

**UNDERSTANDING SCHOOL FARMS AND THEIR CAPACITY TO BUILD FOOD  
LITERACY EDUCATION IN BRITISH COLUMBIA**

by

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submitted by Samantha A. Blair in partial fulfilment of the requirements for

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in Integrated Land and Food Systems

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## Abstract

Food insecurity, diet-related chronic illnesses, and climate change have become more prominent in public health and education policy, leading to the identification of many policy and program gaps in our food and education systems. Research shows young adults finishing secondary school without consistent food education lack knowledge of basic nutrition, food skills, food systems, everyday food practices, and food production. School farms as food literacy interventions can positively impact food literacy and food security. Links have been established between food literacy and food system knowledge and healthier food practices to decrease diet-related diseases like obesity and diabetes amongst individuals and improve overall community health and well-being. However, little research exists on self-identifying school farms as unique and specific programs or their connection to food literacy in secondary schools. This community-based research study aimed to develop a working definition of ‘school farm’ and understand school farms’ capacity to build adolescent food literacy. I used semi-structured interviews with multiple stakeholders (n=18) across 6 school farms in British Columbia, Canada and applied Framework Analysis using food literacy and community determined frameworks as well as inductive coding to analyse qualitative data. My analysis showed that school farms are defined by 1) food production capacity and scale; 2) community integration; and 3) experiential educational opportunities to teach food system and core curricula. School farms offer comprehensive food literacy education, including individual and collective food system skills, behaviours, and knowledges, to improve personal, community, and environmental health. My data also revealed school farms’ positive impacts on students’ mental health and well-being, and the academic success of neurodivergent and culturally diverse students who often struggle in traditional formal education settings. Additionally, the data indicated school farms face major

barriers like funding, sustainability, and management obstacles. This study helps to clarify the concept of school farms and explain how they contribute to student food literacy, especially within the context of British Columbia.

## Lay Summary

British Columbia is unique in that there are several functioning school farms in the province.

While there are established and tested models for food education curriculum for primary school students and in school gardens, and plentiful research on secondary school agricultural education in the United States, there is little research on secondary school food education in Canada or research on self-identifying ‘school farms’. The few schools in Canada undertaking high school food education via school farms are doing so with limited resources, research, and support.

While the idea of ‘school farms’ is not new, there did not exist a cohesive or working definition of what a school farm is, making them difficult to replicate, research, and discuss. As a result, this thesis sought to define a ‘school farm’ and its potential capacity to teach adolescents food literacy, and/or food-related and food system topics.

## Preface

During this thesis work, I, Samantha A. Blair, designed and conducted a scoping literature review and qualitative study using semi-structured interviews to better understand school farms generally as well as their role in BC as food education and food literacy interventions. As the main investigator in the scoping review, I was supported in the design of the study by UBC reference librarian Katherine Miller, who advised me on proper search and database approaches. Two fellow reviewers, Gabrielle Edwards and Katherine Yu, helped review titles, abstracts, and full texts of articles. My committee members (Dr. Annalijn Conklin, Dr. Kerry Renwick, Dr. Lisa J. Powell, and Dr. Eduardo Jovel) were instrumental in the review of my analysis and editing of my write-up and presentation of results.

The interview-based qualitative study was designed in collaboration with my supervisor Dr. Annalijn Conklin with support from my whole committee as well as more than a dozen members from the BC food education community who reviewed my research proposal to refine methods, research questions, and analysis techniques to reflect community needs and ideas. I solely conducted all data collection and analysis. I sent included results involving participant quotes or descriptions to participants for verification. My supervisor and committee all provided feedback on the presentation of my results and analysis which informed my final thesis draft.

I, Samantha A. Blair, am responsible for the vast majority of the research and writing featured in this document. My supervisory committee listed here as co-authors all contributed grammatical and structural edits and provided prompts to expand and clarify my ideas.

The Behavioral Research Ethics Board approved the interview-based study, which is documented on the Certificate of Approval (UBC BREB number: H21-00347) and approval from all four school districts included in this study was obtained prior to conducting my research.

