to their desired use of the garden (N=11). Note: percentages are not cumulative; they reflect multiple category use.

Subject area	N	Percentage
Science	11	100%
Language	9	82%
Math	8	73%
Social Studies	6	55%
Cross-curricular	5	45%
Art	5	45%
Environmental Education	4	36%
Health	3	27%

DeMarco et al. (1999) found in their study which surveyed 236 Virginia teachers, *Integrating Gardening into the Elementary School Curriculum*, that 92.4% used the garden for science education, and 83.1% used the garden for environmental education. Math, at 68.6%, and Language Arts, at 67.8%, mirror our teachers' responses, as does Social Studies, at 51.3%. Health and nutrition (58.9%) and Art (65.7%) were considerably more popular in DeMarco (1999, p. 279).

Teachers named "Environmental education" and "cross-curricular" although neither are official subjects. Logically, since the Kindergarten curriculum is integrated, with subjects only recently mapped for Full-Day Kindergarten, the two Kindergarten teachers responded from that standpoint.

Although Environmental Education (EE) is not, strictly speaking, a subject, teachers listed both Science and EE as subjects with a strong connection to the garden, implying that EE is, in their minds, a separate subject. We will revisit this issue in Chapter 6, where an interesting debate among scholars is taking place on the relationship between EE and science learning.

All teachers listed “science” as relevant to gardening, and 4 out of 11 also listed EE. In addition to the subjects mentioned, teachers also included strands within subjects, such as “five senses,” “patterns,” “local and international trade,” “cooking,” “culture,” “systems thinking,” and “citizenship.”

Following the discussion of gardening and curriculum connections, respondents were asked to describe the benefits of the school garden as primarily curricular – or primarily extra-curricular. (Those who were inclined to respond “both” were prompted to choose one or the other to better define how the garden fit into their own programs.) This was the only close-ended question. In all, 45% (n=5) felt it was curricular, 45% (n=5) felt it was both (could not choose), and only 9% (n=1) felt it was extracurricular.

For Ines, the learning benefits were curricular, but she expressed that the garden itself feels like an add-on, and she noted that she has not figured out how to work it in to her overall program. Laura, an Edgewater teacher with a split Grade 1/2 class, felt it was extracurricular because “it’s broader than just the curriculum.”⁵ Two teachers expressed great discomfort at having to choose, noting that they disliked the question or the paradigm.

Naomi, Grade 5 teacher at Edgewater and one of the two who has been at the school for the entire time (8 years) of garden partnership with our group, felt that it was at first curricular, but also extracurricular because it connected the kids to their community, and “it’s fun, so a great

⁵ Interview, March 19, 2014

extracurricular activity, too... I think you can have a garden and make it part of your school day and make it part of your teaching. It doesn't just have to be a club.⁶

Teacher/researcher Fisher-Maltese (2013) with her colleagues in the Garden Committee, discusses how the garden-based curriculum should replace indoor curriculum, quoting a teacher in her study titled *Fostering Science Literacy, Environmental Stewardship, and Collaboration: Assessing a Garden-Based Approach to Teaching Life Science*:

So you don't have to do lesson 12-1, 12-2, 12-3, 12-4 in a science book, or whatever it is, because instead you're replacing those. So it's not in addition to. It's important to show people that it's not more work. It's just different work. It's a different way to teach the same objectives, the same big ideas, in an authentic manner, as opposed to just in the classroom. (p. 130)

The next set of responses analyzed was about the value of cross-curricular approaches to the garden. All teachers (100%) agreed that this approach was highly valuable, and preferred by many as a general practice, not just in relation to the garden. Laura noted that “science is the obvious link so that's the core but I think it's a natural extension to language (...) math can also be another extension.” Four teachers, Yvonne, Marie, Tanya, and Edward, felt that the garden is or could be actually a focal point for cross-curricular learning. This idea is reflected in the Berkeley, California-based Centre for Ecoliteracy's *Rethinking School Lunch* project (Center for Ecoliteracy 2010), where all of the core subjects are taught using food as the unifying principle, in gardens and classroom kitchens. However, Tanya pointed out that although the value may be “huge,” the ability to implement it is challenging:

⁶ Interview, April 7, 2014

I think it is the initiating it—... to have the time to make the links, to build a really solid sort of unit that would allow you to hit all of the checkboxes that must be checked off in order to do the report cards.⁷

Edward, however, prefers this style of teaching in general, because

otherwise everything gets fragmented and so you have to start with what you feel is something important that you're able to connect to different strands of the curriculum ... it's a more efficient way to use time.⁸

Naomi fleshed this out and drew a link between cross-curricular learning and experiential or hands-on learning:

... being able to integrate subject areas ... is really important, with the kind of weight of the curriculum that we have to deal with, being able to integrate is really important. ... The value of cross-curricular learning is that it lets children come at knowledge from different points of view, even multiple points of view for that child. So they're not just learning in one way. ... especially in the garden because it always has the hands-on component. It pretty much can engage any student ... give(s) them access to the curriculum from multiple points of view and different ways of demonstrating their knowledge.

Thorp and Townsend (2001) elaborate on this, and note that elementary teachers are often frustrated by the artificially constructed disciplinary boundaries:

... I have come to believe that the garden is a portal through the confines of disciplinarity. Corn seeds, ladybugs, children and pumpkins know nothing of these artificial confines. Elementary school teachers also feel closer akin to a way of knowing that cannot be subdivided into tidy categories. During a conversation I had with Carol she explained her frustrations with the current mandated curriculum, "We work with isolated content (math, science, social studies, language arts) that is handed down and treated like

⁷ Interview March 9, 2014

⁸ Interview February 18, 2014

secondary—separated content areas. The garden helps us draw connections across the curriculum, it is material to scaffold.” (p. 355)

Tanya expressed a strong desire to use the new social studies curriculum along with the “easy fit” of plants and soils in Grade 3 science:

Well, I’m lucky because I have Grade 3 so there’s absolute, clear definite links with half of the science curriculum for Grade 3, one of which is soils and the other is plants so it’s a brilliant link. However, I am really interested in looking at the new social studies curriculum and looking at citizenship and how we can draw a bigger picture around the importance of food growing and urban agriculture and know where your food comes from and connecting it in those ways and ideally, having an integrated curriculum where we also, our literacy is focused on writing and reading around the topic so I think it’s ... applicable all over the place.

Miller (2007) takes the position that environmental education is also cross-curricular:

The study of children’s gardens, when couched in terms of environmental education research, is by its very nature interdisciplinary. Environmental education is often linked with science education; however, it also requires understanding within economics, math, geography, ethics, language, politics, and other subjects. As nearly any subject can be taught in the integrated context of a children’s garden, so can environmental education concepts be integrated throughout the entire curriculum (Braus & Wood 1993; Disinger 1998, as cited by Miller 2007). (p. 15)

For Thorp and Townsend (2001) the goal is to reconnect children to *their own* nature as humans intrinsically dependent upon experience in the natural world;

The garden connects children to the organizing principle of experience. Our children are starved for experience. We are cutting children off from the very life forces that sustain us: earth, sun, rain, plants, and animals. They are sending us signals as they only know how, they wiggle, they squirm, they “act out” and tragically we medicate. In the garden children experience comfort, security, belonging, pleasure, and wonder associated with our experience of a living cosmos. (p. 357)

Indira, a Kindergarten teacher at Edgewater, was one of the teachers who named “cross-curricular” as the first curriculum subject in response to my question:

So I think if you look at kids, especially in Kindergarten we begin with things being integrated. They have no sense that math and visual art aren't interconnected as they are, and music and language are interconnected. So I only see a benefit in having it be cross-curricular just like the environment around us that we're, you know three-dimensional creatures. Everything we see is three-dimensional and our thoughts could be, you know three-dimensional.⁹

As an emergent theme, six out of 11 teachers expressed that hands-on learning was a valuable method for learning. The value of hands-on or experiential learning is expressed in the literature. Graham et al. (2005), assessing garden-based programs for their academic benefits, found that:

Engaging, hands-on learning activities incorporated into subject matter are key components of experiential education in which environment-based education programs have been employed, emphasizing the development of lifelong learning skills, such as problem solving and critical thinking. These programs use a multidisciplinary approach to educating students and have been shown to increase test performance, attention, and enthusiasm for learning and to decrease discipline issues in the classroom. (Graham 2005: p. 150, citing Lieberman and Hoody 1998)

In her case study of two Midwestern elementary schools, Martin (2011) found that teachers, administrators and students all valued hands-on learning. She postulates that “theoretical implications of the hands-on learning experience associated with garden-based nutrition education may be a missing link in the current understanding of how gardens improve students’ fruit and vegetable intake.” (p. 50)

⁹ Interview April 24, 2014

4.2.3 Types of Support Needed to Realize School Garden Benefits

In response to the open-ended question, “What support do you need to realize the benefits you’ve outlined?” teachers provided examples which are categorized and ranked in Table

4.2.3.1.

Table 4.2.3.1 Types of Support needed to realize the benefits described, N=11.

Note: percentages are not cumulative; they reflect multiple category use.

Types of Support Needed	N	%
Education, garden expertise, practical support	9	82%
Outdoor learning generally, tips & techniques	4	36%
Parent support (intellectual)	4	36%
Adult support – physical, in garden (parents, volunteers, EA, etc.)	4	36%
Garden Buddies (model of younger & older children partnering eg. Reading Buddies)	3	27%
Community Partner	3	27%
Summer Maintenance	3	27%
Teacher Community eg Professional Learning Community	2	18%
Administrative and Caretaking	2	18%

Logically, some of the Edgewater teachers interpreted this question as directly relating to the support our organization provides. These comments will be examined in our discussion of community partners. While administrative and caretaking support was not ranked high on this list, it should be remembered that in both schools the administrative and caretaking support was a given, at least for the current year. Notably, only 3 of 11 teachers specifically mentioned a community partner as an example of the support they felt they needed, and these three were all at

Edgewater, where the community partner operates. However, high on the list of responses are many elements of what a community partner may bring, for example, more adult support to get the children into smaller groups (Indira, Ines, Tanya), and practical support and education on gardening, eg. when and what to plant, what is a weed (Tanya, Edward, Nora, Evelyn).

Dobbs, Relf and McDaniel (1998) found that 77.9% (N=254) of K-6 teachers in their Virginia study felt additional training would facilitate incorporating gardening into curriculum.

In her evaluative review of 20 studies, Blair (2009) found that:

Both preservice and in-service teachers need more training to effectively use gardening as a teaching tool. Teachers are the mainstay of school gardening. However, gardens require embedded support mechanisms that lighten the teacher's burden. (p. 35)

When specifically asked, "How important is the ratio of adults to children when teaching outdoors in the garden?" 82% (n=9) said it was important, one said it was not important, and one said it depended on the tasks. DeMarco (1999) found that "(a)ccessing adequate volunteer help was selected by teachers as one of the ... most essential [success] factors... volunteers were needed to provide an adequate adult to student ratio when students were engaged in school gardening activities..." (p. 279). This is one of the key contributions of a community partner in our case (providing adult staff and volunteers to increase the adult-child ratio); thus, interestingly the two teachers who did not believe the ratio of adults to children was important or that it depended on the tasks are both Edgewater teachers. This may suggest that with more GBL experience, the ratio of children to adults is less of a barrier.

In response to the open-ended question, "What types of professional development opportunities would be useful?" there were a range of responses. Eight teachers gave 14 suggestions. Three suggestions were having guidelines by grade and season, eg. how-to guides. Three thought that visiting other school gardens would be helpful. Two teachers felt that lesson

plans and curriculum resources are needed. Two said internet-based networking would be helpful. One said a full-day PD session that is “big-picture and inspirational” would be her preferred type of PD, but prefaced that by saying that only with release time would it be feasible. Tanya wanted PD to be *not* just one-day and inspirational, because

I think a lot of teachers will enjoy that but if they're not right on the edge of being able to do it they will go away feeling fantastic and will probably not get it together. ... I think the key to effective professional development is that it is available at a number of places in a learning cycle.

Nora felt that PD should carry some accountability for teachers and include support going forward. Teachers should already be committed to the garden and know that “this is something that’s going to be part of the school structure.”¹⁰

4.2.4 Barriers to using a school garden

This question was open-ended, “What do you feel are the barriers to using a school garden?” Table 4.4.1 shows the responses in order of frequency. Unlike most previous questions, the answers differed considerably by school.

Table 4.2.4.1 Barriers to using a school garden

Note: percentages are not cumulative; they reflect multiple category use.

Barriers	All %	N=11	Edgewater %	N=6	Newcombe %	N=5
Summer maintenance	64%	7	18%	2	100%	5
Lack of knowledge	45%	5	33%	2	60%	3
Lack of time, need to plan unit to use garden	45%	5	67%	4	20%	1

¹⁰ Interview February 19, 2014

Logistics, outdoor readiness, classroom management, garden size	36%	4	33%	2	40%	3
Startup siting, permission, money for materials	36%	4	33%	2	40%	3
Parent, caretaking and administration buy-in, and community support	36%	4	33%	2	40%	2
Scheduling, communication between stakeholders	27%	3	50%	3	0%	0
Maintenance, watering	27%	3	0%	0	60%	3
“Can’t think of any”	9%	1	17%	1	0%	0

The highest frequency response was “summer maintenance”, and notably from the teachers in the school without a community garden partner. During my interviews, conducted in late winter and early spring, hopes were expressed that the day care at Newcombe would pick up the summer maintenance but there had been no clear commitment.

Summer garden work, while important to teachers in our study, is barely mentioned in the literature, and when it is, it is mostly in passing. I suggest that there are at least two reasons for this: first, most of the literature is focused on ascertaining the school year benefits, such as the academic, social, food and nutrition-related benefits for students. Second, most research is from the US, where both the climate and the political support are different. Parker (2012), a Canadian educator/researcher, discusses the summer season in school gardens:

The very nature of a garden can be one of its biggest issues in a school setting. Undoubtedly, a garden requires much care and attention in order to flourish. As well, it is the nature of the North American climate that most of the food which is grown in gardens matures and ripens in the summer months. The months of July and August obviously coincide with the summer break for elementary and secondary students, which can

present a huge challenge for upkeep. In fact, one study found that in Canada 41% of 1000 outdoor projects were abandoned due to difficulties maintaining the site (Kail 2006 as cited in Gaylie 2009 p. 131). This begs the question: who will take care of and tend the garden during this break, and also during the months when students are in school? (p. 45)

Moore (2012) seems to downplay the summer season: “community involvement is important to make sure that gardens are maintained. In Tucson, though, the summer is not as important a growing season as it is in more temperate areas.” (p. 256) This would suggest that with the longer growing season in the southern US, it is easier to design the garden for spring and fall production, and allow for summer fallow.

The next barrier cited was lack of knowledge. This is reflected in the “supports needed” answers, where 82% (n=9) teachers wanted more practical tips and gardening education. There is a slight difference between schools here as well: a higher percentage of Newcombe teachers expressed this feeling. Evelyn, a Newcombe Kindergarten teacher, wanted more specific information on safety, in terms of soil and plants, for her students:

Like knowing what types of soils are okay for Kindergarten students because their immune systems are still developing - we probably need to be aware of that and also plant safety and edible plants versus non-edible plants. We'd really need to learn about that too because my students like to put things in their mouths and I think that should be part of the experience.^{11,12}

The next barrier cited was time: here in relation to the time required to plan and execute garden lessons. Five out of 11 teachers described this as a barrier. More Edgewater teachers found it a barrier than Newcombe (67% versus 20%). This could be because of the greater

¹¹ Interview February 18, 2014

¹² Evelyn's concerns certainly echo comments I have heard over many years of urban gardening. “How do we know that the soil is safe to eat from?” is a common question. This speaks partly to an awareness of our disconnection from our food – how do we know that any of our food was grown safely? My advice is usually to ensure that a soil test has been done to identify any toxins or heavy metals, and if concerned about airborne pollutants, to wash produce before eating, as you would any produce from the grocery store.)

amount of collective experience – even with a community partner, finding the time for the garden is still considered difficult. It is also possible that Edgewater teachers have developed more appreciation of the potential for garden-based learning, and that the bar is higher in their minds. Further research would be necessary on this question to draw any conclusions.

On the question of time, there is some overlap with the question of maintenance and watering – some teachers (3/11, all at Newcombe) mentioned the difficulty of finding time for maintenance and watering. Tellingly, there is a difference between the two schools on the specific point of maintenance and watering, since GTGK contributes a great deal of this type of labour at one school and not the other. I believe this was an underlying reason why Laura from Edgewater could not even think of a single barrier – she thought for awhile and then said perhaps some teachers would have trouble finding the time to schedule a workshop with GTGK.

Time, and the tension between the garden and other school priorities, is actually a major theme in the literature. Graham et al. (2005) surveyed California principals in schools (n=2,381) and found that “the factors that most limited combining classroom instruction with gardening were (a) lack of time, funding, staff support, and curricular materials linked to academic standards; and (b) lack of teacher knowledge, training, experience, and interest in gardening.” (cited in Blair 2009, p. 32). In this study, teachers were found to be largely responsible for the garden. “It is not surprising that time is considered a major barrier when the greatest percentage of responses shows that teachers are responsible for the garden. This can be a tremendous burden on an individual who already has significant responsibilities associated with duties as a teacher. There is a need for strategies so that volunteers and community members are used more effectively to relieve teachers from time spent focusing on garden responsibilities.” (Graham et al. 2005).

A barrier for 5 out of 11 teachers is a broad category of practical concerns. Grouped under this heading are logistics, outdoor readiness, classroom management and garden size. Ines and Indira from Edgewater shared their concerns. Ines discussed creating a routine around the garden, minimizing transitions. Indira, one of the teachers using the garden both with and without our community partnership support, said that communication with parents so that children come to school outdoor-ready was a barrier. Edward, Evelyn and Marie from Newcombe had similar concerns. Edward felt that classroom management outdoors could be a barrier, although he had not experienced it as such yet - “once you’re out of the classroom it’s taking (you) a little bit out of your comfort zone.” He imagined he would need to make some new rules and that “when they get outside ... they think of it as playing rather than learning.”

Evelyn mentioned the logistics of getting her class out to the garden from the second floor of the school. For kindergarteners, this is clearly a concern that could be addressed by a better ratio of adults to children. Marie felt a barrier was that the school garden may be too small, presenting difficulties in sharing the garden space with more classes. This runs counter to some of the how-to literature which stresses “start small” in order not to have maintenance issues, but Marie’s experience showed her that garden space is actually a primary resource for student engagement, and without adequate space, multiple classes cannot use the garden for instruction. (The garden, two raised beds, approx. 4’ x 8’, had been installed some years prior and Marie was the first to animate it for some time.)

The issue of stakeholder buy-in was identified by 4 teachers, two at Newcombe and two at Edgewater. Nora, the Library/Resource and Special Education teacher at Newcombe, named “teacher buy-in definitely, administrative buy-in is a big one, and then again, volunteer buy-in, right? Is it something that the community wants? Is it something that the third-grader

community is going to support?” Ines from Edgewater was not sure that parents accept the garden as a legitimate place of learning, but Indira, also at Edgewater, expressed the thought that if parents are not always supportive, it is because they learned in very traditional classrooms:

So I think for some parents there’s a strong value in obviously pencil/paper work and certain kinds of rote learning; that’s how many parents themselves were educated so having that shift I think we have a ways to go ... But I think the onus is on the teachers to actually show the kind of learning that can happen [outdoors].