Chapter 3 is based on my work in Dr. Annalijn Conklin's lab with Gabrielle Edwards and Kathrine Yu. I was responsible for designing the scoping review, organizing the articles in Covidence, managing the review team, conducting data collection and combining results from all three reviewers and facilitating consensus for inclusion of eligible literature. I drafted results and analysis alone before receiving feedback from the review team and my supervisory committee.

I submitted Chapter 3 to a journal on April 6, 2022 with co-authors Gabrielle Edwards, Katherine Yu, Dr. Eduardo Jovel, Dr. Lisa Jordan Powell, Dr. Kerry Renwick, and Dr. Annalijn I. Conklin; my manuscript was returned July 6, 2022 to revise and resubmit.

The results of my qualitative study (Chapters 5 through 8) are in preparation for a manuscript submission, which will include Dr. Eduardo Jovel, Dr. Lisa Jordan Powell, Dr. Kerry Renwick, and Dr. Annalijn I. Conklin as co-authors.

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## List of Abbreviations

AEC Agricultural Education Centers  
ADEF Agricultural Display/Experience Facilities  
BC British Columbia  
CBR Community Based Research  
CCHS Canadian Community Health Survey  
CFSE Critical Food System Education  
CHSA Coalition for Healthy School Food  
CSA Community supported agriculture  
DPS Denver Public Schools  
F2S Farm to School  
F2SBC Farm to School British Columbia  
FAO World Food Programme of the United Nations  
NPO Nonprofit Organization  
PBE Place based education  
PHABC Public Health Association of British Columbia  
PLO Prescribed Learning Outcomes  
SBLH School-Based Land Holdings  
SSF Specialized Small Farm Operations  
WSCC Web of Science Core Collection

## Acknowledgements

In a time of pandemic and isolation from the institution of UBC and the province of British Columbia, I am forever grateful to my parents, Jamie and Smed Blair. They reminded me that we are never too old to come home and no matter how much we “know,” it is the love and support of our family, friends, and communities that allow us to grow and improve ourselves and our contributions to the world.

I thank my advisor Dr. Annalijn Conklin for taking a chance on me, my liberal arts education, and my real-world experience as the foundations of my knowledge coming into this degree. In sharing her expertise, I have learned the true value of interdisciplinary work and bridging academic and community objectives. I am also grateful for her demonstration that life is never linear or predictable, and our health, well-being, relationships, and perseverance are the basis of our success.

Special thanks to my committee, Dr. Kerry Renwick, Dr. Lisa J Powell, and Dr. Eduardo Jovel, for their diverse knowledge and interdisciplinary perspectives, which forced me to think more critically about my research and the implications of my findings.

Lastly, I offer my gratitude to my fellow students and friends at UBC, who have inspired me to continue my work in this field and created a family and a support system despite the chaos of the last two years.

## Chapter 1: Introduction

North American and global food systems are industrialized, built, and propped up by our governments to generate significant profits for agri-food corporations and their shareholders at the expense of the environment, human health, and wellbeing (Rose & Lourival, 2019; Willett et al., 2019). The public health crises in our society of chronic diseases like obesity and diabetes (Loewen et al., 2019; Settee & Shukla, 2020) and food insecurity (Statistics Canada, 2022) are expressions of the state of our food system (Rose & Lourival, 2019). According to the Statistics Canada's Canadian Community Health Survey (CCHS) (2020), one in 8 households, or 4.4 million people are food insecure in Canada (Tarasuk & Mitchell, 2020). A person is food insecure when they are limited or are unable to acquire adequate nutritional and safe food in socially acceptable ways. This number does not account for First Nations reserves inhabitants (*National Report of the First Nations Regional Health Survey: Phase 3. Volume One*, 2018; Settee & Shukla, 2020) or homeless people- two groups which are at high risk of food insecurity (D. Morrison, 2020; Tarasuk & Mitchell, 2020). In addition, about 17 % of children younger than 18 in Canada are food insecure, as families with children are more likely to struggle to acquire food (Tarasuk & Mitchell, 2020).

Society can fight food insecurity and aid citizens suffering from food-related diseases by providing stable systems of physically available healthy food that is both economically and socio-culturally appropriate and can be utilized by recipients (The EC - FAO Food Security Programme, 2008; West et al., 2020). However, considering there is no shortage of food production (Holt-Giménez et al., 2012), there is an apparent systemic disconnect between the producers and consumers of food, causing a tremendous strain on public health.



A person's psycho-social factors and broader determinants like their social-cultural environment, living conditions, learning environment, and access to food and facilities affect a person's relationship and knowledge of food (Desjardins, 2013). This thesis will focus specifically on the learning environment and how school food education affects students' knowledge and relationships with food. Insufficient food education contributes to the continuing problems of food insecurity and diet-related illness. The following background chapter will describe popular food education delivery and the potential to improve educational and nutritional outcomes based on changing learning models. [Chapter 3](#), a scoping literature review on self-defining school farms, was conducted prior to the qualitative study. This review helped situate school farms in a historical and global context before the qualitative study (featured in Chapters 4 through 8) focused on school farms in British Columbia.

As part of this thesis, the literature review and the community-developed research project sought to define self-identifying school farms and understand how these specific programs could serve secondary school students as potential food literacy interventions.

The main research topic of my thesis was to understand how to define school farms in BC and their capacity to build food literacy, specifically with adolescents; my thesis had five key objectives as follows:

1. Develop a working definition of a school farm (within a BC context) to distinguish them from other school food programming (nutrition classes, school gardens, community gardens, cooking classes, home economic courses, etc.)
2. Determine what gaps exist in secondary school food education in Canada and whether school farms can fill these gaps.
3. Listen to the experiences and goals of the community members responsible for making and participating in school farms, and determine if they promote or align with concepts of food literacy.

4. Create a knowledge base around school farms to help communities enhance their school food education.
5. Further community goals of food security and food sovereignty through food literacy education.

The scoping literature review in Chapter 3 provides an overview of existing research and literature on the topic of self-defining school farms globally. The findings of my qualitative study of semi-structured interviews with 18 stakeholders involved in 6 BC school farms are detailed in Chapters 5 through 8. The chapters describe the main themes contributing to the knowledge of what school farms are and their capacity to teach food literacy, including school farm structure, school farm education, school farm impact on students, and definitions of a school farm. The findings also depict common goals and challenges school farms face. Various types of mapping in the following chapters illustrate how school districts, school farms, and stakeholders individually and collectively experience the main facets of school farm programs and how they understand school farms' contribution to food literacy education generally and specifically for adolescents. This thesis ends with a broad discussion of my research (Chapter 9) and provides recommendations and future directions in a concluding Chapter 10.

## Chapter 2: Background

### 2.1 Nutrition Education and Individual Behavioral Focus

Traditional nutrition and individual behaviour-focused methods of food education deliver ‘depoliticized’ and individualized health paradigms that trap students in the idea of dietary choice as their only means of agency in their health, public health, or their food systems (Flowers & Swan, 2016; Rose & Lourival, 2019). Food education has been traditionally taught through formal education using conventional pedagogical methods and ‘value-neutral’ curricula (Crosley, 2013; Rose & Lourival, 2019). An education that is ‘value-neutral’ is not neutral when you consider the context of the information *not* being taught. There is an epistemological tension where traditional nutrition science is privileged over cultural and social knowledge of food and participation in the food system, especially amongst marginalized and low-income communities (Dawson, 2020; E. Swan & Flowers, 2015). Historically, environmental and food education decision-makers have chosen to emphasize individual choice rather than collective action and participation in the food system and have told people nutrition alone is the answer to their food-related issues; this type of food education discounts system injustices related to race, class, gender and culture (Crosley, 2013; Dawson, 2020; Rose & Lourival, 2019; Stapleton, 2015). Traditional food and environmental education curricula generally avoid these subjects and replace them with health-focused teachings (Harris & Barter, 2015).