Other practical issues such as money for garden construction, garden siting, and permission were barriers perceived by 4 teachers, 2 in each school. Research by Skelly & Bradley (2000) surveying 71 Florida teachers found that only 27.4% of school gardens were funded by the school, while grant funding covered 49.3%, teachers’ personal funds were used in 52.1%, and donations supported 69.9% of school gardens. In Canada, a study commissioned by Evergreen (2001) found that much of the funding for outdoor greening projects comes from outside the school.

Scheduling and communication was identified as an issue only at Edgewater, where the community partnership is active, and 3 out of 6 teachers, a significant portion, identified this as a concern. With a community partner organizing student access to the garden via communications with individual teachers, there is a risk that teachers using the garden without the partner will find it already occupied by a class when they arrive. The need for teachers to share an information platform with each other and/or the community partner is highlighted by this response.

4.2.5 Policies that enable school gardens

The next two questions related to policy. There is a perceived shift in the mood here:

from subjectivity and interpersonal relationships built around the garden, and the memories of rich, vibrant experiences with students, to a sense of formality, distance and institutional scale. The first question dealt with policies that support school gardens. Table 4.2.5.1 shows the weight and distribution of answers. There was little difference between schools.

Table 4.2.5.1 Teacher Awareness of Enabling Policies

Note: percentages are not cumulative; they reflect multiple category use.

Enabling Policies Awareness	All %	N=11
Aware of and named policy, policy framework or regulation	18%	2
Named Ecoschools	9%	1
Named Acting Today, Shaping Tomorrow	9%	1
Named Evergreen (TDSB partner which offers grants for school greening)	9%	1
Named California (where a policy of A Garden in Every School exists)	9%	1
Responded negatively to question	18%	2
Don't know or not sure	55%	6

Two teachers responded negatively to the question, one saying she had no interest in policy, and the other saying “I’m not a policy person.” But two others were very intrigued by the question, and wanted more information. Anna, a grade 2 teacher at Edgewater, who has also been at the school since the gardens started, mentioned that the existing policy on Daily Physical Activity could be utilized in the garden, if students were engaging in activities such as “pretty

heavy gardening, mulching or carrying buckets of water”.¹³ Naomi said it “would be great if there was more policy support for school gardens ... [if] they were promoted more actively at a board level and ... even at a provincial level.” Naomi expressed an understanding that with policy supports, some of the barriers to school gardens might be overcome, through increased status for GBL as a teaching method. Overall, teachers had little awareness of enabling policies. Policy seemed to be perceived as something exterior to the lived reality of teaching, rather than a guide or framework within which one teaches.

4.2.6 Policies that discourage gardens

Most teachers (82%, n=9) were not aware of any policies at the school level that discouraged school gardens, since they are all involved in the use or creation of them. (There was no difference between schools on this question.) However, 55% (n=6) conjectured that if there were such policies, they would be related to safety or to caretaking responsibilities. For example, ratios and outdoor safety, student allergies or sensitivities, regulations about built elements in the garden, products used in the garden, and access to water were all thought to be potentially the stuff of discouraging policies. Naomi voiced the thought that “if caretakers aren’t supportive they can use policies to bolster their lack of support.”

Indira was aware of garden restrictions from the school board and Evergreen, which offers garden grants in partnership with TDSB, including installation of hard elements, signage, native plants, soil and lumber, but stated that “it’s definitely not something that prevails when teaching.” Her awareness stems from participating in grant writing.

Policies discouraging gardening in the Toronto District School Board (TDSB) were outlined in the report authored by Green Thumbs Growing Kids (2013), such as policies at

¹³ Interview, April 9, 2014

TDSB's Caring and Safe Schools Department that prohibit vines growing on fences and lower branches of trees being cleared to keep sightlines in the yard (GTGK 2013). However, these policies have not been adhered to even in the Green Thumbs Growing Kids' school partner gardens, so enforcement is locally variable¹⁴.

4.2.7 School Culture/Ecoschools

Understanding the effect of school culture as it relates to school gardens was an emergent objective of my study. School culture— an undefined quality – seemed to determine whether or not teachers felt supported in school gardening. Passy (2014) cites Daly (2008) who claimed there were 156 definitions of the concept by 1952 – and argues that rather than being “shared vision and common values,” school culture is better described as a “zone of polycultural contestation and ideological settlement.” (Passy 2014, p. 33) Depending on the specific tensions at play, it seems that the definition could lie somewhere in between. Within our theoretical framework of Social Cognitive Theory, teachers who feel that the school culture supports their use of the garden for student instruction may be more willing to act on their internal motivations, especially if other teachers are also doing so, which would in turn increase their self-efficacy, and lead to more collective efficacy. Thus, using SCT, we can propose that some school gardening could lead to more school gardening, and a more accepting school culture. On the ground, however, results can be mixed, and gardens can take many years to develop.

Responses to the question about school culture showed an emergent linkage between the Ecoschools program and the school garden. With each school having been recently certified at the Platinum level, with the highest status in the Ecoschools program, there was considerable overlap between teachers involved in Ecoschools initiatives and teachers in our garden study.

¹⁴ Participant observation.

While no questions were specifically asked about the goals of the Ecoschools certification program in relation to the goals of the school garden, it became evident that teachers have a range of opinion on the connectedness and shared or divergent goals of each. The generalized “school culture” question, “How does/would your school culture support the garden project?” allowed teachers to answer from that nuanced space.

The Ecoschools certification program assesses schools in six areas: Leadership and Teamwork, Energy Conservation, Waste Minimization, Vibrant School Grounds, Ecological Literacy, and Healthy Communities. As the originator of the now-provincial Ecoschools program, the Toronto District School Board is a leader in integrating this non-mandatory certification approach.

Ecoschool certification must be annually renewed. Explicit support is given through the awarding of points for food gardening, perennial gardens and composting. Edgewater teachers expressed how important the Platinum certification is to the principal there. Newcombe had a new principal so the commitment to the program was unknown at the time of my interviews.

In answer to the question about school culture, 36% (n=4) of teachers mentioned Ecoschools first. Ecoschools was included in the answer in 55% (n=6). This was followed by comments by 55% (n=6) that Ecoschools certification is part of the school culture, and thus the gardens were supported by the school culture. Anna’s comments represent this:

Interviewer: Does the school culture support the school garden, and if so, how?

Respondent: I’d say some on one side and some of the other side. So it does support—so our school culture—I think because we’re an Eco-School and we’ve been trying to maintain our Platinum status the garden is obviously a big part of [that] ... it’s one of the ‘look-fors’ in the process. [They ask] what are your school grounds like? What do you do with them?

I think the kids here are somewhat aware of things like garbage and trying not to waste stuff and composting and as we've been trying to run the compost program for many years now and doing different things with it and so they're very aware that there is a garden out there and the compost goes in it and food comes from that.

However, she noted that not all teachers were “into the environment” and in that sense, Ecoschools and the garden were not as integrated into the whole school as they could be. Nora was more circumspect about the reach of the Ecoschools program:

Well, I just feel like, you know sometimes it's not part of the school culture. It's part of the principal's culture and 'x' and 'y' is shown to get Platinum but it doesn't necessarily mean that children know what is recyclable and what isn't, or how to reduce ... It's not mandatory.

The question of whether environmental education, supposedly mandatory, has become *de facto* implemented by Ecoschools, a voluntary, extracurricular program, will be examined later.

4.2.8 Importance of Food Production

One of the final questions in the interview, “how important is food production in the school garden?” elicited a range of responses. The question was open-ended but was coded to three possible answers, “very important”, “important” and “not important”. Only 2 teachers thought it was “very important,” one from each school. Table 4.2.8.1 illustrates the responses.

Table 4.2.8.1 Importance of Food Production

Importance of Food Production	N=11	All %	N=6	Edgewater %	N=5	Newcombe %
Quite important	2	18%	1	17%	1	20%
Important	6	55%	2	33%	4	80%
Not important	3	27%	3	27%	0	0%

Food is important or very important to most (73%, n=8) of our study respondents. However, it appears to be less important overall to the Edgewater teachers compared to Newcombe teachers. Reasons given for its importance include: taste (use of all five senses), educating about seasons, educating about plants and in particular the fruits of the plants, validating heritages, a healthy diet, and a summer-time draw. No teacher expressed the value of the food production as being connected to the school lunch program or any other feeding program. The process of growing the food, and experiential learning, were considered more important.

Tanya expressed the importance of food as part of students' self-awareness:

Interviewer: And how important is the food production part of the garden for your students, do you feel?

Respondent: It's funny because part of me would like to say that it's about growing anything but I think there's something quite powerful and special about food because I think it has become such a mystery to people generally about where their food comes from. And I have a vivid memory of some kids at a former school that I was at had seen a radish pop its red head above the soil and the shock and excitement about understanding that they had actually generated food that they could eat. I think it was—I think it really helps them to tune into the relevance of the living cycle of plants to their own lives and to the creation of something that then becomes part of their living cycle or very immediately part of their living cycle. They get it, right ... Kids ate radishes that would never have eaten radishes before.

Other teachers described why edible produce carried meaning for children. Naomi brought up the value of student's agency in producing the food; she also highlighted education

about local food and seasonality being of importance to the largely immigrant population. In addition she saw value in validating children's experience with farming from their home countries, as did Edward, who also saw the food production as encouraging a healthy diet. Nora said that not only does the garden offer beauty, "you also get something in return, vegetables or herbs or what have you. So I think it's a very rich thing to do in school." Marie thought that the community engagement, in particular the summer draw, would be the edible produce. Evelyn noted that to reach all five senses, a long-standing component of Kindergarten curriculum, one needed ways to integrate the sense of taste with other sensory explorations – only possible in the edible garden. However, contrary views were held by another Kindergarten teacher, Indira, who felt, as did Ines, that stewardship and engagement with the soil was more important than food. Indira said that food was more of an adult interest, and that food production is still abstract for Kindergarteners who might find more of immediate interest in digging for worms.

Bell & Dymont, in their study of Canadian school grounds (2006), found that about one-third of the garden projects they surveyed grew food (35 out of 105 respondents). Of those, 80% reported using the food garden as a deliberate strategy to promote nutritional awareness among students (Bell & Dymont 2006, p. 39).

Nevertheless, the amount of food provided by the garden, unless the garden is very large, will not impact evenly on student nutrition overall. Some children will consume small amounts of nutrient-dense foods, or a large amount irregularly, but this is not likely to register as a "feeding" program affecting healthy diets or nutrition. However, it demonstrates the value of tasting and exposure. Blair (2009) makes an important point about seasonality in temperate regions:

To decrease the threat of the obesity epidemic, children need to broaden their perspective on what foods are edible and to repersonalize food. Gardening in America's northern

regions during the school year requires elongating the growing seasons in both spring and fall, thus stretching children's knowledge and taste for cool-season vegetables, particularly for dark leafy greens. Because of our supermarkets' global reach and constant supply of heat-loving vegetables, many cool-season crops remain unfamiliar. For more ecological, local food systems to satisfy year-round vegetable needs, children's tastes in food need to expand beyond the fatty, salty, sweet, and subtropical (Blair 1996, cited in Blair 2009). (18)

Edward thought that food production would add quite a bit of pride to the garden project:

Well, I think that ... the more successful in terms of growing food—I think it would make everyone feel good about ... the garden although I know that, ... probably if we're just starting something then you know we'd probably start small and ... take pride in whatever we can produce.

But I know the feeling that I got when I, ... whenever I've been growing a garden you feel good ... if you have a crop and even if you can start sharing it and giving away things to people ... so I think it would be really great and I think the children would, you know get really excited about that aspect of it ...if they'd been successful and we've grown some things.

Not all teachers thought food growing was critical. For Ines, it's more about stewardship and engagement. Anna said it depended on her class; some classes seemed to care as a group more than others. Even for Naomi, who rated food growing “important”, it was more about the element of agency than the food production itself.

4.2.9 Teacher affect

This was an emergent theme in the study. Using SCT, we recall that social, environmental and personal motivations are all interdependent in order for change to occur. In the literature and in the present study, most respondents are teachers who are already interested in gardening. Thus, increasing the social and environmental opportunities to enact their interest

is likely to lead to change.

Dobbs, Relf and McDaniel (1998) report on receiving responses from a broad-based survey sent to principals of 100 randomly chosen schools in the state of Virginia, and asked to distribute the questionnaires randomly to teachers without concern for prior expressed interest in gardening (Dobbs, Relf and McDaniel 1998). They received a 34% response rate (n=337). Of those, 13% were not interested in using horticulture or gardening in the classroom and 88% were interested. However it is likely that teachers with no interest would also simply have not returned the questionnaire. Nonetheless, within the group of interested teachers, most (87%) indicated that they gardened at home or at school and that most (85%) currently used plants or seed in their classrooms (Dobbs, Relf and McDaniel 1998).

Thus, teacher interest, especially given the non-mandatory nature of school gardening, is a critical ingredient in school garden success. Laura and Ines both referred to their own childhoods as an example of why they sought benefits for their students through gardening. Ines grew up in a rural community, in forested land. Laura had a garden growing up:

... the school is very much a hub of the community and having a garden here allows the kids to experience what many of us experienced as children and took for granted, having our own gardens.

Edward, with 20+ years of teaching experience, commented that:

I think a teacher can only teach things well if you can be passionate about what you're doing so you have to find a way that, to make everything work for you.

Indira discussed finding real meaning in the garden:

I think the large picture is obviously taking care of the planet and ... emotional and mental health and for really bringing real meaning to your day in whatever capacity, engaging with living things beyond our fellow human I think is really, really important.

Greenwood (2010) reminds us:

No matter how scientifically rigorous, politically informed, or culturally responsive, environmental education is barren if it does not include re-enchantment with the wide world of creation, encounters with the others, and gratitude for the gift of life. (10)

It's important for teachers to be moved by their own sense of wonder in order to engage with the garden as a teaching tool. Teachers' knowledge and skill as gardeners is less important than their willingness to try to bring their class to a garden bed and see if they can create meaning through experience. However, the development of gardening skills would also increase students' and teachers' self-efficacy in the garden, and this would promote more school gardening through the sharing of these skills across ages. SCT reminds us that internal, personal motivation needs to be matched with social and environmental enablers. At the same time, if the social and environmental enablers are already present, new personal motivations may arise among both teachers and students.

Wistoft (2013) develops the idea that passion for the subject matter is critical for students to learn. Unravelling the mystery of how students respond so well to a gardening and cooking program, she posits:

In the Gardens for Bellies programme, the instructors show their love for nature, the soil, crops, and food in personal and different ways—they do not all love the same thing, and they each act from their own personal passion. ... But just as it is not enough to talk of one's love, it is not enough (from a systems-theoretical point of view) merely to feel it. The passion must become part of the system's self-referentially coded communication. In this case, the passion is doubled by the passion to communicate the passion, as one instructor says:

My teaching is my passion for showing the pupils my passion.

It is here, in the way life and passion are brought together, that the most important elements in the instructors' identity are created. (p. 137)

In this way, teacher affect is very important to student learning, and this is doubly true in school gardens, where teachers' own interest in the subject matter supports their confidence with their students in the outdoor environment, away from the "comfort zone" of the classroom, as Edward put it.

Gardens can increase teacher collaboration (Thorp 2006). This supports the social enabling factors at work in SCT, where the social modelling of a behaviour supports increased personal activity and hence the development of environmental support in reciprocal triadic determinism (Bandura 1986). At Edgewater, the development of the gardens has increased teacher engagement overall with using the outdoors for student instruction, and fostered self-organization among teachers for collaboration. A group of 16 (8 teachers, 7 Early Childhood Educators, and gym teacher) Kindergarten-level teachers, within the school, has met and inaugurated a structure to set in place strategies for using the outdoors.¹⁵

At Newcombe, teachers planned to "buddy up" – Grade 3 with K and Grade 3 with Grade 1, to create a mentorship program with their students similar to the Reading Buddies program designed along these lines. This supports the SCT premises on cognitive development, including language ability, observational learning, purposeful behaviour and self-analysis (Bandura 1986). The teachers understand that having a mentorship program could support their goals of bringing the children out to the garden for experiential learning together, and that developing new efficacies, personally and collectively, can arise from this action.

4.3 School Garden Surveys

Three recent online surveys are useful for validating some of the data above. Our organization, Green Thumbs Growing Kids, is part of two larger initiatives through which

¹⁵ Interview with Indira, April 24, 2014

surveys were distributed in late 2013 and early 2014. The initiatives, Imagine a Garden in Every School (IGES), and the Ontario Edible Education Network (a project of Sustain Ontario) (OEEN), each conducted surveys to learn more about school food garden practices in Ontario. The OEEN survey was part of a larger one on school food more generally. The researcher has reviewed the respondent information from the two surveys and eliminated any duplicate responses. The third survey was part of an organizational evaluation carried out by post-secondary students completing their practicums with Green Thumbs Growing Kids (GTGK), getting teacher feedback about programs in the school garden and greenhouse.

4.3.1 Online School Gardening Surveys 1 & 2, 2013/2014 (Harrison-Vickars 2014, forthcoming)

	Survey 1 – OEEN N=21	Survey 2 – IGES N=34
Using garden to grow food	95%	85%
Length of time operating = less than 5 years	71%	74%
Goals: increased access to natural environment & outdoor activities		79%
Goal: increased access to healthy foods and nutrition		79%
Food produced each year: 0-100 lbs	25%	84%
101-500 lbs	25%	13%
501 – 1000 lbs	25%	3%
1000+	25%	0%
Who do you see as the main driver(s) of your garden?	Students - 4	

	School Staff - 10 Volunteers - 1 NGO - 4 Other: Daycare food provider (1) Parents (2) Paid garden educator (2)	
How has your garden affected your school and/or surrounding community?	See Appendix A	Many positive affects described, most in relation to children and youth but also seniors. Students are seen to engage with the food gardens particularly, and observers cite increased willingness to try new foods, children’s inquiry re origins of foods, etc. Impacts on parents and teachers also noted.

In the surveys, as in our interviews and literature review, food is important or very important component of the school garden. However, it was considered equally important to connecting children to nature in the IGES survey, where the question was directly asked. Food produced falls mostly in the <100 lbs category, demonstrating that produce yield is not the primary outcome, with only a couple of notable exceptions. School staff are the drivers of most of the projects, which is supported by the literature and by teachers in our Newcombe case. Most projects were fairly new.

4.3.2 Teacher survey – Green Thumbs Growing Kids 2014 (GTGK 2014)

An anonymous online survey was distributed to 36 teachers with whom GTGK worked over the last year via Survey Monkey; response was n=9 (25%). Questions asked on the closed-ended survey corroborate some of the interview responses. I include excerpts here which mirror two of the interview questions in our comparative case study, and include the full survey and results in Appendix B.

Q4. I would attend professional development relating to the school garden programs

77% of teachers surveyed said they would attend professional development (PD) related to the school garden.

Q5. I find the school garden most useful for:

A. Teaching the curriculum

B. Extracurricular activities: (choose one)

78% of teachers surveyed found the school garden useful for teaching the curriculum.

22% of teachers surveyed found the garden useful for extracurricular activities.

This data supports our interviews and the literature in that most teachers were interested in PD relating to the garden. The majority of teachers used the garden for teaching the curriculum.

Chapter 5 Policy landscape for school gardens

In considering the policy landscape that affects the school gardens in our study, we find four areas of policy to examine: 1) Environmental Education, including in the Ontario Curriculum, 2) Comprehensive School Health, 3) School Food and Food Literacy, and 4) the Toronto District School Board's garden policies. Each of these policy angles was deemed important for my study because they directly include or impact on school gardens at some level.

5.1 Environmental Education

At the end of the UNESCO-declared Decade of Education for Sustainable Development (2005-2014), citizens of countries including Canada should be assessing the state of environmental education within their borders. Following on the UNESCO meetings in Belgrade and Tbilisi, Canada and Ontario are directed to provide 'education for sustainable development' at all levels (UNESCO: Belgrade Charter 1975, Tbilisi Final Report 1977). Of particular relevance to young children in their own communities is the following from the Tbilisi Declaration (1977) that environmental education should:

relate environmental sensitivity, knowledge, problem-solving skills, and values clarification to every age, but with special emphasis on environmental sensitivity to the learner's own community in early years (p. 27)

Environmental education in Ontario is mandated, some argue loosely, by *Acting Today, Shaping Tomorrow* (ATST) (Ontario Ministry of Education 2009). Since restructuring the education system throughout the 1990s, the Ministry of Education centralized curriculum content which had previously been the purview of individual Boards. However, the Ministry did not centralize policy-making on matters deemed to belong to Boards. Thus, ATST is referred to as a

“policy framework” – not actually a policy. It is up to individual Boards to pass policies to implement it. Boards may differ substantially in how they interpret ATST’s local relevance.

School gardens are widely understood as a tool for environmental education, and certainly fall within ATST’s “vision”:

Ontario’s education system will prepare students with the knowledge, skills, perspectives, and practices they need to be environmentally responsible citizens. Students will understand our fundamental connections to each other and to the world around us through our relationship to food, water, energy, air, and land, and our interaction with all living things. The education system will provide opportunities within the classroom and the community for students to engage in actions that deepen this understanding. (p. 6)

In ATST, notable as actions to be undertaken by the Ministry of Education:

- promote links between formal education systems (e.g., the school system) and non-formal education systems (e.g., non-governmental organizations), (...)

School boards will:

- encourage environmental learning for all students inside and *outside* the classroom, (...)

Schools will:

- encourage all students to participate in environmental education activities *on school grounds*. (p. 15-16) (*Emphasis added*).

The issue of school grounds investment or lack thereof highlights the status of ATST as a working policy framework. No funding is yet allocated through the funding formula for school grounds. Boards are on their own determining how to allocate existing general Ministry funding to cover the costs of maintaining their school grounds. When Full-Day Kindergarten was instituted, some schools, and in one case an entire school board, decided to invest in school grounds with their capital allocation, as detailed in this September, 2014 Globe and Mail story by Caroline Alphonso:

The Simcoe [District School] board in Ontario is building outdoor classrooms with funding – about \$8,000 per school – provided by the Ministry of Education to support the implementation of full-day kindergarten. School boards were given flexibility on how to use the funds and Simcoe decided to use the money in a way that all students, not just those in the kindergarten program, could benefit from play-based learning.¹⁶

Curriculum itself is a form of policy, in that it determines what children learn and when they are supposed to learn it. Whether environmental education is actually infused into curriculum is debatable. While the Science and Technology curriculum released after ATST is a vast improvement over its predecessor, there is still a feeling among teachers expressed in the current study and elsewhere that environmental topics in the science curriculum are an add-on and that teachers can pick and choose whether or not to integrate environmental learning. Nora comments:

...they give examples of soil degradation or ... pollutants in the environment and so on. But those feel like suggestions... [it] suggests that it's not important – or it's information that you can just disregard or substitute your own ideas for. ... It's one thing to have all that curricula – but then, what do we do to support that?

The Canadian Council on Learning reported in 2009 that studies show:

Many teachers are reluctant to address environmental education and name various reasons for avoiding environmental topics, including; lack of resources, inexperience, lack of confidence and insufficient support.... In recent years, an overloaded curriculum and emphasis on testing and standards were added to the list of reasons that prevent teachers from spending too much time on “extra” topics such as environmental education. (CCL 2009, p. 3)

¹⁶ <http://www.theglobeandmail.com/news/national/education/schools-looking-outside-to-inspire-students/article14488735/>

5.1.1 Environmental education curriculum in school gardens

As our study's teachers indicated, the Ontario Science and Technology curriculum contains the most links to the school garden compared to other curriculum subjects. The literature is also strong on this point, generally indicating a high degree of congruence between science education and garden-based learning.

Yet while science instruction, including living things, ecosystems, plants and soils, water and other life-system strands are an obvious fit for the school garden, and could fill the garden program on their own, gardens also offer tantalizing pathways into social and artistic endeavours. Language and mathematics are made important and real, through measurement and signage that interprets and reflects the garden activities back to students, and through poetry and artwork the garden inspires. While there is no single garden curriculum, garden educators can draw on many resources and some have learned to let nature be the teacher (Thorp 2006). Secondary science teacher John Sherk went so far as to raise chickens in his Scarborough garden:

The whole point of environmental education is to help people encourage conditions that foster life... becoming aware of ourselves as living creatures, the relationships we have with other living creatures, and what living creatures in general depend on for a healthy and happy life and survival is, I think, a very important part of education. (Houghton 2003, p. 59).

Bucher (2012) introduces her study of garden educators in Philadelphia and Havana:

In both cases educators explain their own perspectives on school garden programs by drawing on 'pedagogical gateways,'... In situations where they must overcome contextual barriers to garden implementation, these pedagogical gateways assist teachers in gaining administrative and community approval for their choices and actions regarding garden education. (p. 25)

The science and technology curriculum, particularly for Grade 3 and Grade 6, provides such a “pedagogical gateway”. The study in Grade 3 of plants and soils, and in Grade 6 of biodiversity, allows garden and food educators to zoom in on the sustainability education potential of this subject matter. Tanya remarked on this, noting that Grade 3 science and social studies [citizenship] could be integrated to “draw a bigger picture around the importance of food growing, urban agriculture and know[ing] where your food comes from...” This is where corporate control of agriculture and the food system meets critical questions: What are the social and environmental costs of the industrialized, commodified food system? What do chemical fertilizers, herbicides and pesticides do to soil life? The act of gardening is a simple, small way to build competency and literacy for real citizenship, not consumership (Giroux 2013).

The pedagogical gateway afforded by the Grade 3 Plants and Soil curriculum gives us an opportunity to teach about the land and the living soil in which our school gardens grow. We can see for ourselves that science as reductive dualism is not the only worldview, and that a broader framework for truth exists. Soils, even rocks, have relationships in indigenous worldviews (LaDuke 1999, cited by Kapyrka & Dockstator 2012). Before 2009, the Ontario Grade 3 curriculum put plant study under Life Systems, and soil study under a different category, Earth and Space Systems, claiming that soil is “abiotic.” Thankfully, that has been reframed in the current Science and Technology curriculum - “soil is made up of living and non-living things” - but many such false dualisms remain, and some outdoor educators still use the old curriculum.

In our study, 45% of teachers named learning about soils and plants as a benefit of school gardens. Connecting soil and plant health challenges the dominant food system. The current agri-food system has mystified the connection between soil and food, promoting the use of harsh chemicals sourced from finite resources to dominate agricultural practices. By separating science

study units into strands that decouple plants from soil, the Ontario curriculum added to this mystification. If gardens can reunite soil systems and food systems, early in a learner's life and even simply kinaesthetically, it may become more difficult for the agri-food industry to decouple these systems, because education will help increase awareness of the importance of soil health to human health. The learner can later return to this knowledge gained through experience and sensory awareness.

5.2 Comprehensive School Health

According to the Ottawa Charter for Health Promotion (1986), to which Canada is a signatory, schools are key locations for health promotion interventions (World Health Organization 2009). Perhaps overlooked in this key document are the numerous references to the natural environment: “(t)he inextricable links between people and their environment constitutes the basis for a socio-ecological approach to health.” (World Health Organization 2009). Public schools have long been viewed as ideal locations for nutrition initiatives (Briggs & Safai 2003, Story, Kaphingst & French 2006, Richie, Crawford, Hoelscher & Sothorn 2006). In Canada at the federal level, the Pan-Canadian Joint Consortium for School Health is the mechanism through which provincial Ministries of Education and Health interact. Their Comprehensive School Health Framework names *Teaching and Learning*, *Healthy School Policy*, *Physical and Social Environments*, and *Partnerships and Services* as the four pillars reflecting the role of education in health promotion within the school community setting.¹⁷ In the Social and Physical Environment pillar, school grounds are named as sites for intervention (“The buildings, grounds, play space, and equipment in and surrounding the school.”)¹⁸

¹⁷ <http://www.jcsh-cces.ca/index.php/school-health/school-health-programs>, retrieved 18 June 2014.

¹⁸ <http://www.jcsh-cces.ca/index.php/school-health>, retrieved 18 June 2014.

The World Health Organization released its *School Policy Framework: Implementation of the WHO Global Strategy on Diet, Physical Activity and Health* in 2008 (World Health Organization 2008). Contained in this 53 pg. document, under the heading of School Food Programmes, the following is among three “suggestions for implementation”:

Encourage and support schools to develop school gardens. Interact with relevant international agencies, such as the Food and Agriculture Agency of the United Nations (FAO), to mobilize additional support for the development of projects on school gardening. (p. 14)

Most of the document focuses on collaboration of education and health ministries. Under the heading “other ministries and levels of governance” ministries of agriculture are also mentioned in relation to school gardens, as well as urbanization and planning regarding the physical environment of schools, and recreation programmes. (p. 26)

The FAO, for its part, released a comprehensive 28 pp. document titled *A New Deal for School Gardens* (2010). In the introduction, school gardens are seen to address environmental and health concerns equally:

As environmental concerns broaden and diet-related health and nutrition problems increase, governments and development partners are increasingly interested in the potential of school gardens. ... (for) the promotion of good diet, nutrition education, and the development of livelihood skills, together with the power to extend this learning beyond the school itself in a variety of ways. This educational focus can be an important long-term contributor to national health and food security.

Putting learning first

The garden curriculum: School gardens cannot singlehandedly raise the level of children’s health or substitute for school meals – but they can contribute to them. Above all, they must be an educational instrument targeting not only children, but also their families, the community, and the school itself. (...) *Gardens are the right place, sometimes the only place, to learn how to:*

- cultivate food successfully;
- respect the environment in direct practice (e.g. Conserving water, replacing trees)
- see the bond between gardening and good nutrition, and learn to grow a healthy diet;
- value fresh vegetables, fruits and legumes, including indigenous foods;
- store and preserve foods and prepare them safely;
- appreciate the links between diet and health;
- apply concepts of good diet and healthy lifestyle to one's own practices;
- resist junk food;
- market and sell food;
- explain and demonstrate one's learning and understanding to others. (p. 12)
(*Emphasis added*)

The report does acknowledge challenges to successful school gardens. Notably,

(...) the need for expertise and training in garden management and horticulture; issues of curriculum integration; monitoring and evaluation; and support and encouragement for hard-working school staff. All these suggest the need for careful planning and long-term support, rather than quick fixes. (...) Some well-documented success stories suggest that the most sustainable programmes often grow organically; they start small, take little for granted and expect slow progress; they allow schools to opt in and later to 'graduate' and help others; they offer small incentives and long-term co-ordination.

All of these factors should be taken into account when deciding the best way forward and how far the process (...) should be divided between top-down facilitation and bottom-up initiative. (p. 4)

In Ontario, the Comprehensive School Health initiative is called *Healthy Schools* and is housed under the Ministry of Education. The Foundations for a Healthy School (2006) matrix categorized activities under four headings: *High-Quality Instruction and Programs*, *A Healthy Physical Environment*, *A Supportive Social Environment*, and *Community Partnerships*. This government document included the phrase “starting a school garden and planting fruits and

vegetables in it,” under the heading of “A Healthy Physical Environment.” However, no additional supports or guidance are offered.

The only visible sign of an institutional program under the *Foundations for Healthy Schools* framework was the Ministry of Education’s Healthy Schools Recognition Program, a voluntary program requiring participating schools to submit an annual form detailing their activities, which need not be ambitious – just in keeping with the spirit of increasing healthy food and physical activity. They are then given a letter from the Minister and a pennant. This program had a moderately poor reach across the province - 596 schools participated in 2007-2008, when the program started. Five years later, 702 schools participated, a participation rate of 14% of Ontario schools. The schools were largely duplicated from one year to the next. The program was discontinued in 2012, and has not been replaced.

5.3 School Food and Food Literacy

The People’s Food Policy Project, a national endeavour involving 3,500 people, points out that Canada is the only G8 country without a nationally-funded school meal program, and calls for school meal programs, school gardens and food literacy programs as part of a nationally-funded Children and Food strategy (Food Secure Canada 2011). The federal government is theoretically bound by international agreements such as the Comprehensive School Health policies above, but responsibility rests with the provinces for implementation, with no federal funding dedicated to school food.

In Ontario in 2008, the government passed legislation titled Healthy Food for Healthy Schools Act (Government of Ontario 2008), which amended the Education Act to allow the Ministry to regulate foods sold in schools. It was particularly focused on trans fats, but set the stage for more regulation on other matters. In 2010 the School Food and Beverage Policy known

as P/PM150 was added, which further regulated the sale of foods and beverages, with foods categorized into three areas: “sell most (80% or more), sell less (20% or less), and “not permitted for sale”. It allowed exceptions on special event days. Notably, under “practices for consideration”, mention is made of offering “when available and where possible, food and beverages that are produced in Ontario.”

Further, schools are exhorted to “be environmentally aware (e.g., reduce food waste, reuse containers, recycle food scraps).” “Recycling food scraps” could be referring to composting, or to municipal waste pickup, neither of which are mandated or supported by existing infrastructure. In the case of composting (generally accepted as a key element of organic gardens, and certainly a ripe opportunity for environmental education), while it appears in the Grade 3 and Grade 7 Science and Technology curriculum, the actual maintenance of compost systems is not included in caretakers' or any other school staff job descriptions, at least in the TDSB. In the case of municipal organic waste pickup, this depends on the municipality. In the Toronto District School Board, the largest school board in Ontario (and Canada), schools have not yet been included in the municipal organic waste pickup regime (the Green Bin). A small pilot began in 2014, but it still begs the question of how to learn or teach about composting if all you do is separate organic waste and ship it “away”.

P/PM 150 was claimed by the government to be a “comprehensive” approach to healthy school food, when in fact it is simply prohibitive. Wistoft (2013) describes “comprehensive” quite differently while summarizing a garden-based learning program evaluation:

In addition, there was found to be a strong impact on nature and health aspects, where the main point is not merely to do away with ‘bad food’ and unwanted additives and pesticides, but rather to learn to grow and prepare healthy and aesthetically pleasing food in a natural setting with natural ingredients where the outdoor space is constructively

used in the teaching and learning process. (p. 130)

There are indications that P/PM150 is less than fully embraced by the school system. The advocacy group People For Education reported in 2012 that P/PM 150 is having “unintended consequences on cafeteria revenues and fundraising initiatives, limiting [schools’] ability to subsidize field trips and make charitable donations.” (People for Education 2012, p.2).

In 2013, the Ontario Government held hearings on its proposed Local Food Act, and heard from a number of stakeholders that “food literacy” should be included. Garden-based learning was clearly identified by deputants as part of food literacy. The Act is now law (Government of Ontario 2013), and the Ontario Ministry of Agriculture and Food is tasked with defining “food literacy in relation to local food” for the purposes of the Act. Stakeholder groups are participating in consultations at this time.

Informing this opening is also the report of the Healthy Kids Panel, called *No Time To Wait* (Healthy Kids Panel, 2013). Recommendation 2.8, Establish a universal school nutrition program for all Ontario publicly funded elementary and secondary schools, is under review in the current consultations, and includes this statement:

These programs should include learning about *where food comes from and how it is grown*, as well as the hands-on experience of cooking and access to healthy foods for those coming to school hungry. (p. 37) (*Emphasis added*).

This recommendation does not specifically state *how* students will learn “where food comes from and how it is grown”. Students currently go on regular field trips to specific farms designed for such visits. This has, arguably, not been enough education to prevent poor nutritional choices and outcomes. Whether gardens on school property will be considered a better approach or simply another possible one, and supported through a funding mechanism, remains to be seen.

5.4 Toronto District School Board (TDSB) Garden Policies

The Toronto District School Board (TDSB) is the largest school board in Canada. Long recognized as a leader in environmental education, the TDSB adopted the Go Green Climate Change Action Plan in 2010 (TDSB 2010a). Included are:

installation of solar PV systems on school roofs, developing school grounds' potential as community energy hubs and *market gardens*, and signing an agreement to trade the Board's carbon emissions whose income would be used for an Environmental Legacy Fund. (p. 1) (*Emphasis added*).

The Environmental Policy of the Board (TDSB 2010b) spells this out in more detail:

4.6. To respond to climate change, focus shall be on three critical areas as an important basis for planning and decision making: mitigation, adaptation, and education, as follows:

- (a) climate change shall be mitigated by reducing the Board's greenhouse gas (GHG) emissions by amounts that exceed the Kyoto Protocol targets.
- (b) activities to adapt to climate change shall be undertaken, such as increasing tree planting and partnering with local organizations to establish pilot *market gardens* on some of the large suburban school grounds; ... (p. 2) (*emphasis added*)

Thus, school gardens are supported by TDSB policy, through partnerships with local organizations which fund the gardens. When undertaking garden projects, the schools are encouraged to engage staff housed in the Sustainability Office, who visit the school and produce a report indicating the suitability and any constraints they perceive in installing the garden. They also support revitalizing formerly cultivated garden spaces rather than starting new ones¹⁹.

5.5 Summary

¹⁹ Sustainability Office Senior Manager Richard Christie, personal communication

This completes the findings from the policy analysis relating to school gardens. In connecting these findings to the comparative case study, I rely again on Bandura's Social Cognitive Theory (1986) to support a theory of change. As collective efficacy in school gardening grows, regardless of whether it is through schools alone or with community partners, policy needs to keep in step in order to facilitate the environmental factor: that is, school gardens becoming the norm, with best practices supported. Policy has not kept up with practice: schools are embarking on garden projects through the passion and dedication of volunteers, community initiatives and key champions. Even though policies are generally supportive, they are not specific enough to be widely implemented. There are few implementation measures to bring the policies to reality. More specific and enabling policies, and measures to implement and evaluate them, are needed to create the environmental conditions within the reciprocal triadic relationship: in other words, to realize the benefits to students that teachers expect from garden-based learning. In Chapter 6 I will discuss these findings and make recommendations.

Chapter 6 Discussion

“... I think every curriculum should be really connected powerfully to the real world so that it makes sense to people, that it’s actually based in context of our lives and meaning, you know, what is important in our planet in this day and age. ... if kids are looking at their food differently on the weekend, if they are making different choices, if they are excited to be growing a garden in their backyard, my work as a teacher feels like it is three times more powerful and rewarding.” – Tanya, Grade 3 teacher

Tanya’s experience in gardening with her students has provided her with considerable food for thought. Laaksoharju et al. (2012) became interested in studying children’s gardens after learning that 30% of the children in Helsinki did not view human beings as part of nature, and that 36% of the boys claimed that plants are not essential for human life (Laaksoharju et al. 2012, citing Laaksoharju & Rappe, 2010).