Criticism of traditional nutrition education points to the fact that nutrition education does not question *why* our society is suffering at the hands of our food system, but rather perpetuates a culture of condemnation of individuals who are taught to believe that if they just eat a more nutritious diet, regardless of external factors, they can achieve health. This puts the onus of health on the individual rather than addressing many of the larger societal pressures and

determinants of health related to food knowledge, practices, access, and consumption (Dawson, 2020; Fingland et al., 2021). Some experts view nutrition education of this type more reductively as *nutritionism*, which perpetuates targeted ideas of ‘good’ or ‘bad’ nutrients and consequently ‘good’ or ‘bad food’ (Renwick & Smith, 2020). The food industry has commercialized this decontextualization of food from ecological or social relationships to convince consumers to purchase and consume highly processed foods based on a prescription of ‘good’ or ‘bad’ nutrients (Dawson, 2020; Renwick & Smith, 2020) without regard to the nuances of culture, place, or access to food. The individualized focus reinforces rather than challenges the prevailing neoliberal capitalist food system hegemony under the guise of personal dietary health choices. Nutrition education in this way is flawed because food knowledge, rather than food experience or practice alone, cannot benefit an individual’s health and will ultimately not benefit society (Park et al., 2020). By prioritizing nutrition education over a broader food system education, people’s food knowledge is built on Western ideals and standards of health and dominance over nature, which discounts the lived experience and cultures of people, specifically marginalized populations (Rose & Lourival, 2019; E. Swan & Flowers, 2015), like Indigenous peoples and other minorities (Dawson, 2020).

Although studies show that nutrition education and application of that knowledge in school positively impacts behaviour change and food knowledge of students (Fordyce-Voorham, 2011; Sadegholvad et al., 2017; Zhou et al., 2016), there are questions about whether or not nutritional literacy alone can achieve better health outcomes. Broader determinants rather than food knowledge and behaviour change alone contribute to growing trends in nutrition-related diseases such as economic, education, racial discrimination, and political determinants (Cockerham et al., 2017; Desjardins, 2013). For example, despite nutrition knowledge and application links to

positive food knowledge and behaviour, macro trends indicate obesity rates for the last decade have increased and are predicted to continue to rise (Carrara & Schulz, 2018; Swinburn et al., 2011).

## **2.2 Types of Food Knowledge**

Aside from the focus on individualism and nutrition, another concern of contemporary food education is the top-down model of vertical learning, which does not permit informal or lateral ways of learning through local or different knowledge systems, like Indigenous food systems (Gartaula et al., 2020). Knowledge is acquired through a mix of formal and informal sources. Formal knowledge is typically learned in a classroom using organized syllabi and curriculum. In contrast, informal knowledge is learned from social relations and networks of people in a home and community environment (Coca, 2021; Gartaula et al., 2020). When discussing education, it is essential to consider both informal and formal knowledge and how these knowledges intersect and impact the behaviours and beliefs of people, especially young students. The qualitative research in this thesis focuses on young people, specifically adolescents enrolled in secondary schools.

The absence of community and informal knowledge in food education today is perhaps motivated by a disconnect in governing bodies that recognize food insecurity and its consequential health problems, but do not address appropriate solutions like improved food education to solve the social issues at the root of those problems. For example, the World Food Programme of the United Nations (FAO) highlights food insecurity issues, including access, utilization of food, and stability. Still, their solutions do not include food or food system education (Gartaula et al., 2020).

Park's 2020 study recognizes that while the FAO emphasizes that our food systems must be reassessed in the global context of rapid population growth, urbanization, change in consumption habits, and the pressures of climate change, the lack of a conceptual framework guiding food system research is problematic (2020). Moreover, there is a lack of research on how food education could solve these issues, which has led to educational gaps discussed later in this chapter. As a potential solution to address the gaps in food education, I am positing the application of a framework known as food literacy to food education, which includes different types of food knowledge, addresses food system inequities and health issues, and expands beyond the primary focus on nutrition education. Previous studies assessing youth attitudes toward the food system (Harmon & Maretzki, 2006a, 2006b) and what should be taught about nutrition and food systems in secondary schools (Sadegholvad et al., 2017) concluded that nutrition, food skills, food systems and food ethics are essential for students' food education. , As literature expands on food literacy, there is a congruent expansion of food education programs including broader food system topics of agriculture, ecology, social, economic, and health related topics.