The reward of building a classroom community filled with wonder and joy, learning through collaborative questioning and research, is powerful for some teachers regardless of the practical difficulties (Thorp 2006). Teachers, as the primary actors in determining whether children have access to a school garden, are the key players to implement policies and to establish best practices relating to garden-based learning.

The research questions informing this study are:

- 1) how do teachers in two schools perceive school gardens?**
- 2) How do their perceptions match the literature?**

This was the subject of Chapter 4. Further,

- 3) Are there differences between them because one has a long-time community partner?**

To answer this, I review results of our study and in the literature about partnerships that support school gardens. I also use my knowledge as a practitioner, and the self-reflection I have done as a result of this study.

6.1 School-community garden partnerships: results from case study

While the literature is very robust in general terms asserting that community partnerships provide much needed support to teachers during the school year (Graham 2005, Smith 2005, Miller 2007, Fisher-Maltese 2013, Blair 2009 citing O’Callaghan 2005, Miller 2013, Hammond 2000, Thorp 2003, Richardson 2011, Ozer 2007, Somerset & Markwell 2008, Robinson & O’Brien 2009, Martin 2011), there is not much mention of the issue of summer maintenance, which is a high-ranking concern of teachers in our study. Teachers in our study differed in their views of the problem of summer maintenance: teachers in a school with a community partner looking after the garden during the summer did not give it as much thought (it was mentioned by 2 out of 6 as a barrier), whereas teachers in the school without a community partner unanimously (5/5) named it as a barrier.

There were two noticeable differences between the results from two schools. Responding to the question about benefits of school gardens, Edgewater teachers as a group were able to identify 21 distinct benefits (average of 3.5 benefits/teacher). In contrast, Newcombe teachers collectively identified 11 benefits (average of 2.2 benefits/teacher). Thus, the teachers in the school with a community partner were able to identify 59% more benefits. This suggests that the time not spent worrying about maintenance, and the availability of a structured garden program for a number of years, contributed to a deeper understanding of the benefits the school garden can provide to students, and/or that the increased variety of activities provided by a community partner contributes to a realization of more benefits.

SCT helps explain why teachers who are themselves motivated to use the gardens see benefits for their students along the lines of engagement: they are themselves engaged and are providing a role model for the students by acting on their belief in the school garden as an instructional site. The emergent importance of teacher affect in our study highlighted the need for opportunities for teachers to become engaged with other teachers, modelling the potential of gardens for student learning.

There was also a significant difference between schools in the number of teachers identifying math as a curriculum subject they feel strongly connects to the garden. Edgewater teachers were unanimous in including math, while only 2 of 5 of Newcombe teachers identified math as strongly connecting to the garden. This could be a result of garden programming offered by a community partner which helps teachers draw out more curriculum links, particularly in subjects where students (or teachers) may be struggling. The fact that GTGK led a raised-bed project used for math instruction by the teachers may also have informed this result.

Yvonne and Naomi have been teaching at Edgewater for four and twelve years respectively. When asked about supports needed to use the garden, they were both quick to note the support of Green Thumbs. Naomi:

We have at the school really, really benefited from having Green Thumbs here... [From] the beginning, Green Thumbs [had] really, really good curriculum connections and lessons and so that was a really good model of a way to look at the garden. And I think that that's really, really helpful.

And the other thing is just in terms of care of the garden. I think having, you know expertise, like people who, even if the people aren't necessarily doing the work but having people who actually know how to take care of a garden is really important and it's—I mean that might exist in a staff but if that staff member left or something—I guess

it sort of helps maybe in having continuity with a garden because that's really important in school gardens is how to care for them long-term.

Yvonne:

Well, the support that your program has provided us is really great because you provide these workshops that are hands-on and really tied to the curriculum and we've had really good instructors...they were all really super with the students and yeah I think we've received a lot of support from you guys.

Laura recalled a time she was concerned about bringing her class out to the garden for a Green Thumbs Growing Kids workshop:

... at the beginning of the year when I came out in the garden in October, I had two severely behavioural kids and I was really worried about—I actually had an assistant for them and I just realized the day before we were to come that I wasn't going to have the assistant during the periods I was in the garden. So I was very worried because I didn't want to be out there by myself with them and it turned out—and I went because I didn't want to not go and I thought well, we're on the school grounds so if anything happens I can always go into the school or whatever but there was no issue at all.

They were so engaged and I was quite surprised because it was the beginning of the year and I thought, you know I was really worried so ... it was just an excellent example of how that kind of experience can draw in kids with special needs and there was no issue of behaviour and your staff were wonderful with them.

Drawing on SCT, the presence of a community partner in this case created an enabling environment for teachers. The creation of an enabling environment supports the cognitive and social processes that teachers must go through in order to use the garden. This is not to say they cannot do it without a community partner – Newcombe and many other schools embark on garden projects driven from within the school. The question remaining is whether the presence of a community partner increases the chances of success and longevity. Although we cannot answer this definitively, we can draw some inferences from the current study and the literature. If the

community partner's involvement addresses gaps that teachers have identified, and helps to remove barriers that teachers have identified, it is likely that the gardens in our study and beyond, given similar conditions, would benefit from the partnership, and succeed for longer.

However, school gardens with external partners may experience advantages that are site-specific rather than generalizable. Additionally, the advantages of community partnership, if scaled up, could have their own problems, of dependency, removal of responsibility from teachers, students and parents, or the placement of externally- and privately funded organizations' priorities ahead of priorities in the publicly funded schools in which the partners are active.

Other perceived barriers for teachers in our study and in the literature included lack of knowledge, logistics of using the garden for instruction, funding, stakeholder buy-in, planning time and maintenance. Many of these barriers can be minimized by the involvement of a community partner, depending on the programs offered and the nature of the involvement. In the case at hand, the school with a community partner was less concerned about maintenance and more concerned about scheduling and communication between stakeholders. With a community partner organizing student access to the garden via communications with individual teachers, there is a risk that teachers using the garden without the partner will find it already occupied by a class when they arrive. Thus, community partners, while addressing a number of needs, can increase the need for communications around garden use.

In jurisdictions where school gardens are common, many NGOs are active partners in providing staffing and expertise. For example, in the Washington, DC area where school gardens are included in legislation (Healthy Schools Act 2010), there are 15 named NGOs partnering with schools on garden-based events (Office of the State Superintendent of Education 2013).

It is generally agreed in the literature that paid staff are needed for the best use of the school garden in student instruction (Graham 2005, Alexander et al. 1995, Brynjugard 2001, Canaris 1995, Thorp & Townsend 2001, O’Callaghan 2005, Ozer 2007, Hazzard 2010). Whether paid staff or volunteers, however, gardens enrich students’ school experience by bringing in caring adults not associated with rigid school structure (Alexander et al. 1995). In the community-based school garden partnership model in our study, where one organization partners with a group of four schools, the summer staff are also responsible for supervising younger youth in their first summer job; helping to instill values of teamwork, workplace safety, the importance of punctuality, an opportunity for creative program design, development, testing and evaluation, and all the fresh produce they can eat. Summertime, which can be the downfall of many a school garden, becomes a community development asset, where youth are leading children’s programs in the green space that is an amenity for low-income kids, where they can get wet and play in nature as befits any kid in summer. Their parents and grandparents get some greens – and some long gourd, melons, beans, tomatoes and other fresh, culturally relevant foods – for the summer table. Teachers come for a summer garden training workshop: caretakers come to learn more about composting. (Harrison 2009)

Furman & Gruenewald (2004) promote the idea of *critical pedagogy of place*, and although they provide only a passing mention of school gardens, the authors develop the idea of shared leadership between teachers, administrators and community members in making the school a community asset that fosters ecological knowledge in adult as well as child learners.

This model is aligned with a repositioning of schools as community hubs (Clandfield and Martell 2012, Houghton 2010). The partnership between the school and its surrounding community, based in the physical locale of the garden, supports both the school and the

community and at the same time reorients the education system, drawing on the ‘funds of knowledge’ (Gonzalez et al., cited by Richardson 2011) already present in the community. As Richardson (2011) puts it:

The collaborations of teachers are underwritten by the commitments of the larger surrounding community. In its best moments, there is a kind of collaborative dependency operating here where, if there are not family members or community volunteers to work in the garden, teachers would not have the opportunity to work together on rethinking and elaborating their curriculum. While one cannot know from the popular discourse the precise level of shared decision making, two-way learning, or the authentic use of funds of knowledge brought to bear on official school knowledge, the establishing and maintaining a garden is itself indicative of the possibilities for such processes. (p. 117)

Community partnerships may also require partners to pull back at times to avoid creating dependency or to make more space for parents and community volunteers, as Richardson (2011) discusses. Indira pointed to examples of partnerships where a ‘gradual release’ is obtained, by partners training the teachers to continue the work in their absence. Indira pointed out that

It’s obviously exciting to have experts come in from outside and the kids respond to that. I think also if we only rely on that, then the notion of the kids becoming experts doesn't occur. If it’s a one-shot or a two-shot, once a month we plant with Green Thumbs, then I think the teacher ... the following week ... (should say), hey we're going to go out now. So hopefully the teaching that occurs, the learning that occurs for the teacher through an expert is the idea. ... realistically, 99 percent of the [students’] time is spent with their teacher, and for the teacher to develop confidence, to feel ‘I can do this’- (is the goal).

Green Thumbs Growing Kids (GTGK 2013) conducted its own interviews with school board personnel and proponents of school gardens in a variety of jurisdictions. Bruce Day, a 28-year School Grounds leader for the Toronto District School Board, reported that he has seen many gardens begin and fail, with the average lifespan for most school gardens running two to

three years. Gardens maintained by an external organization working in partnership with the school are more successful. (p. 19).

Our study shows that there are small differences in teacher perceptions of the school garden, but overall, the presence or absence of a community partner does not itself determine the impact on students, in the eyes of the teachers. There may be a connection to longevity, but this requires further research. There may be a difference to the community, however, if the community partner is operating programs on the school grounds in summer. This is beyond the purview of this comparative case study, and would also require more research.

I learned through the study how very much more engaged in gardening teachers can be when no community partner is present. This certainly gave me pause. Are community partners like me/my organization taking *too much* responsibility, in fact creating a dependence, in the name of being helpful? In my interviews with teachers Tanya and Indira, the idea of ‘gradual release’ provided a new context for a partnership model. Teachers use this phrase to describe how they pass responsibility on to students to utilize their learning skills. If a partner organization can train the teachers adequately to take over the curricular piece of the school garden (linked to the school day), perhaps the partners’ role would then evolve to being an after-school and/or summer partner, freeing up resources to help start new school-community gardens. To maintain a good adult-child ratio, the partner organization can leverage its volunteer base, but leave the teachers in charge of planning and executing the garden programming.

Other aspects of the community partnership model which is in place at Edgewater seem anomalous. According to the research literature, most school gardens are undertaken by teachers, occasionally with support from parents and community volunteers, particularly through the Master Gardener program, the AmeriCorps volunteers, and Co-operative or Agricultural

Extension offices throughout the U.S. There are no analogous programs in Canada, except Master Gardeners, who have not taken up the cause in Ontario as of yet.

However, in Ontario, as in other jurisdictions, non-profits are partnering with schools to animate their gardens. I propose that this model is more accurately termed a school-community garden, as opposed to a school garden. It is a hybrid model, and usually involves community members accessing the school grounds through the summer months, when food production is often (and hopefully) high, and from which the community receives benefits beyond those known and proposed to be found through school gardens. This hybrid school-community model builds on the strengths and assets already present in the community as indicated by the core precepts of health promotion, treating the school as a community hub (Clandfield & Martel 2010) and building on knowledges in the multi-ethnic community (Harrison 2009, Richardson 2011).

My theoretical frames of reference included Bandura's (1986) Social Cognitive Theory (SCT) to explain changes taking place at an individual and school level. In SCT, learning takes place through three equally important factors; internal personal factors, behaviour, and the external environment, in a reciprocal triadic relationship (Bandura 1986). In this case study, benefits were expected and observed by teachers using and planning to use their school gardens. They had internal personal motivations (interest in the garden) and elements of behaviour (either use of the gardens in the past, or intention to use them in the future, or both). The same cognitive process observed in students who use gardens can be observed in teachers: each of the three determining factors, when present, creates a framework for self-efficacy and collective efficacy; using the gardens and finding ways to integrate them into the curriculum creates social change.

While social cognitive theory can help frame research relating to individuals and even schools, a theoretical framework supporting policy implementation is also required in order to address our final question relating to how school gardens could be more widely and successfully implemented.

The study and the literature agree that implementation of school gardens is complex and requires supports from above and below. Turning to Hill & Macrae's (1995) Efficiency-Substitution-Redesign (ESR) framework, we can make recommendations for policy and implementation.

6.2 Assessment and Policy Recommendations

The final two research questions are:

(4) How does Ontario and school board policy impact on school garden implementation? And (5) given the data we have, how could school gardens be more widely and effectively implemented?

In both environmental and health policy frameworks such as *Acting Today, Shaping Tomorrow* (2009) and the *Framework for School Health* (2006), school grounds are named as program sites, but the lack of funding dedicated to school grounds reduces these policy intentions to mere rhetoric. With no directed funding for school grounds, schools are forced to rely on parents or on external funders to cover the costs of installing and maintaining school gardens. Some “top-down facilitation” as noted by *A New Deal for School Gardens* (FAO 2010) would go a long way in Ontario – given the interest in school gardens in all parts of the province including the North²⁰.

²⁰ The 2013 Nishnawbe Aski Nation Food Sovereignty conference I attended featured gardens in all sessions of Open Space Technology, where conference participants chose the subject matter. School garden projects such as in Fort Albany First Nation, near the Arctic Circle, aim to connect students to indigenous wild and garden foods.

Policies relating to Healthy Schools and to Environmental Education are implicated, and also, educational policies such as standardized testing also have an impact. Policies at the school and school Board level are most relevant to teachers' everyday lives but are of course informed by policies at higher levels of government. We will review what we learned in our study and in the literature about the gap between policies and practice. To understand this gap better, we will discuss assessment as it relates to some policies and policy frameworks.

Assessment of student learning, and program assessment, are important to policy-makers. Assessment forms the backbone of policy, in that the rationale for the policy is contained in evaluations or evidence from other jurisdictions or related policies. Without assessment, accountability for the efficacy of the policy is limited. These principles underlie Ontario's standardized testing regime as described in *Growing Success: Assessment, Evaluation and Reporting in Ontario Schools* (Government of Ontario 2010). This document details the policy that is enacted by the Education Quality and Accountability Office (EQAO), the body which administers large-scale student testing. Although controversial, the Ontario government stands behind this education policy. The 2009 Auditor General's Report, although it found problems with EQAO, continued to affirm its use (Ontario Auditor General 2009).

Teachers in our study were not specifically asked about this education policy, but two of the three grade 3 teachers brought it up in relation to school gardening. In our study, teachers were generally not aware of policies that either supported or discouraged school gardens. Teachers who were aware of policies tended to conflate them or not know whether a policy was based at the school, the school board or was handed down from the Ministry of Education. This lack of awareness and knowledge makes it difficult to draw any conclusions about teachers' perspectives on existing policies.

6.2.1 Healthy Schools Policy

School health policies, particularly in relation to food, are emerging as a key issue at national and provincial levels. In Ontario, the Foundations for a Healthy School (2006) matrix includes school gardens, but only under “a healthy physical environment”, one of four “pillars” including:

- High-quality instruction and programs
- A Healthy Physical Environment
- A Supportive Social Environment
- Community Partnerships

To realize the potential of school gardens, there should also be a connection to “high-quality instruction and programs”, because the mere existence or “start” of a school garden does not ensure that students are engaged in the activities that provide health or educational benefits. “Community partnerships” could also be named as relevant to school gardens, since the summer season, when much of the produce is available from school food gardens, suggests community involvement.

The institutional program mandated to enact the *Framework for Healthy Schools* was the Healthy Schools Recognition Program (HSRP) through the Ministry of Education. A weakly supported program, it was discontinued in 2012 and not replaced. A similar program could be made much more robust through the addition of food literacy program grants, including gardens, farm-to-school, and student culinary and nutrition programs.

Assessment of student health initiatives is clearly limited, with no data on the Ministry of Education’s web site relating to gains in student health through the (discontinued) HSRP or any similar programs. Visitors to the webpage where the HSRP was housed are invited to review a

new report, *Achieving Excellence: A Renewed Vision for Education in Ontario* (Ontario Ministry of Education 2014). This report indicates no new school health programs and no mention of the Comprehensive School Health partnership, although “student well-being” is noted as a “core priority”. The Pan-Canadian Joint Consortium for School Health has recently released a study seeking to establish base-line indicators for future evaluation of Comprehensive School Health initiatives (Hussain 2013), a full ten years after the establishment of the Consortium under the aegis of the Public Health Agency of Canada.

Public health units are mandated to work with schools under the provincial Health Act (Government of Ontario 1990). In Toronto, there is a small group of public health nurses in the Chronic Disease Prevention division, working with children and youth, who are active in supporting school gardens. Because they work in summer, this is another potential source of support in terms of volunteer management, produce harvesting etc. During the school year, these individuals do link school gardens to other health initiatives at the schools such as Lunch and Learn events.

However, in the literature, supported by our study, there is an apparent disconnect between the reasons that school gardens are started, the indicators on which they are measured, and the way that they are actually used. Producing food in the garden, while logically connected to food literacy and nutrition, is not the top reason for starting or using a school garden – rather, science instruction and environmental education are more often the stated benefits of the gardens. This speaks partly to the professional role of teachers in imparting mandated curriculum. Health and Physical Education are indeed in the curriculum, but often there is a gym teacher responsible for teaching this curriculum, and this educator sees the children on a rotation schedule, usually geared to high-impact physical activity. In our study, which included no gym

teachers, 3 teachers out of 11 included “health” as a subject area they saw linked to the garden. Future research should review this apparent disconnect between reasons given for school gardens and the actual uses to which they are put.

6.2.2 Environmental Education Policy

Environmental education (EE) has a strong policy basis at first glance with *Acting Today, Shaping Tomorrow* (2009). While school gardens are not explicitly supported, the use of school grounds for environmental learning is prescribed, and learning about the environmental footprint of food is alluded to in the overall vision. However, there was no assessment of student learning built into ATST. The word “assessment” does not even appear.

There is an interesting discussion in the literature on whether EE is really cross-curricular or should remain housed in science. Grace and Sharp (2000) name as a “rhetoric-reality gap” the notion that environmental education is cross-curricular. They contend that it rests predominantly with science departments and has been taught by geography and science teachers. Wals, Brody, Dillon & Stevenson argue in a 2014 *Science* article titled *Convergence Between Science and Environmental Education* that science should house environmental education, and furthermore, it should do so within the context of the school garden. Changes in both science education and environmental education, the authors argue, have paved the way for a new convergence, where each “discipline” can support the other to better achieve its stated aims in a “mature symbiotic relationship” (Wals et al. 2014). The school garden becomes a metaphor for this synthesis, in their view.

A completely contrary view is held by Tsevreni (2011), who elucidates a participatory action framework in *Towards an environmental education without scientific knowledge*, within which children use their imaginations and develop self-efficacy in environmental engagement

without science education at all, and re-imagine their city as a place conducive to play and nature, unmediated by scientific explanations of environmental problems (Tsevreni 2011). It could be argued that the school garden is the way to *remove* environmental education from the confines of science curriculum, and to use and document real interdisciplinary approaches, which could increase teacher use of the school garden.

6.2.2.1 Ecoschools as environmental education assessment

At both Edgewater and Newcombe, the Ecoschools certification program is linked to the success of the school garden in the minds of most of the teachers, especially at Edgewater where the garden has been going much longer. Within the Ecoschools certification protocol, the school-community partnerships gardening on school grounds are explicitly recognized and using them provides points towards higher levels of certification.

This case study suggests that the implementation of environmental education in the two schools is carried out, whether intended or not, by the EcoSchools certification program. EcoSchools provides the only assessment mechanism, however flawed, of environmental education within Ontario's education system. It does not focus on student achievement in environmental learning, but rather awards certification points for activities undertaken that are believed to support environmental learning. Yet without it, there would be no way of knowing how students *might* be learning about environmental topics. In an era of so-called "accountability" and high-stakes testing for literacy and numeracy, provincial authorities clearly do not believe that environmental education should be put to the same test, nor would the environmental education community be likely to advocate for such an approach. Universality of programs is part of equity-seeking strategies by advocates in public education, and without some

form of assessment, environmental education “in all grades and in all subjects” as mandated by ATST (p. 12) remains a nice sentiment with no accountability.

Teachers in the current study largely embrace Ecoschools, although there was a sense of it being “a lot of work.” Yvonne struggled to differentiate between the certification program and the garden as a physical undertaking:

I think I can just—happen to guess and say that for people who are not on the eco-team, there is a difference in perception between what an Eco-School does and what's done in a garden. ...

Perhaps Eco-Schools, it just—it might seem like another sort of—board initiative kind of thing where it feels like there's a lot of rules. ... The application that we fill out is really extensive, right, and it seems to get more detailed every year and so I think there is some perception amongst the staff that it's ... it hasn't been like super easy to implement some of the things.

Interviewer: And you think the garden is, feels more...

Respondent: Well, if the garden has to do with, yeah, well it's more, it's more tangible ... you've got your students—they're in the garden. They've got their hands in the dirt. They're planting things. That's easy to understand and it's right in front of you right whereas the things they're trying to do as an Eco-School is more big-picture stuff, down-the-road stuff, you know, long-term stuff that involves extra work but you may not see the “why” of it quite so easily as the kids being in the garden...

As Yvonne states, the garden may feel more tangible, but “big-picture, down the road stuff” is important too, if we are to see real change. However, the extracurricular and voluntary nature of Ecoschools creates a weakness when labour issues arise. During the 2013 work-to-rule carried out by the teachers' unions in Ontario, Ecoschools-linked work was discontinued, including composting. Interestingly, Green Thumbs Growing Kids' greenhouse field trip and

garden-based programming was still attended by teachers, as they categorized the programs as curricular.

The Ecoschools program itself has changed and adapted every year of its 11 years. At first, there was no recognition of school gardens or composting. Now, in a number of places in the 2013/14 Certification Guide (TDSB 2014), school food gardens are mentioned. Under the title “Healthy Communities” (a relatively new section) the following “look-for” is scored:

Local: Does your school community connect to and support environmental groups and initiatives (e.g., Evergreen, EcoSpark, Toronto Renewable Energy Co-op, Green Thumbs Growing Kids, Foodshare's The Great Big Crunch, PACT, 20/20 The Way to Clean Air, TEA, City of Toronto Community Clean Up, Waste Reduction Week, TRCA, ACER, Cycle Toronto, Culture Link Settlement Services, Great Canadian Shoreline Clean-up; students engage in community service through local environmental action)?

Thus, the current certification protocol names three organizations (GTGK, FoodShare and PACT) who partner with schools to implement school food gardens and composting on-site (TDSB 2014). This indicates institutional support for the benefits brought by community partners, including funding, staffing, volunteers, expertise, physical skills and labour.

6.2.3 Assessment and Standardized Testing

A final emergent theme in our teacher study was the problem for teachers of standardized testing, particularly in the month of May when gardens are being planted, and both grade 3 and grade 6 students have to stay indoors writing the tests. Yvonne commented on it unasked, responding to what supports she needs to use the garden:

Time is the main thing for me because I teach Grade 3 and it's an EQAO year and there's so much math to get through and also reading is a huge focus in our school this year. It's a huge focus every year but especially this year we were just given this number, oh, improve reading by 'x' percent, right. So we all feel this sort of need to, I guess, hit these

marks and so time, time is really the biggest obstacle. Especially with dealing with huge quantities of math that we have to cover for EQAO; because (of) EQAO our math year is shortened - we have to be finished by the beginning of May so normally you'd have ten months; we're shortened to eight months because we have to spend an extra month preparing for the EQAO.

It so happens that grade 3 and grade 6 science curriculum is very closely aligned with garden themes; biodiversity, soil and plants. Given the urgency of environmental and sustainability education, and the rhetoric of policy-makers insisting on evidence-based interventions, school gardens should be seriously considered for the purpose of environmental and science education, as well as an opportunity for cross-curricular integration.

School gardens, with a broad evidence base in terms of academic achievement, could be well supported at \$32M per year, the cost of EQAO. At an average of \$6,500 per school, that would be generally in keeping with the average allocation made to each school garden in a jurisdiction where they are supported by policy: Washington DC (OSSE 2012). Standardized testing in general, and EQAO in particular, provides an interesting comparator to school gardens: each expresses a similar goal ("to improve student learning" -- see Government of Ontario 2010, p. 6), and costs about the same. An interesting question for further research is whether the evidence base for standardized testing causing improvement in student achievement is any stronger than that for school gardens, since one is supported by policy and fully implemented, and the other is vaguely supported by policy "frameworks" and largely unimplemented.

Assessment is part of the role of the teacher, and is ideally individualized as much as possible to each student. Large-scale assessment through EQAO does not provide students with any insight into their own areas of needed improvement. Meanwhile, student learning in both environmental education and health/food literacy, although technically mandatory through curriculum, remain largely unassessed.

6.2.4 School Board Policy

The Toronto District School Board has a garden-friendly policy, as noted in Chapter 4. Gardens, and pilot projects with local organizations, are supported - with the adjective “market” preceding them. As an undefined term, “market garden” seems calculated to reassure trustees that these gardens will not cost the Board money, but it is also unclear if the Board would at some point want to retain income from produce sold from its lands. Since the environmental policy in fact generates income for the Board, through agreements under the FIT²¹ program, it would seem fitting that some of that income could go towards educational pieces that deepen environmental learning on school grounds, as well as to continuing to invest in energy conservation.

Whether the support for gardens will extend beyond “large suburban school grounds,” presumably mostly in secondary schools where students can operate a “market” garden, and include the teaching and learning aspect (not just food production) remains to be seen. Elementary schools with much smaller grounds could host “learning gardens” that would enable younger children to benefit from such a policy. As noted in the literature review, early childhood is an important time for environmental education.

6.3 Implementation Recommendations

In developing garden-based learning on school grounds, practitioners should pay heed to Cotton (2007, citing Olson, 1992) who notes the difficulty in integrating into schools what he terms “visionary projects”:

Olson recommends that innovators work in conjunction with teachers to develop new projects: “The new practice is, thus, carefully mapped onto the actual working lives of

²¹ Feed-In-Tariff, a Government of Ontario program supporting local photovoltaic energy production. The TDSB has agreements with solar energy companies that allow them to use school roofs for their installations.

teachers—neither the adequacy of the new ideas, nor the inadequacy of the old are assumed. Dialectically each is used to assist the other’ (Olson 1992: 69).

Teachers’ working lives are complex. As public servants they are expected to accomplish many varied educational goals beyond academic results: not the least of which are the goals of garden projects eg. better nutrition and more environmental learning. A strategy for increased garden implementation should align with what teachers are already doing; using gardens for science and other academic subjects, building on success in that realm.

6.3.1 Efficiency-Substitution-Redesign framework

Hill & MacRae (1995) propose that strategies designed for a more sustainable agriculture can be used in other areas such as energy and health. (Hill & MacRae 1995, p. 82). Logically then, the Efficiency-Substitution-Redesign (ESR) framework can extend to education as well, and be utilized to construct recommendations for school garden inclusion into institutional policies in education and health. In reviewing our results within the ESR framework, we can posit changes to the school culture and policy landscape that will reflect what we know about school gardens and what teachers need to use them, in order to suggest pathways to widening implementation.

School gardens, if properly resourced, could represent an efficiency for teachers in terms of meeting the requirements of Ministry curriculum. There is concern that curriculum is overloaded, and teachers in our study and in our survey agreed that a cross-curricular approach was valuable and would support their use of the school garden. If the garden can be used to teach multiple subjects including environmental education, teachers would gain time while providing a rich and engaging activity. However, an efficiency-stage change in terms of curriculum, where teachers can use the garden to teach a variety of subject matter, would depend on the level of

support within the school and community for the garden, and training availability, as the efficiency could be outweighed by issues of maintenance and lack of knowledge.

Our aim here would not be to mandate a garden in every school, but to mandate the teacher training and curriculum that is suited to garden-based learning. If a school does not have a good site for a garden, they can look for opportunities to partner with a local community garden in order to use this curriculum.

When considering school garden implementation and expansion, there are opportunities at each level of difficulty, shown here as Table 6.3.1 (after Hill & MacRae 1995):

Table 6.3.1 ESR framework and School-Community Gardens

Unsustainable	Shallow sustainability		Deep sustainability
Conventional/ current	Efficiency	Substitution	Redesign
Factory model of schooling, children institutionalized and taught indoors	Science teaching using indoor and outdoor gardens as currently established, demonstrating workable models shown to increase science test scores	Outdoor education centres begin modelling school gardens & conducting teacher training	Outdoor learning incorporated into school day. If no school garden, local community gardens host students. Credit program developed.
EE policy suggests using school grounds and points to learning about food & soil as EE, claims to be integrating into all subjects, no further support	Develop cross-curricular lesson plans based on this policy: give teachers more resources to use in gardens	Include school grounds in funding formula instead of current outdoor ed. allocation and/or cut back EQAO. Use STEM (Science, Technology, Engineering and Math) for curriculum development	Develop garden-based curriculum with new funding for all schools via school boards. Grant stream for gardens with per-sq. m template for access by community partners
Comprehensive School Health policy points to school grounds as program sites with no further guidance or support	Public Health units develop summer programs using existing school gardens	Updated policy specifies school grounds as program sites and allocates grant-based funding to schools & community partners	Portion of preventive health care budget allocated to school nutrition, gardens, culinary & farm-to-school programs
Random and uneven solutions to labour required for working	Jobs for qualified social assistance recipients, co-op placements, internships, managed	Summer jobs funding at community centres directed to school gardens. University partnerships credit	Year-round school garden co-ordinators, interns and practicum students engaged & properly supervised, staff

school gardens	by community agencies, other partners or school council	students for garden (program) work. Grants for garden co-ordinators.	in collective bargaining unit
School food programs uneven, underfunded, nutrition programs and gardens are grant and donation dependent.	Increased funding as percentage of health care budget spent on diet-related diseases known to be preventable. Funds also sourced through private foundations and pooled for this purpose, managed by arms-length govt. foundation	Food as an organizing principle for multiple curriculum subjects; gardens are long-term undertaking. Student nutrition programs funded through tax on unhealthy foods/ beverages, as well as public health investment eg. portion of preventive health care budget.	Full farm-to-school-to-farm, culinary arts and school garden programs woven into curriculum and publicly funded. Federal and provincial policies support school food and gardens for food literacy and EE. Private and public funding are both accessible to projects.
School garden programs are uneven with no professional learning community	Network to share resources which includes community partners, formal and informal educators. Regular training events & network meetings	Every school board has a full-time staff person dedicated to helping co-ordinate local school-community partnerships; leveraging opportunities eg bulk purchasing or in kind donations. Funding reallocated from EQAO, assessment tools developed.	Consolidate best practices and processes from multiple school boards and have tested curricula available (local variations acceptable). Assessment tools in place with annual reporting

<p>School gardens are dependent for knowledge base on local champions who move or age out</p>	<p>Master Gardeners and/or local horticulture clubs create school garden support program</p>	<p>Teacher training ramped up through Ontario College of Teachers & partners. Gardening curriculum linked to environmental education, climate change, peak oil, local food, water conservation, carbon sequestration, urban agriculture etc.</p>	<p>Teacher AQ: premium paid for outdoor school garden & environmental educators, work all year round. Eco-Caretaker designation, higher pay. Jobs run in summertime & educate community less formally. Community partners where feasible also run programs in the garden year round, help manage compost, integrate volunteers & elders, preschoolers, link garden to culinary programs & feeding programs. Garden-based educator a professional occupation.</p>
---	--	--	--

7.1 Summary

School gardens are increasingly popular, for a variety of desired outcomes ranging from hands-on science learning, to food literacy, to environmental and sustainability education. Published literature on the subject focuses largely on the health and nutrition aspects, given concern about obesity and diabetes in young people and the desire for interventions at school. Much of the research involves students, particularly elementary students, and their attitudes and behaviour concerning nutrition with and without gardens. Teacher attitudes and behaviour -- what teachers think about gardens, why they use them -- are the focus of this study, along with the overarching policy frameworks in which school gardens operate. Specifically, the research questions that framed this study are: how do teachers in two schools perceive school gardens? How do their perceptions match the literature? Are there differences between them because one has a long-time community partner? How does Ontario and school board policy impact on school garden implementation in these two schools? Finally, given the data we have, how could school gardens be more widely and effectively implemented?

The schools chosen for the comparative case study are both downtown Toronto, Ontario schools, with little green space nearby. The differences between the schools are: 1) Edgewater has a denser population in the surrounding high-rise community, and is in the bottom quarter socio-economically (based on income, languages spoken and length of time in Canada), while Newcombe is in an older residential neighbourhood characterized by row houses with yards, in the top third socio-economic bracket of public schools; 2) Edgewater is in its ninth year of school ground gardening with a community partner helping, and Newcombe is in its second year of a garden project without such a partner. Both schools have recently been certified Platinum (the

highest level) in the voluntary annual Ecoschools certification program. Teachers self-selected to participate in the study, based on interest in teaching in the garden. At Newcombe, teachers in the study (n=5) teach approximately 35% of the students there: at Edgewater, teachers in the study (n=6) teach approximately 27% of the students in the school.

This research into teacher attitudes in two schools shows that teachers (n=11) agree on the primary benefits and curriculum links associated with school gardens. The primary benefit to students articulated by teachers is the student engagement in learning made possible by the school garden. The primary subject linked to the garden is science; for some teachers this is synonymous or closely aligned with environmental education. For others, environmental education is perceived in a different context, that of the Ecoschools program. The Ecoschools program expressly supports school gardens and awards points for them towards certification. Ecoschools and garden projects share support from teachers concerned about the environment, yet there are differences in perception regarding the role of Ecoschools certification vs. garden-based learning. The difference most clearly articulated is the primarily curricular use of the garden, while Ecoschools is technically and practically extracurricular.

Teachers in both schools are mostly unaware of policies governing school gardens. Teachers are marginally aware of policies directing environmental education, and it could be inferred that the study participants, as teachers most motivated to use school gardens, could be teachers most likely to be aware of such policies. Ecoschools, a voluntary certification program, provides the closest link to policy awareness.

In relation to the initial question about differences between the schools because of a community partner, this study suggests that while most school gardens are undertaken without a formalized community partner, gaps in school garden implementation including teacher training,

curriculum resources, time for maintenance and summer care could be partly addressed by having such a partner or partners.

In our comparative case study, in the school with a community partner, teachers (n=6) are more able to name a range of benefits to students, note the use of the garden for math instruction, and are less aware of barriers to school gardening because of the summer gap. The partnership with an outside organization facilitates garden-based learning without the primary responsibility of taking care of the garden.

Food production, while important to most teachers in our study, is not absolutely essential for teachers to perceive benefits of garden-based learning. Teachers do connect the school garden to the movement for local and sustainable food, but not to obesity prevention per se. This demonstrates a disconnect between the stated reasons for school gardens by their proponents and the lived experience of working and teaching in school gardens. This is not to say that obesity prevention is NOT a benefit of school gardens, just that if so, it is a benefit that exists within a larger frame of health promotion.

In our study, teachers elucidated many ways in which the food garden can change children's relationship to food and discussed ways that food production and tasting was important. One teacher's comment about agency (see Naomi, p. 58) highlights a general benefit: school gardens also connect or reconnect children to the natural world in which they can form their own relationships with the stuff of life – the worms, bugs, flowers and dirt that respond to water, to touch, to interaction. This supports a sense of self-efficacy and combats the powerlessness children may feel in the school classroom. The children's passion for the garden releases new energy from adults and increases their desire to provide this opening.

In terms of policy, the Ecoschools program has implemented the Ministry's policy

framework, *Acting Today, Shaping Tomorrow* (ATST) (Government of Ontario, 2009), better than the Ministry of Education itself. While there are Ministry-created changes to curricula as mandated by ATST, there are no mechanisms in place for assessing student learning about the environment. The Ecoschools program is substituting for assessment, and it is extracurricular, voluntary and does not provide funding for teacher training or infrastructure costs.

Environmental and sustainability education (ESE) in Ontario suffers from lack of accountability. The Ecoschools program provides the only practical framework in which ESE can reliably take place. With respect to the need for local, urban ESE, as encouraged by the provincial policy framework, school gardens present a clear opportunity for interdisciplinary ESE, and with proper supports, could begin to report on environmental attitudes and behaviour changes as a result of garden-based learning. Within this framework, as well as within a more robust universal school food policy and practice environment, school food gardens can be pivotal to the practice of a rich, multilayered and transformative pedagogy in the face of climate change, economic polarization and urbanization.

Health policies such as the Healthy Schools framework also suggest that school gardens are beneficial, without providing more guidance or the means to implement them. However, from the teachers' standpoint in our study and in the literature, using the gardens for health instruction is less prioritized than science and environmental learning. Health and physical education curricula also suffer from lack of accountability and assessment, compared to academic subjects.

While school garden proponents – including myself – argue for more inclusion of school gardens in educational policy, this would be best accomplished in tandem with increased teacher training, additional qualifications and other systemic ratcheting up of outdoor learning in general

and garden-based learning in particular. Teachers in our study and in the literature agree on the need for professional development and more curricular and learning resources to be able to use school gardens effectively. This supports my original hypothesis relating to benefits potentially supplied by community partners, particularly where the community partner is a garden ‘expert’, similar to itinerant music teachers or to school librarians.

My starting hypothesis was that schools that have structured relationships with community partners to support their gardens have advantages over those who do not. This cannot be either verified or disproved by the data we have. Our study looked at two school gardens, one in its 9th season that has a community partner, and one in its second season that does not. However, no inference can be drawn from this data because we do not have longevity data for school gardens more generally, and the partnership aspect has also not been sufficiently studied. Many of the gaps, barriers or missing resources cited by teachers in our study and in the literature are elements of garden programs that community partners can and do provide, such as training in garden skills, knowledge transmission, lesson plans and curriculum, increasing the adult-child ratio and helping with maintenance, but no generalizations can be made on this basis because of the wide variance in garden-based programs provided by community partners in the small amount of research data available.

How did our case study compare with the literature?