## **2.3 Food Literacy**

The definition of food literacy continues to evolve with research, and there is no consensus on the characterization and measurement of what it means to be 'food literate' (Rosas et al., 2020; Thompson et al., 2021). At present, definitions of food literacy fall into two main themes: (1) individual knowledge, choice, and skill and (2) collective action, knowledge, and participation. The first addresses a person's food skills and knowledge of food, and the second refers to how people function as informed members of critical food contexts (Slater et al., 2018; Truman et al., 2017). Definitions of food literacy from the early 2000s were dominated by an individualistic

approach to food. Education focused on culinary skills and nutritional knowledge. Educational policy and practices focused on concepts of personal resources, capabilities, knowledge, skills, and behaviour centred around people needing to meet national nutrition recommendations (Rosas et al., 2020; S. P. Wijayaratne et al., 2018). Across most food literacy definitions in contemporary literature, the most consistent themes are nutrition knowledge and the practical skills, behaviours, and competencies necessary to feed oneself; how to plan, manage, prepare, preserve, cook and eat foods affectively and safely (Desjardins, 2013; Perry et al., 2017; Rosas et al., 2020; Vidgen & Gallegos, 2014). The second theme of the food literacy definition focuses on collective well-being related to food and understanding how individuals, families, communities, and society can have improved diets (Vidgen & Gallegos, 2014).

Eating is a pedagogical act made up of many teaching and learning opportunities connected by the diverse and various agents and processes required by our food system (E. Swan & Flowers, 2015). The expansion of the definition of food literacy shows the distancing from individual decision-making to a more encompassing participation of the food system involving ecology, culture, politics, and economics within the food system. This expansion seeks to empower people to make lasting changes that will positively affect the health of their communities (Rose & Lourival, 2019). A food literate person with these competencies will possess a critical understanding of the food system and will have the ability to achieve personal health, well-being, and a level of self-efficacy and confidence to contribute to the sustainability of their food system (Begley et al., 2019; Cullen et al., 2015; Lalli, 2021; Perry et al., 2017; Rosas et al., 2020; Slater et al., 2018; Thompson et al., 2021). A functionally food literate person understands and has access to information about how food affects people and the planet's well-being.

Food literacy in education is often spoken of as a means to achieve food sovereignty, or a people's right to form and regulate their own food and agricultural system to produce healthy and culturally appropriate food using sustainable and ecologically sound methods. Food sovereignty is locally defined by a population in relation to their social and ecological context (Powell & Wittman, 2018). This idea of food sovereignty relies on both the knowledge of the individual as well as the knowledge and participation of a community. This complexity can also be seen in the evolution of the definition of food literacy. Food *system* literacy encourages conversations and engagement to link topics of structural inequities, injustices, and environmental sustainability. This systemic piece is vital to achieving food sovereignty (Widener & Karides, 2014). The continued development of food system literacy with a critical lens will enable citizens to advocate for both themselves and their communities by choosing and voicing support for a food system that values the health of their environment and wellbeing over the profits of industrialized food structures (Rose & Lourival, 2019), thus working towards a more food sovereign future for coming generations.

## **2.4 Food Literacy in Practice**

A study by Sadegholvad et al. (2017) identified a global pedagogical gap in food education programs. There is a structural curriculum-based problem, where students have inconsistent exposure to hands-on, skill-based food programming like cooking or food production. Their proposed solutions involve incorporation of more informal education opportunities or experiential education to allow for skill-based learning. Place-based education (PBE) (Pontius et al., 2020; Roberts, 2011) and critical pedagogies (Meek & Tarlau, 2016), which are often experiential, help schools address knowledge delivery issues of traditional formal food education. These experiential food education approaches help students develop an awareness of



food sovereignty and food systems through experiential action, helping them to build a critical consciousness of their role within their food system (Coca, 2021; Crosley, 2013; Harris & Barter, 2015; Rose & Lourival, 2019). Transformative learning and raised consciousness through engaging and motivating environmental- and food-based education is critical to promoting food system literacy (Rose & Lourival, 2019).