Our case study agreed with much of what the formal research literature demonstrates. Teachers in our study and in the literature use gardens for science instruction primarily, followed by other subjects including environmental education (Graham et al. 2004, Graham & Zidenberg-Cherr 2005, Dirks & Orvis 2005, Skelly & Bradley 2000). Cross-curricular lessons and activities for the garden are highly valued, in our study and in the literature (Alexander, North & Hendren

1995, Thorp & Townsend 2001, Thorpe 2006, Gaylie 2009). Student engagement is one of the primary benefits of the school garden, identified by teachers in our study as well as the literature (Skelly & Bradley 2000, Alexander 1995, Williams & Brown 2012, Bucher 2010, Fisher-Maltese 2013). While nutrition education and healthy eating are considered among the main reasons for having a school garden, and much of the research on outcomes is focused on nutrition, it is not clear that teachers use school gardens for this purpose as much as for science education and environmental education, in our study and in the literature (Graham & Zidenberg-Cherr 2005). Hands-on and experiential learning are cited as methods that work to engage students in our study and in the literature (Skelly & Bradley 2000, Thorp & Townsend 2001). The need for additional adults to help manage students in the garden is indicated in our study and in the literature (Thorp & Townsend 2001, DeMarco et al. 1999, Dobbs et al. 1998). The amount of food produced is not as important as the sense of agency and the process of learning where food comes from, in our study and in the literature (Waliczek et al. 2000, Skelly & Bradley 2000, Graham & Zidenberg-Cherr 2005).

The notable difference was that teachers in our study were more concerned about the summer season than is demonstrated in the literature. Putting aside the limitations of our study and its small group size, this could be partly a result of differences in Canada vs the US (where many of the studies are conducted), including a shorter growing season. Some Canadian literature does show more concern for the issue of summer care (Parker 2012, Kail 2006 as cited in Gaylie 2009, Harrison 2009). Practical literature and internet networks of school garden educators discuss the subject at much more length.

Bucher (2010) comments on research gaps that this paper begins to address:

... very little is actually known about practitioners' beliefs with respect to the educational purposes of environmental action in school settings in any part of the world (Schusler,

2009), and the actual implementation of school garden programs are under-documented (Ozer, 2007). Moreover, while the history of children's garden policy and garden-based learning theory is fairly well-documented in the United States, there is much less documentation for other parts of the world (Desmond et al. 2004). (p. 24)

7.2 Limitations of the current study

This study is limited by the small size of the study groups. Teachers self-selected to participate, so results cannot be generalized to any other teachers within each school, or in any other schools.

The data collected from this study are only generalizable to this population because of the specificity of the sites, populations and current applications of garden activities. However, the study could be replicated in similar situations, such as other elementary schools with gardens both with and without community partnership support.

7.3 Research gaps and recommendations

Although we did not measure student achievement in academic subjects in our case study, the primary rationale and benefits of school gardens identified by teachers included science education and student engagement. The value of cross-curricular approaches to the garden was unanimously expressed. The literature indicates that school gardens increase student achievement in academic subjects. As Bucher (2010) indicated in the above quotation, the actual development and implementation of garden-based curriculum, and medium-term studies measuring academic achievement where such curriculum is used, would inform policy implementation.

This study builds on existing research relating to the perceived benefits and barriers to school gardens for elementary students, through the eyes of their teachers. Gaps in the research include:

- a) longevity and ongoing operation of school gardens;
- b) the role of community partners who support school gardens.

School gardens come and go. In the OEEN and IGES surveys, most school gardens (71% and 74% respectively) were in operation less than 5 years. Locally, a 28-year veteran of the Grounds Team at Toronto District School Board told GTGK that school gardens usually last 2 or 3 years (GTGK 2013). Skelly & Bradley's (2000) teacher survey found that of the 35 schools surveyed, only 4.2% had been operating for more than four years; 42.2% had been operating 6 months or less (Skelly & Bradley 2000). Rarely does the research indicate the garden longevity (Blair 2009).

Research focused on academic goals or nutrition education within the school year is understandably limited to discussing these topics within the school year timeframe. Some research on out-of-school programs, after-school programs and summer programs fleshes out benefits to children and youth paralleled in school-day programs (Pothukuchi 2004, Poston et al. 2005). To date, however, little research appears to have been done focusing on the various methods of ensuring that the summer season is productive and that the necessary staking, harvesting, watering and replanting is done before children return in the fall.

Another research gap of importance is the connection between income and access to school gardens. Bruce Day, a 28-year veteran Grounds Team leader in the Toronto District School Board interviewed for a 2013 study, notes that gardens maintained by highly motivated parents in affluent neighbourhoods also succeed over time in gaining neighbourhood support and

integration into the school's curriculum (GTGK 2013). This begs the question of who can access the benefits of school gardens. All children are subject to the deleterious effects of the food and beverage industries' targeting of children for consumption of foods high in salt, sugar and fat. However, lower-income children are at higher risk of obesity (Frederick, Snellman & Putnam 2014) and lack of access to nature (Bell & Dymont 2006). Stewart et al. (2013) found through GIS analysis that school gardens predominate in higher-income areas that are ethnically less diverse in Santa Clara County, California:

Indeed, proponents of school gardens in the popular debate argue (James, Marab and Parrish 2011, cited in Stewart 2013) that school gardens predominantly exist in affluent neighborhoods, where students are already much more likely to be exposed to organic food, large backyard spaces, and environmental exploration at home. (Stewart, Purner and Guzmán 2013: p. 130).

A recent study confirms the findings of Stewart et al. (2013). The Robert Wood Johnson Foundation Bridging the Gap (2014) research program found that school garden programs in the U.S. have increased steadily over the past seven years from 11.4 % of schools in 2006-07 to 26.6% in 2012-13, but that the majority of garden programs are in higher income areas. (Turner, Sandoval & Chaloupka 2014).

Additional research on teacher affect and perceptions of benefits and barriers would be useful. Teachers' views of their role in nutrition education and health promotion may vary widely; this would also be an important area for further research. Future research should review the apparent disconnect between reasons given for school gardens (nutrition and health related) and the actual uses to which they are put.

Evaluative studies of garden-based curriculum, linked to academic and cross-curricular subjects, would be useful for practitioners. The role of community partners could be studied in much greater depth by investigating the groups themselves, to better understand how school

gardens fit into their frames of reference and whether certain types of partnerships are more easily replicated than others. Adult community members taking care of school gardens in summer would have valuable perspectives on their relationship to spring planting and fall harvest seasons, where children or youth are present as students.

7.4 Reflections as a practitioner-researcher

In answer to Thorp's (2006) "signposts" (see Chapter 3) – Reflexivity: how have my working theories changed along the way? I was surprised at the number of school gardens in the literature and in our Ontario surveys undertaken by teachers alone, without community supports. This points to the tenacity and dedication of teachers who 'go it alone' and whose school communities may or may not respond with supports and funding. At the same time, it may also point to a research publication gap whereby community partners have not published in peer-reviewed journals. For example, the 'grey' literature is more forthcoming about the variety of strategies for taking care of school gardens over the summer, and there is an active Internet-based network of school garden animators, many of whom are from community partner organizations. After my interview with Indira, I thought more about how to implement the 'gradual release' so that community partners orient ourselves to passing as much of the responsibility for garden-based learning on to the teachers who, indeed, are 'with the children 99% of the time' as Indira mentioned. The lesson for community partners could be that too much external involvement could detract from teacher engagement in the garden. A balance should be sought between facilitation and control. Primary use of the garden by teaching staff is ideal during the school year, while community control of the garden space is ideal in the summer weeks.

7.5 Final thoughts

In conclusion, a hybrid school-community garden could offer high-quality environmental education to students throughout the school year, and good opportunities for summertime activities, youth summer employment, intergenerational programming and recreation. As in any ecological system, each season in the school-community garden has its star players and key relationships. The production of food makes knowable a set of relationships; a key intervention in public space that demonstrates and interrogates the nested systems in which we humans find ourselves (Capra 1997). If education for sustainability is to have more traction in Ontario, the means must be fostered by a more universal and intentional approach from a young age. School gardens present an opportunity to realize benefits for the whole community across intersecting indicators: health, including physical and mental health, sustainability education and authentic academic learning. However, to more adequately and equitably realize their benefits, efforts to bridge gaps in training and resources must be stepped up.

Community-based partnerships have the potential to situate school gardens in a more effective health promotion framework, through community development and food security initiatives. Community agencies already partnering with schools are a logical starting point for such partnership development, and many existing resources could be re-allocated and/or built upon to support school gardens. The resources are spread between ministries and municipalities, as well as non-governmental and private organizations. A single desk at the Ministry of Education to convene school garden stakeholders would be a step in the right direction. Ultimately, there is no one-size-fits-all in school gardens, and decisions need to be made locally once policy supports are in place.

Bibliography

Alexander, J., North, M.W., & Hendren, D.K. (1995). Master Gardener Classroom Garden Project: An Evaluation of the Benefits to Children. *Children's Environments* 12(2): 123-133.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review* 84, 191-215.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice Hall.

Batuk, T.M. (2013). *Let's Grow: Plants, Minds, and Bodies*. Unpublished Masters Thesis, MA, Southeastern Louisiana University. Hammond, Louisiana.

Bell, A.C. & Dymont, J.E. (2006). *Grounds for Action: promoting physical activity through school ground greening in Canada*. Evergreen.

Bell, A.C. & Dymont, J.E. (2008). Grounds for health: the intersection of green school grounds and health-promoting schools. *Environmental Education Research* 14(1), 77-90, DOI: 10.1080/13504620701843426

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.

Bowker, R., & Tearle, P. (2007). Gardening as a learning environment: A study of children's perceptions and understanding of school gardens as part of an international project. *Learning Environ Res* 10:83–100. DOI 10.1007/s10984-007-9025-0

Boynton, C. M. (2010). *Learning spaces in school: Comparing math instruction and learning in school gardens and classrooms*. (Order No. 3444596, University of California, Berkeley). *ProQuest Dissertations and Theses*, 75. Retrieved from <http://search.proquest.com.ezproxy.library.yorku.ca/docview/859003388?accountid=15182>. (859003388).

Briggs, M. & Safai, S. (2003). Position of the American Dietetic Association, Society for Nutrition Education, and American School Food Service Association: Nutrition services: An

essential component of comprehensive school health programs. *Journal of the American Dietetic Association* 35(2), 57-67. doi:10.1053/jada.2003.50100

Bucher, K. A. (2012). *Sowing city schools: Teachers and garden education in Havana and Philadelphia*. (Order No. 3494413, Indiana University). *ProQuest Dissertations and Theses*, 272. Retrieved from <http://search.proquest.com.ezproxy.library.yorku.ca/docview/921868462?accountid=15182>. (921868462).

Calderon, D. (2014). Speaking back to Manifest Destinies: a land education-based approach to critical curriculum inquiry. *Environmental Education Research* 20(1), 24–36, <http://dx.doi.org/10.1080/13504622.2013.865114>

Canadian Council on Learning (2009). Making the environmental grade: The benefits of going green in the classroom. CCL: Lessons in learning, June 24, 2009. Retrieved from <http://www.ccl-cca.ca/CCL/Reports/LessonsInLearning.html#2009> June 28, 2014.

Canaris, I. (1995). Growing foods for growing minds: Integrating gardening into the total curriculum. *Children's Environments* 12(2), 134-142.

Capra, F. (1997). *The Web of Life: a new scientific understanding of living systems*. Anchor: Random House, NY.

Center for Ecoliteracy (2010). *Rethinking School Lunch*. Retrieved from <http://www.ecoliteracy.org/sites/default/files/uploads/CEL-VisualGuide.pdf>, June 18, 2014.

Chatterjee, S. (2005). Children's Friendship with Place: A Conceptual Inquiry. *Children, Youth and Environments* 15(1): 1-26.

Chawla, L. & Cushing, D.F. (2007) Education for strategic environmental behavior, *Environmental Education Research* 13(4), 437-452, DOI: 10.1080/13504620701581539

Chiarotto, L. (2011). *Natural Curiosity: building children's understanding of the world through environmental inquiry/A Resource for Teachers*. The Laboratory School at The Dr. Eric Jackman Institute of Child Study, University of Toronto.

Clandfield, D. & Martel, G., eds. (2010) *The School as Community Hub: Beyond Education's Iron Cage*. Canadian Centre for Policy Alternatives, Ottawa, ON.

Cotton, D. R. E. (2006). Implementing curriculum guidance on environmental education: the importance of teachers' beliefs, *Journal of Curriculum Studies* 38:1, 67-83

Cotugna, N., Manning, C. and Didomenico, J. (2012) Impact of the Use of Produce Grown in an Elementary School Garden on Consumption of Vegetables at School Lunch. *J. Hunger & Environmental Nutrition*, 7:11-19

Cross, B. A. (2013). *The impact of a school garden and environmental education on the environmental awareness of fifth graders*. (Order No. 1536527, Southeastern Louisiana University). *ProQuest Dissertations and Theses*, 72. Retrieved from <http://search.proquest.com.ezproxy.library.yorku.ca/docview/1354473402?accountid=15182>. (1354473402).

Davis, J.N., Ventura, E.E., Cook, L.T., Gyllenhamer, L.E., & Gatto, N.M. (2011). LA Sprouts: a gardening, nutrition, and cooking intervention for Latino youth improves diet and reduces obesity. *Journal of the American Dietetic Association*, 111, 1224- 1230.

DeMarco, L.W., Relf, D., and McDaniel, A. (1999). Integrating Gardening into the Elementary School Curriculum. *HortTechnology* 9(2), 276-281.

Desmond, D., Grieshop, J., & Subramaniam, A. (2002). *Revisiting garden based learning in basic education: Philosophical roots, historical foundations, best practices and products, impacts, outcomes, and future directions*. Prepared for IIEP/FAO, SDRE Food and Agricultural Organization/United Nations, Rome, Italy, UNESCO International Institute for Educational Planning, Paris, France.

Dirks, A., & Orvis, K. (2005). An Evaluation of the Junior Master Gardener Program in Third Grade Classrooms. *Hort Technology* 15(3), 443-447.

District of Columbia, Healthy Schools Act (2010).

District of Columbia, Office of the State Superintendent of Education (2013).

- Dobbs, K., Relf, D. and McDaniel, A. (1998). Survey on the Needs of Elementary Education Teachers to Enhance the Use of Horticulture or Gardening in the Classroom. *Hort Technology* 8(3), 370-373.
- Duhn, I. (2012). Making 'place' for ecological sustainability in early childhood education *Environmental Education Research* 18(1), February 2012, 19–29
- Evergreen (2001). *Nature Nurtures: Investigating the Potential of School Grounds*. Evergreen.
- Faddegon, P.A. (2005). *The kids growing food school gardening program: Agricultural literacy and other educational outcomes*. Doctoral dissertation, Cornell University, Ithaca, NY.
- Fisher-Maltese, C. (2013). *Fostering science literacy, environmental stewardship, and collaboration: Assessing a garden-based approach to teaching life science*. (Order No. 3597942, Rutgers The State University of New Jersey - New Brunswick). *ProQuest Dissertations and Theses*, 162. Retrieved from <http://search.proquest.com.ezproxy.library.yorku.ca/docview/1442199751?accountid=15182>. (1442199751).
- Food and Agriculture Organization of the United Nations (UN-FAO). (2010). *A New Deal for School Gardens*. FAO: Rome, Italy.
- Food Secure Canada. (2011). *Resetting the Table: A people's food policy for Canada*. Food Secure Canada, www.foodsecurecanada.org.
- Frederick, C.B., Snellman, K., & Putnam, R.D. (2014). *Increasing socioeconomic disparities in adolescent obesity*. *Proceedings of the National Academy of Sciences, U.S.A.* Accessed online June 17, 2014 at <http://www.pnas.org/content/early/2014/01/08/1321355110.full.pdf+html>
- Furman, G.C., Gruenewald, D.A. (2004). Expanding the Landscape of Social Justice: A Critical Ecological Analysis. *Educational Administration Quarterly* 40(1) 47-76.
- Gaylie, V. (2009). *The Learning Garden: ecology, teaching and transformation*. New York: Peter Lang.

Giroux, H. (2013). *When schools become dead zones of the imagination: a critical pedagogy manifesto*. Retrieved from <http://www.truth-out.org/opinion/item/18133-when-schools-become-dead-zones-of-the-imagination-a-critical-pedagogy-manifesto> June 26, 2014.

Giroux, H. (undated) Neoliberalism and the Vocationalization of Higher Education. Retrieved from http://www.henryagiroux.com/online_articles/vocalization.htm on June 25, 2014.

Godlewska, A., Moore, J., & Bednasek, C.D. (2010). Cultivating ignorance of Aboriginal realities. *The Canadian Geographer / Le Géographe canadien* 54(4), 417–440. DOI: 10.1111/j.1541-0064.2009.00297.x

Government of Ontario (1990). Health Protection and Promotion Act. Retrieved from http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90h07_e.htm#BK7 July 16, 2014.

Government of Ontario (2008). Healthy Food for Healthy Schools Act. Retrieved from http://www.e-laws.gov.on.ca/html/source/statutes/english/2008/elaws_src_s08002_e.htm June 26, 2014.

Government of Ontario (2010). Growing Success: Assessment, Evaluation and Reporting in Ontario Schools. First Edition, Covering Grades 1 to 12. Retrieved from Ontario Ministry of Education, <http://www.edu.gov.on.ca/eng/policyfunding/growSuccess.pdf> July 23, 2014

Government of Ontario (2010). Policy/Program Memorandum No. 150: School Food and Beverage Policy. Retrieved from <http://www.edu.gov.on.ca/extra/eng/ppm/150.html> June 26, 2014.

Government of Ontario (2013). Bill 36, Local Food Act. Retrieved from http://www.ontla.on.ca/web/bills/bills_detail.do?locale=en&BillID=2754 June 26, 2014.

Grace, M. & Sharp, J. (2000). Exploring the Actual and Potential Rhetoric-reality Gaps in Environmental Education and their Implications for Pre-service Teacher Training, *Environmental Education Research* 6(4), 331-345, DOI: 10.1080/713664698

- Graham, H., Feenstra, G., Evans, A. M., & Zidenberg-Cherr, S. (2004). Davis school program supports life-long healthy eating habits in children. *California Agriculture* 58, 200–205.
- Graham, H., Beall, D., Lussier, M., McLaughlin, P. & Zidenberg-Cherr, S. (2005). Use of School Gardens in Academic Instruction. *Journal of Nutrition Education and Behavior* 37(3): 147-151
- Graham, H. & S. Zidenberg-Cherr. (2005). California teachers perceive school gardens as an effective nutritional tool to promote healthful eating habits. *Journal of the American Dietetic Association* 105:1797-1800.
- Green, M. (2007). *Food gardens: cultivating a pedagogy of place*. Monash University, Gippsland. AARE Conference Fremantle – November 2007.
- Green Thumbs Growing Kids (2013). *School Food Gardens in Ontario: Educating for Health and Sustainability*. GTGK, retrieved from <http://www.kidsgrowing.ca/what-we-do/imagine-garden-every-school> June 26, 2014.
- Green Thumbs Growing Kids (2014). *Evaluation Survey of Teachers from 2013*.
- Greenwood, D.A. (2010). Nature, Empire, and Paradox in Environmental Education. *Canadian Journal of Environmental Education* 15, 9-24.
- Greenwood, D.J., Whyte, W.F. & Harkavy, I. (1993). Participatory Action Research as a Process and as a Goal. *Human Relations* 46(2) 175-192.
- Gruenewald, D. (2003). The Best of Both Worlds: A Critical Pedagogy of Place. *Educational Researcher* 32:4, 3-12.
- Guitart, D.A., Pickering, C.M., & Byrne, J.A. (2014). Color me healthy: Food diversity in school community gardens in two rapidly urbanising Australian cities. *Health & Place* 26, 110-117.
- Hale, J., Knapp, C., Bardwell, L., Buchenau, M., Marshall, J., Sancar, F., Litt, J. (2011). Connecting food environments and health through the relational nature of aesthetics: Gaining insight through the community gardening experience. *Social Science & Medicine* 72, 1853-1863.

- Hammond, L.A. (2000). *Building a mien-american house: A case study in school-community relations*. PhD.(Ed) dissertation. (Order No. 9980504, University of California, Davis). *ProQuest Dissertations and Theses*, 459-459 p. Retrieved from <http://search.proquest.com.ezproxy.library.yorku.ca/docview/304582392?accountid=15182>. (304582392).
- Harrison, S. (2009). School Food Gardens in Multicultural Inner-city Settings. *Green Teacher* 84, 24-28.
- Hart, P. and Nolan, K. (1999). A Critical Analysis of Research in Environmental Education. *Studies in Science Education* 34, 1-69.
- Healthy Kids Panel (2013). *No Time To Wait: The Healthy Kids Strategy. Report to the Ontario Ministry of Health and Long-Term Care*. Retrieved from <http://www.health.gov.on.ca/en/public/programs/obesity/default.aspx> on June 26, 2014.
- Heim, S., Stang, J., & Ireland, M. (2009). A garden pilot project enhances fruit and vegetable consumption among children. *Journal of the American Dietetic Association* 109(7), 1220-1226. doi: 10.1016/j.jada.2009.04.009
- Hill, S.B. & MacRae, R.J. (1995). Conceptual Framework for the Transition from Conventional to Sustainable Agriculture. *Sustainable Agriculture* 7(1), 81-86.
- Houghton, E. (2003). *A Breath of Fresh Air: celebrating nature and school gardens*. Learnx Foundation, Sumach Press and Toronto District School Board. Toronto.
- Houghton, E. (2010) *Green School Hubs for a Transition to Sustainability*. In Clandfield & Martel, eds. *The School as Community Hub: Beyond Education's Iron Cage*. Canadian Centre for Policy Alternatives, Ottawa, ON.
- Hoy, W.K. (1998). Book review [Self-efficacy: The exercise of control, by Albert Bandura]. *Educational Administration Quarterly* 34 (1): 153–158.
- Hussain, A., Christou, G., Reid, M., & Freeman, J. (2013). *Development of the Core Indicators and Measures (CIM) Framework for school health and student achievement in Canada*. Summerside, PE: Pan-Canadian Joint Consortium for School Health (JCSH).

- Janesick, V.J. (2004). *“Stretching” Exercises for Qualitative Researchers*. Second Edition. Sage Publications.
- Jorgensen, D.L. (1989). *Participant Observation: A Methodology for Human Studies*. Sage Publications.
- Kapyrka, J. & Dockstator, M. (2012). Indigenous Knowledges and Western Knowledges in Environmental Education: Acknowledging the Tensions for the Benefits of a “Two-Worlds” Approach. *Canadian Journal of Environmental Education* 17. 97-112.
- Kemmis, S., McTaggart, R., and Nixon R. (2013). *The Action Research Planner: Doing Critical Participatory Action Research*. Springer Singapore.
- Klemmer, C.D., Waliczek, T.M. & Zajicek, J.M. (2005). Growing Minds: The Effect of a School Gardening Program on the Science Achievement of Elementary Students. *HortTechnology* 15(3): 448-452.
- Korteweg, L. & Russell, C. (2012). Decolonizing + Indigenizing = Moving Environmental Education Towards Reconciliation. *Canadian Journal of Environmental Education* 17. 5-14.
- Kozak, M. and McCreight, J. (2013). We Grew It!: Enrichment Through Gardening in Elementary School. *Applied Environmental Education & Communication* 12:29–37.
- Krasny, M.E. & Tidball, K.G. (2009) Applying a resilience systems framework to urban environmental education, *Environmental Education Research* 15:4, 465-482, DOI: 10.1080/13504620903003290
- Laaksoharju, T., Erja Rappe, E., & Taina Kaivola, T. (2012). Garden affordances for social learning, play, and for building nature–child relationship. *Urban Forestry & Urban Greening* 11: 195– 203.
- Langellotto, G.A. & Gupta, A. (2012) Gardening Increases Vegetable Consumption in School-aged Children: A Meta-analytical Synthesis. *HortTechnology* 22(4).
- Lather, P. (1986). Research as praxis. *Harvard Educational Review* 56(3), 257-277.

- Lekies, K. S., & Sheavly, M. E. (2007). Fostering children's interests in gardening. *Applied Environmental Education & Communication* 6(1), 67-75. doi: 10.1080/15330150701319362
- Libman, K. (2007). Growing youth growing food: How vegetable gardening influences young people's food consciousness and eating habits. *Applied Environmental Education & Communication*, 6(1), 87-95. doi: 10.1080/15330150701319388
- Lieberman, G. and Hoody, L. (1998). *Closing the Achievement Gap: Using the Environment as an Integrating Context for Learning*, State Education and Environment Roundtable. San Diego, CA.
- Lineberger, S.E. & Zajicek, J.M. (2000). School gardens: Can a hands-on teaching tool affect student's attitudes and behaviors regarding fruit and vegetables? *HortTechnology* 10(3):593-596
- Louv, R. (2005). *Last child in the woods: Saving our children from nature-deficit disorder*. Chapel Hill, NC: Algonquin Press.
- Lucas, B. (1995). Learning Through Landscapes: An organisation's attempt to move school grounds to the top of the educational agenda. *Children's Environments* 12(2), 233-244.
- Malone, K. and P. Tranter (2003). Children's Environmental Learning and the Use, Design and Management of Schoolgrounds. *Children, Youth and Environments* 13(2)
- Martin, C. L. (2011). *Lessons From the Garden: garden based nutrition education at two elementary schools*. Unpublished Masters Thesis, MSc.Nut. Michigan State University.
- McAleese, J. D. & L. L. Rankin. (2007). Garden-based nutrition education affects fruit and vegetable consumption in sixth-grade adolescents. *Journal of the American Dietetic Association* 107:662-665.
- Meinen, A., Friese, B., Wright, W., Carrel, A. (2012) Youth Gardens Increase Healthy Behaviors in Young Children. *Journal of Hunger & Environmental Nutrition* 7:192-204
- Miller, M.A. (2007). A Rose by Any Other Name: Environmental Education through Gardening, *Applied Environmental Education & Communication* 6:1, 15-17, DOI: 10.1080/15330150701385769

Miller, D.L. (2007). The Seeds of Learning: Young Children Develop Important Skills Through Their Gardening Activities at a Midwestern Early Education Program. *Applied Environmental Education and Communication*, 6:1, 49–66.

Moore, R. C. (1995). Children gardening: First steps towards a sustainable future. *Children's Environments*, 12(2): 222-232.

Moore, S.A., Apicella, J., Marston, S., & Thompson, M. (2012). Designing Nature for Learning: School Gardens for Youth and Child Education. *Children, Youth and Environments* 22(1), 250-259.

Morgan, P.J., et al. (2010). The impact of nutrition education with and without a school garden on knowledge, vegetable intake and preferences and quality of school life among primary-school students. *J. Public Health Nutrition* 13(11), 1931-1940

Morris, J.L., Neustadter A., & Zidenberg-Cherr, S. (2001). First-grade gardeners more likely to taste vegetables. *California Agriculture* 55(1):43-46.

Morris, J.L, Zidenberg-Cherr, S. (2002). Garden-enhanced nutrition curriculum improves fourth-grade school children's knowledge of nutrition and preferences for some vegetables, *Journal of the American Dietetic Association* 102(1): 91-93.

Namenek Brouwer, R. & Benjamin Neelon, S. (2013). Watch Me Grow: A garden-based pilot intervention to increase vegetable and fruit intake in preschoolers. *BMC Public Health* 13:363. <http://www.biomedcentral.com/1471-2458/13/363>

Nowatchin, E.A. (2014). *Educational Food Landscapes: Developing Design Guidelines for School Gardens*. Unpublished Masters Thesis, MLA, University of Guelph.

O'Brien, S.A. & Shoemaker, C.A. (2006). An After-school Gardening Club to Promote Fruit and Vegetable Consumption among Fourth Grade Students: The Assessment of Social Cognitive Theory Constructs. *HortTechnology* 16(1). 24-29.

Ontario Office of the Auditor General. (2009). Chapter 3.04: Education Quality and Accountability Office. Retrieved from http://www.auditor.on.ca/en/reports_en/en09/304en09.pdf

Ontario Ministry of Education (2009). *Acting Today, Shaping Tomorrow: A policy framework for environmental education in Ontario schools*. Queen's Printer for Ontario.

Ontario Ministry of Education (2014). *Achieving Excellence: A Renewed Vision for Education in Ontario*. Retrieved from <http://www.edu.gov.on.ca/eng/about/renewedVision.pdf> July 13, 2014. Queen's Printer for Ontario.

Orr, D. (2004) *Earth in Mind: On Education, Environment, and the Human Prospect*. Island Press.

Ozer, E.J. (2007). The effects of school gardens on students and schools: Conceptualization and considerations for maximizing healthy development. *Health Education & Behavior*, 34 (846)

Paperson, L. (2014). A ghetto land pedagogy: an antidote for settler environmentalism, *Environmental Education Research* 20:1, 115-130, DOI: 10.1080/13504622.2013.865115

Parker, R. (2012). *Lessons of the Land: best practices and suggested experiential activities for teaching about food, agriculture and the environment*. Unpublished Masters Thesis (M.Ed.), York University.

Parmer, S. M., Salisbury-Glennon, J., Shannon, D., & Struempfer, B. (2009). School gardens: an experiential learning approach for a nutrition education program to increase fruit and vegetable knowledge, preference, and consumption among second-grade students. *Journal of Nutrition Education and Behavior* 41(3), 212-217.

Passy, R. (2014). School gardens: teaching and learning outside the front door. *Education* 3-13 42(1), 23-38, <http://dx.doi.org/10.1080/03004279.2011.636371>

Pedlar, M. (2004). Editorial. *Action Learning: Research and Practice* 1(1), 3-7.

People for Education (2012). Healthy students/healthy schools. Report available online from <http://www.peopleforeducation.ca/document/healthy-schools-2012/> retrieved June 26, 2014.

Pigg, A.E., Waliczek, T.M. & Zajicek, J.M. (2006). Effects of a Gardening Program on the Academic Progress of Third, Fourth, and Fifth Grade Math and Science Students. *HortTechnology* 16(2).

- Poston, S.A., Shoemaker, C.A. & Dzewaltowski, D.A. (2005). A Comparison of a Gardening and Nutrition Program with a Standard Nutrition Program in an Out-of-school Setting. *HortTechnology* 15(3), 463-467.
- Pothukuchi, K. (2004). Hortaliza: A Youth “Nutrition Garden” in Southwest Detroit. *Children, Youth and Environments* 14(2), 124-155.
- Ratcliffe, M.M., Merrigan, K.A., Rogers, B.L. & Goldberg, J.P. (2011). The Effects of School Garden Experiences on Middle School-Aged Students’ Knowledge, Attitudes, and Behaviors Associated with Vegetable Consumption. *Health Promotion Practice* 12(1): 36-43
- Reason, P. and Rowan, J., Eds. (1981). *Human Inquiry: A Sourcebook of New Paradigm Research*. John Wiley & Sons.
- Richardson, Troy A. (2011) At the Garden Gate: Community Building Through Food: Revisiting the Critique of “Food, Folk and Fun” in Multicultural Education. *Urban Review* 43:107–123 DOI 10.1007/s11256-009-0146-x
- Ritchie, L. D., Crawford, P. B., Hoelscher, D. M. & Sothorn, M. S. (2006). Position of the American Dietetic Association: Individual-, family-, school-, and community-based interventions for pediatric overweight. *Journal of the American Dietetic Association* 106, 925-945. doi:10.1016/j.jada.2006.03.001
- Sato, M., Silva, R. & Jaber, M. (2014). Between the remnants of colonialism and the insurgence of self-narrative in constructing participatory social maps: towards a land education methodology, *Environmental Education Research* 20(1), 102-114, DOI: 10.1080/13504622.2013.852654
- Scully, A. (2012). Decolonization, Reinhabitation and Reconciliation: Aboriginal and Place-Based Education. *Canadian Journal of Environmental Education* 17, 148-158.
- Skelly, S. M., & Bradley, J. C. (2000). The importance of school gardens as perceived by Florida elementary school teachers. *HortTechnology* 15(3), 439-443.
<http://horttech.ashspublications.org>

- Skelly, S. & J. Zajicek. (1998). The Effect of an Interdisciplinary Garden Program on the Environmental Attitudes of Elementary School Students. *HortTechnology* 8(4), 579-583.
- Skinner, E.A., Chi, U., and The Learning-Gardens Educational Assessment Group (2012). Intrinsic Motivation and Engagement as “Active Ingredients” in Garden-Based Education: Examining Models and Measures Derived From Self-Determination Theory. *Journal of Environmental Education* 43(1), 16–36.
- Smith, L. L., and Motsenbocker, C. E. (2005). Impact of Hands-on Science through School Gardening in Louisiana Public Elementary Schools. *HortTechnology* 15(3), 439-443.
- Sobel, D. (2004) *Place-Based Education: Connecting Classrooms and Communities*. Great Barrington, MA: Orion Society, 2004.
- Sobel, D. (1998) *Mapmaking with Children: Sense-of-Place Education for the Elementary Years*. Portsmouth, NH: Heineman.
- Stevenson, R.B. (2007). Schooling and environmental education: contradictions in purpose and practice. *Environmental Education Research* 13(2), 139-153, DOI: 10.1080/13504620701295726
- Stewart, Iris T., Elizabeth K. Purner, and Patricia D. Guzmán (2013). “Socioeconomic Disparities in the Provision of School Gardens in Santa Clara County, California.” *Children, Youth and Environments* 23(2), 127-153. Retrieved June 17, 2014 from <http://www.jstor.org/action/showPublication?journalCode=chilyoutenvi>.
- Story, M., Kaphingst, K. M., & French, S. (2006). The role of schools in obesity prevention. *The Future of Children* 16(1), 109-142.
- Subramaniam, A. (2002). Garden-based learning in basic education: a historical review. University of California, Davis, 4-H Center for Youth Development Monograph. <http://fourhcyd.ucdavis.edu>

Thorp, L., & Townsend, C. (2001, December 12). *Agricultural Education in an Elementary School: An Ethnographic Study of a School Garden*. Proceedings of the 28th Annual National Agricultural Education Research Conference in New Orleans, LA (pp. 347–360).

Thorp, L. (2006). *The Pull of the Earth: Participatory Ethnography in the School Garden*. AltaMira: MD.

Torbert, W.R. (1981). *Empirical, behavioural, theoretical, and attentional skills necessary for collaborative inquiry*. In Reason & Rowan, Eds., *Human Inquiry: A Sourcebook of New Paradigm Research*. John Wiley & Sons.

Toronto District School Board (2010a). *Go Green: Climate Change Action Plan*. Operational Procedure PR603.
<http://www.tdsb.on.ca/AboutUs/Policies,ProceduresForms/Detail.aspx?docId=1756> Retrieved 26 June 2014.

Toronto District School Board (2000, 2010b). *The Environment*. Policy P028.
<http://www.tdsb.on.ca/AboutUs/Policies,ProceduresForms/Detail.aspx?docId=194> Retrieved 26 June 2014.

Toronto District School Board (2014). *Ecoschools Certification Guide and Planner*.
<http://www.tdsb.on.ca/AboutUs/Innovation/EcoSchools/HowtoApplyandCertificationResources.aspx>. Retrieved 26 June 2014.

Tsevreni, I. (2011). Towards an environmental education without scientific knowledge: an attempt to create an action model based on children's experiences, emotions and perceptions about their environment. *Environmental Education Research* 17(1), 53-67, DOI: 10.1080/13504621003637029

Tuck, E., McKenzie, M. & McCoy, K. (2014) Land education: Indigenous, post-colonial, and decolonizing perspectives on place and environmental education research. *Environmental Education Research* 20(1): 1-23, DOI: 10.1080/13504622.2013.877708

Turner, L., Sandoval, A. & Chaloupka, F.J. (2014). *Research Brief: School Garden Programs are on the Rise in US Public Elementary Schools, but are Less Common in Schools with*

Economically Disadvantaged Student Populations. Robert J. Wood Foundation: Bridging the Gap.

United Nations Environment Programme, International Environmental Education Programme. *The Belgrade Charter: a framework for environmental education*. UNESCO/UNEP. Retrieved from http://unesdoc.unesco.org/Ulis/cgi-bin/ulis.pl?catno=17772&set=53AC7E24_0_198&gp=0&lin=1&ll=1 June 26, 2014.

United Nations Educational, Scientific and Cultural Organization (1977). *Intergovernmental Conference on Environmental Education Final Report; Tbilisi (USSR)*. Retrieved from <http://unesdoc.unesco.org/images/0003/000327/032763eo.pdf> June 26, 2014.

Waliczek, T. M., Bradley, R. D., Lineberger, R. D., & Zajicek, J. M. (2000). Using a web-based survey to research the benefits of children's gardening. *HortTechnology 10*, 71–76.

Waliczek, T. M., Logan, P., & Zajicek, J. M. (2003). Exploring the impact of outdoor environmental activities on children using a qualitative text data analysis system. *HortTechnology 13*, 684–688.

Waliczek, T.M. & Zajicek, J.M. (1999). School Gardening: Improving Environmental Attitudes of Children Through Hands-On Learning. *Journal of Environmental Horticulture*, 17(4): 180-184.

Wals, A., Brody, M., Dillon, J., & Stevenson, R.B. (2014). Convergence Between Science and Environmental Education. *Science 344*, 583-584. AAAS.

Wang, M., Rauzon, S., Studer, N. et al. (2010). Exposure to a Comprehensive School Intervention Increases Vegetable Consumption. *Journal of Adolescent Health 47*: 74–82.

Williams, D.R. & Brown, J.D. (2012). *Learning Gardens and Sustainability Education: Bringing Life to Schools and Schools to Life*. NY: Routledge.

Williams, D. and Dixon, P.S. (2013). Impact of Garden-Based Learning on Academic Outcomes in Schools: Synthesis of Research Between 1990 and 2010. *Review of Educational Research 83* (2): 211–235.

Wistoft, K. (2013). The desire to learn as a kind of love: gardening, cooking, and passion in outdoor education. *Adventure Education & Outdoor Learning* 13(2), 125–141, <http://dx.doi.org/10.1080/14729679.2012.738011>

World Health Organization (2008). *School Policy Framework: Implementation of the WHO Global Strategy on Diet, Physical Activity and Health*. World Health Organization, Geneva, Switzerland.

World Health Organization (2009). *Milestones in Health Promotion: Statements from Global Conferences. The Ottawa Charter for Health Promotion, First International Conference on Health Promotion, Ottawa, 17-21 November 1986*.

World Health Organization (2009). *Interventions on diet and physical activity: what works: evidence tables*. World Health Organization, Geneva, Switzerland.

Yin, R.K. (2014). *Case Study Research: Design and Methods 5th Ed.* Sage Publications. Originally published in 1989.

Appendix A

1. OEEN Survey (Green Thumbs Growing Kids 2013, with thanks to Kate Greavette from York Region Food Network for data analysis and summary)

Ontario Edible Education Network Online Survey

June - September 2013

Total respondents: 21

**** survey respondents represent individual schools, public health units and community organizations**

Survey Respondents -

Represent: 89 gardens

The 89 gardens have the following participants:

Total Participants (5-65+): 7185

Total Participants (5-18 years): 5965

Location of Gardens

Mississauga (2)	Orillia
Toronto (9)	York Region
Guelph (3)	Lion's Head
Hamilton	Ottawa (2)
Fergus	

95% of the respondents' projects involve food gardening.

Q3 How was the project started/by whom?

23% of respondents indicated that their project 'grew out of casual conversation and built momentum over time'

29% of respondents indicated that their project 'was initiated by a community organization/NGO'

14% of respondents indicated that their project 'grew out of a parent's council planning meeting'

29% of respondents indicated that their project was started by a teacher/faculty/student champion

5% of respondents indicated that their project grew out of their local community health centre or transition town movement

Q4 Who do you see as the main driver(s) of your garden project?

24% of respondents identified **students** as the main driver of the garden project.

48% of respondents identified **school staff** as the main driver of the garden project.

24% of respondents identified a **NGO** as the main driver of the garden project.

Q5 How many years has your project been in existence?

The majority of school gardens are relatively new, with 15 respondents indicating their project is less than 5 years old. Three respondents indicated that their garden is between 6 and 10 years old.

Q6 How often does each child / youth visit your project (approximately)?

12 of 16 responses to this question indicated that children/youth visit their school garden frequently (either daily or weekly).

	Never	Infrequent	Occasional	Often	Regularly
Student Nutrition Programs	3	5		1	3
Nutrition Workshops	3	3	2	2	1
How to grow food workshops	1	3	2	4	7
Naturalization and Stewardship workshops	5	2	3	2	3
Cooking workshops	2	3	4	3	1
School/curriculum-based workshops	1	3	3	2	4
Teacher Training Workshops	7	5	1		
Community workshops outside school hours	8	3	3	1	1
Art projects	1	8	8		
Community meals	4	6	5	1	
Food bank donating	6	2	2		2
Seed Saving	3	2	7	2	3
Composting	1	1	4	1	10
Other					

Q7 What types of events / initiatives / programs happen at your garden project? (Check all that apply)

Q8 Do you record how many lbs of food are harvested through your project in each season?

24% of the respondents indicate that their project records the amount of food harvested each year. Of the respondents who record the amount of food harvested each year, 25% harvested 0-50lbs; 25% harvested 101-500lbs; 25% harvested 501-1000lbs; and 25% harvested more than 1001lbs.

Q9 Where is your garden located?

With the exception of two, all respondents indicated that their project is located on school/campus property. Of the two exceptions: one is a daycare located on municipal land, and the other is a garden located on private property.

Q10 Do you compost on-site at your garden?

84% of respondents compost onsite. Most common compost methods include: aerobic wood and wire bin, plastic bin, and vermi-compost.

Q11 How many volunteer hours are donated to your project each week?

Eight respondents indicated 1-5 volunteer hours per week; 3 respondents indicated 6-10 volunteer hours per week and 5 indicated more than 20 volunteer hours per week.

Q12 Does your project involve paid staff?

More than half the respondents to this question indicated that their project has paid staff: 11 respondents have paid staff; 9 respondents do not have paid staff.

Paid staff supports the garden project through a combination of tasks including administrative support, education and programming in the garden, and garden maintenance.

Generally speaking, paid staff support is a seasonal or part-time position.

Q13 If you have been gardening for more than one season, what has allowed your project(s) to be sustained & maintained over time? (brief, up to 200 words)

Respondents indicated hard work, and dedication of staff and volunteers as key elements of project sustainability. Many projects indicate a heavy reliance on grants and donors.

Q14 If research were undertaken in the near future to support increase school / community gardens for children, what type of information or research would be beneficial?

- Nutrition impacts of food gardening programs
- Academic performance impacts of food gardening

- Behaviour impacts of food gardening
- Special needs impact of food gardening
- Life skills development for participants
- Parenting/family interaction impacts

Q15 Would you be interested in being part of a mentoring project to support new school / community gardening projects for children?

11 respondents indicated yes; 3 respondents indicated no.

Q16 Would you benefit from the support of an experienced mentor’s support to your garden project?

13 respondents indicated yes; 3 respondents indicated no.

2. **Imagine A Garden in Every School campaign School Garden Survey** (Green Thumbs Growing Kids 2013, with thanks to Kate Greavette from York Region Food Network for data analysis and summary)

IGES School Garden Survey 2013-2014

September-December 2013, online

Survey Respondents: 34

Q1 What is your project name? (not included here)

Q2 Where is your project located?

Stratford	Ancaster
Mississauga	Kingston
Toronto (8)	Hamilton (2)
Port Hope	Whitby
Guelph	Cambridge (2)
South Bruce Peninsula	Metcalfe
Waterloo	Ottawa
Huntsville	Tobermory
Peterborough (6)	Stouffville
Primrose	Fonthill

Q3 Why was your project initiated and what issues does it address or celebrate?

- 79% of respondents indicated that their project was initiated for increased access to the natural environment and outdoor activities
- 79% of respondents indicated that their project was initiated for increased access to fresh healthy foods and nutrition
- 58% of respondents indicated other purposes for their school garden (no comments were listed)

Q4 What year did your project start?

Of the surveyed gardens, 1 was established prior to 2005. Eight gardens were initiated between 2005 and 2008; and 25 gardens were established between 2009 and 2013.

Q5 How do you care for your garden when school is not in session?

- Summer camp staff
- Volunteers
 - Students, families, neighbours and community residents are given access to a storage shed to water and weed. Volunteers sign up for a designated timeslot over the summer, and are responsible for getting it covered should their summer schedule change. In exchange for watering and weeding, volunteers can take some harvest with them.
- Drip irrigation system
- Plant smart
 - Plant crops for early/late harvest
 - Use native plants
 - Plant low-maintenance vegetables and fruits
- Develop a Garden Coordinator position (part-time)
 - Example: One school uses its District School Board of Niagara (DSBN) Energy Rebate to hire a student to tend to their garden and trees in the summer.
- Garden Champions
 - School staff and neighbours
- Daycare
 - Some schools collaborate with a local daycare to encourage the daycare to regularly visit the garden to water and harvest.

Q6 Do you use your project to grow food?

Twenty-nine gardens, representing 85% of respondents, grow food; 5 gardens do not.

Q7 If you do grow food, please estimate the number of pounds/year:

84% (25 gardens) of the respondents growing food, produce between 0 and 100 lbs of food annually; 4 of the gardens growing food produce between 101 and 500 lbs of food annually; 1 school garden produces more than 500 lbs of food annually.

Q8 What has been your greatest area of accomplishment/success and why? / How has your garden affected your school/or surrounding community?

The identified accomplishments can be broadly classified under the themes of Environment, Community Involvement and Curriculum Connection.

Environment

- “Seeing the cement courtyard yield such beautiful vegetables, fruits and herbs”
- Increased biodiversity and animal habitation
- Garden has become a popular formal/informal outdoor meeting space
- Urban students learning the basics of growing their own food
- Beautification – previously empty/unused spaces are now being gardened
- Garden expansions
- Wild edible tours are popular
- Students have broadened their knowledge and appreciation of gardening local food and the ecosystem

Curriculum Connection

- Extending growing season with use of polytunnel
- Increase in practical gardening and problem solving skills among students – students harvesting and processing food, leadership development – inspiring kids to show up week after week, year after year
- Value development – more caring, calm; thinking about (and appreciating) the processes that brings food to the table
- Successful planting and transplanting
- Linking garden development to the curriculum (designing the garden using math and computers)
- Students experiencing the process and engaged

Community Involvement

- Involvement of parents
- Enthusiasm!
- Garden projects have become a mecca for student volunteers
- Donations of seeds and supplies from the community
- Increased awareness of social justice issues
- Increased awareness of the garden within the community
- Building interest and enthusiasm for the community gardening
- Participating in agricultural fairs
- Serving food grown at the garden at school events
- Receiving approval to start a school garden
- Garden project has been a great opportunity to bring together community, both physically and digitally

Q9 What major challenges have you encountered in your project?

Theme	Concerns
Funding	<ul style="list-style-type: none"> • Lack consistent funding • Difficulty gaining donations of plants for the garden
Lack of Outdoor Time	<ul style="list-style-type: none"> • How to keep momentum for school garden strong in the winter • How to build consistency, when students tent to participate in garden on a short-term basis
Volunteers	<ul style="list-style-type: none"> • Coordinating volunteers <ul style="list-style-type: none"> - From year to year - Managing number of volunteers (especially when a lot of volunteers turn up!) - Managing volunteers when their level of gardening knowledge and know-how is so diverse - Building sustainability
Lack of Support and Guidance	<ul style="list-style-type: none"> • Lack guidelines/models for school gardens (what can/should not do) • Lack support on how to encourage the school community to look past the past the immediate and physical act of gardening, to understand significance of school gardens in broader context • Initial lack of expertise in getting project off the ground • Access to kid-friendly tools • Lack knowledge of what is best to plant for school gardens (e.g. what to plant for early/late harvest) • Staff being unwilling to 'get their hands dirty' • Difficulty working with School Board in planning stages of the ground
Location of site	<ul style="list-style-type: none"> • Ensuring sufficient sun • Aesthetics • Sufficient space to accommodate a class • Limited space for school gardens in urban schoolgrounds
Summer	<ul style="list-style-type: none"> • Promote opportunities to extend season (e.g. polytunnel, cold frame) • Ensuring sufficient coverage of school garden in school • Access to water in summer
Coordinating activities	<ul style="list-style-type: none"> • When different grades/classes on working on a school garden, some have

	expressed difficulty in coordinating all the ages and activities
Cross-Curricular planning	
Vandalism	
Deer/birds/rabbits eating produce	

Q10 What type of support(s) would be helpful from the Imagine A Garden In Every School Campaign?

- 1) Share information about funding opportunities (94%)
- 2) Host conferences, training webinars, and workshops related to garden education (80%)
- 3) Create a web-based tool to share lesson plans and curriculum resources (71%)
- 4) Provide ways for projects to network online (54%)
- 5) Provide email newsletter (34%)
- 6) Other (20%)
 - Create forum for donation of materials and plants for gardens
 - Mentorship program – schools visit other schools to learn about successes/challenges, share information and leverage gardens as necessary tools for all schools
 - Create a database of individuals in area who are willing to lend expertise
 - Networking (not through social media)
 - Set up network with high schools to provide names of students interested in maintaining school gardens for community service hours
 - Contact School Gardening Committees with ‘school garden sales kit’ or information on ‘how to find a School Garden Champion’ and how to talk to school administration

Q11 Policy change/action plans you would find most useful.

- 1) Increased opportunities for project funding (74%)
- 2) Prioritize gardens as part of school planning (68%)
- 3) Outdoor classroom funding and supports at the Board (65%)
Professional development for garden-based teaching and learning (65%)
- 4) Increased dialogue with policy makers and planners to understand how/why to include food gardens in/near schools (56%)
Increased access to food growing infrastructure (56%)
- 5) Garden consultant at Board (44%)
- 6) Curriculum change (41%)
- 7) Providing recommendations to governments (35%)
- 8) Other (3%)
 - There is no curriculum connection to school gardens in Junior grades, and thus limited time can be devoted to it

Appendix B

Teacher Survey Green Thumbs Growing Kids

Survey distributed to 36 teachers

Total respondents: 9 (25%)

Q1. We would like your feedback on your experience(s) with Green Thumbs Growing Kids' programs. Please rate the following:

Rating scale (from highest to lowest) of:

Excellent

Strong

Adequate

Needs Improvement

Poor

With the option of "No experience to rate".

100% of teachers surveyed said that the value of their class' experience was either **STRONG** or **EXCELLENT**

100% of teachers surveyed said that the quality of GTGK lessons & activities were either **STRONG** or **EXCELLENT**

89% of teachers surveyed said that the programming had **STRONG** or **MEANINGFUL** purpose for their students.

89% of teachers said that the level of student engagement was either **STRONG** or **EXCELLENT**

100% of teachers surveyed said that the staff's knowledge and ability to facilitate workshops was either **STRONG** or **EXCELLENT**

66% of teachers surveyed said that the level of volunteer support to help supervise classes was **STRONG** or **EXCELLENT**

Q2. In your own words, what was most valuable about your class' experience in the program(s):

Activities that do not end on the day of the visit. They see the tangibility of the activity when they plant their seedlings and then as the summer nears or ends see the "fruits of their labour"

The hands on nature of the experience is key; I love how the students were able to interact with the volunteers to ask questions etc.

Hands on. Easy to integrate into almost any school day in some way.

- Active, engaging and relevant outdoor time - sense of stewardship for something tangible their school community - confidence with caring for plants and the environment - connection with caring adults in the community

- Getting them into the garden -

Students getting their hands dirty, and learning about plants and gardens from educators who know a great deal, love teaching, and clearly love learning and sharing.

In order to understand the value of our physical environment students must have hands-on access to it. A garden at school promotes a sense of responsibility, ownership and pride in the community and our earth's environment. Students overcame their squeamishness in response to earth and worms: they absolutely adored the worms and learned how to handle them with care while appreciating their importance in the circle of life. The students also really liked working with [REDACTED], who emanates a joy, generosity of spirit and an expertise the students really respond to.

I have always enjoyed the programs at Allen Gardens. My students were engaged in the hands-on activities provided. I would suggest that the tour of the greenhouse could be improved by providing smaller groups so that all of the students could hear the information and pose questions. I would also spend less time sitting and listening to the opening presentation and more time 'doing'.

Q3. I found it easy to incorporate the school garden into my curriculum:

89% of teachers surveyed found it easy to incorporate the school garden into their curriculum.

Comments:

The program related directly to science, social studies and language curriculum.

Q4. I would attend professional development relating to the school garden programs

77% of teachers surveyed said they would attend professional development (PD) related to the school garden.

Comments:

How to wake up the garden and put it to sleep. What needs to be done to keep it up and running during the growing season while school is still in.

How to incorporate the garden more into our plants curriculum when I don't have much general knowledge about plants i.e. I learn what I need to for the curriculum but I don't have more in depth knowledge about plants that I could answer other questions

Incredibly helpful to talk to each other face-to-share, share successes, learn from each other.

How to extend the program through the winter months by growing in the classroom more about food security and local food movements in our community

- Big ideas - extensions - working collaboratively with shared resources, i.e. books, sites

I think that simple lessons, as well as a time frame with required materials is useful.

Time is so limited!!

Q5. I find the school garden most useful for:

A. Teaching the curriculum

B. Extracurricular activities: (choose one)

78% of teachers surveyed found the school garden useful for teaching the curriculum.

22% of teachers surveyed found the garden useful for extracurricular activities.

Comments:

It's really both. Can't just choose one!

it could be used either way but there are so many aspects of the curriculum that can easily be integrated into the experience

I find I've had to incorporate the garden into all parts of the curriculum in order to maximize time spent in the garden.

Q6. I noticed a positive change in my students' behaviour who participated in gardening activities:

66% of teachers surveyed said they noticed a positive change in the behavior of students who participated in garden activities.

Comments:

It didn't help with those children who have challenges with their behaviour, but it may have aided those who have problems listening, to be active.

The outdoor active learning was ideal for my group

The garden allows an inclusive environment where many learning modalities are honoured.

Students spend too much time indoors, and too much time sitting. When they are engaged in experiential and meaning learning their behaviour tends to be fantastic...no surprise!

It brought out their gentleness and caring, and opened up their perspective and understanding of natural science.

Q7. I found the GTGK staff easy to contact and communicate with regarding questions, suggestions and scheduling

100% of teachers agreed or strongly agreed that the GTGK staff were easy to contact and communicate with regarding questions, comments, suggestions, and scheduling.

Comments:

████████ *REALLY fast with communication and her volunteers are REALLY good!*

Very easy - helpful and accommodating my only suggestion for improvement is with planning more specifically geared towards the comprehension and attention levels of young children vs young adults.

Email and response is timely

Q8. I would like to play a more active role in my school's garden outside of GTGK programming:

44% of teachers surveyed either agreed or strongly agreed that they would like to play a more active role in their school garden outside of GTGK programming.

44% we impartial to the idea of playing a more active role in their school garden outside of GTGK programming.

11% strongly disagreed that they would like to play a more active role in their school garden outside of GTGK programming.

Comments:

Not sure what support I'd need, but my VP and P are supportive of finding new ways to do gardening in other parts of the school or surrounding area.

Would love to - but will likely not be returning to same school next year

I look forward to ongoing collaborations with GTGK, sharing in mutual learning as well as materials, photos, lessons.

Time is so limited!!

Q9. I would be most interested in participating in the following themed programs (eg. a workshop series):

89% of teachers surveyed would be interested in participating in programming with a land-based tradition theme.

78% of teachers surveyed would be interested in culinary and biodiversity themed programs.

When asked what kind of theme based programming teachers would be interested in they showed a high interest in land-based traditions (89%), culinary programming (78%), and biodiversity (78%).

Interest wasn't as strong in storytelling (44%), movement and music (44%), and visual arts (33%).

Comments:

All of the above. Thank you.

I really would like a contact and resources regarding aboriginal strategies and perspectives on biodiversity, storytelling, all of the above.

They all sound exciting to be honest; I can't prioritize, as the possibilities are endless in each area. Keep up the incredible work.

No, because I am no longer a classroom teacher.

Appendix C

INFORMED CONSENT FORM FOR IN-PERSON INTERVIEW

My name is Sunday Harrison. I am a student at York University in the Faculty of Environmental Studies. For my final research project, I am interested in teacher attitudes towards school gardens, garden-based learning, and teachers' knowledge of policies that support or hinder school gardens. I am therefore asking if you would agree to participate in my research by answering a series of questions. I think you may benefit from participation in this research because sometimes when we reflect back on previous experiences or collect our thoughts on a topic we can learn or understand events in a new way. If you feel uncomfortable or concerned about this please let me know and we can either not continue with the interview or reschedule at a time that is more appropriate.

Please understand that you do not have to participate in this research, and that you can terminate your participation at any time during the course of the interview. Also feel free to skip any particular question and move on the next one at any time during the interview. In addition, once the interview is finished, you have the right to ask me to erase the tape recording and not include the information you provided.

This research is confidential and no individuals or organizations will be identified without their consent. Any information that could reveal your identity or that of your school will be excluded from any future articles or research reports that are written based on this research.

If you have any questions or concerns, please feel free to contact my Supervisors:

Tim Leduc, Assistant Professor, FES, (416) 736-2100 x 22103 tleduc@yorku.ca

Rod MacRae, Associate Professor, FES, (416) 736-2100 x 22116 rmacrae@yorku.ca

for answers to questions about this research and about the rights of participants.

I am fully aware of the nature and extent of my participation in this project as stated above and the possible risks from it. I hereby agree to participate in this project. I acknowledge that I have received a copy of this consent statement.

Signature of participant

Date

Printed name of participant

Signature of researcher

Appendix D

The comparative case studies were conducted as part of the Policy Enactments in Sustainability Education (PEASE) project, supervised by Timothy Leduc, Assistant Professor, Faculty of Environmental Studies. The Research Ethics approvals were made by both York University and the Toronto District School Board.