PBE and critical education approaches seek to infuse education with a sense of moral obligation and community participation by creating symbiotic teaching and learning ideologies and practices shared by various agencies, institutions, and people, in order to refocus education on the production, distribution, preparation, consumption, and disposal of food (Rose & Lourival, 2019). PBE blends ecological and social justice issues (Gruenewald & Smith, 2008) and encourages rehabilitation to the environment and the decolonization of ecological literacy through critical and transdisciplinary learning (Mier y Terán Giménez Cacho et al., 2018). Another approach, Critical Food System Education (CFSE) acknowledges the importance of community members and teachers to not only teach food education curricula but also promote the involvement of informal food knowledge that exists already within communities (Meek & Tarlau, 2015). CFSE as a theoretical framework helps situate students' food system knowledge in a way that empowers them to realize their potential to transform food and social justice issues through collective action (Meek & Tarlau, 2015).

Food education participation is related to improved consciousness around food and eating habits based on people's informal knowledge and connections to place (Rose & Lourival, 2019). With the support of schools, experiential learning can contribute to students' food literacy and support informal food education to ultimately build community food security (Gartaula et al., 2020).

Studies in both Western and non-Western contexts report the need for food education to be reinforced in school (Fordyce-Voorham, 2011; Sadegholvad et al., 2017).

## **2.5 Food literacy for Adolescents**

Adolescents are a key demographic for food education because students are considered future decision-makers and influencers of the food system (Gartaula et al., 2020; Nanayakkara et al., 2017; Slater et al., 2018; A. Smith, 2020). While food literacy is a useful framework to educate students in general about their food system, this thesis focuses specifically on adolescents in secondary school. In the Canadian context, secondary school includes grades 9 through 12, which generally serves students between the ages of 14 and 18 (EduCanada, 2020). This age group is referred to as teenagers or adolescents (Center for Disease Control, 2020). In Westernized countries, including Canada, secondary schools have less opportunities, programming, or compulsory classes that teach about food, and graduates' knowledge of nutrition and food systems is insufficient (Ashlee & Fuller, 2021; *LEAF Teenage Years Engagement Survey*, 2018; Nanayakkara et al., 2017; Sadegholvad et al., 2017). Students graduating have little to no knowledge of basic nutrition, food skills, food systems, everyday food practices, or food production (Colatruglio & Slater, 2016; Sadegholvad et al., 2017). This is especially problematic because research shows adolescent years are key in helping people establish healthy food habits, understand career pathways, and question food system related issues (Nanayakkara et al., 2017).

The importance of nutrition and food knowledge for teenagers is based on the fact that their dietary requirements are different from children and so they require a deeper understanding of food skills and how food can promote healthy eating (Brooks & Begley, 2014). Influencing the fresh produce intake of adolescents is thought to have a long-standing impact on their health

(Brooks & Begley, 2014). Because unhealthy eating habits and weight gain established in adolescence are generally maintained in adulthood (Brooks & Begley, 2014; Leone et al., 2015), the potential to impact teenage health is another motivator for improved secondary school food education.

Food literacy seeks to improve young people's eating and food choices (Truman et al., 2017) but youth require more than basic nutrition knowledge and food skills to navigate the food system and improve their well-being (Slater et al., 2018). It is not just important to promote nutrition and food choice among adolescents, but knowledge of various cooking methods were also deemed important in order to reach an outcome that was delicious and met different health, dietary, and budgetary demands (Fordyce-Voorham, 2011). Also, adolescents need to be exposed to situations where they can learn to identify quality, seasonal, fresh food as a consumer.

Recognizing *quality* food extends beyond simple nutrition classes, and includes understanding the environmental sustainability of food practices and food production like ethical farming and manufacturing processes (Fordyce-Voorham, 2011). The knowledge of the processes of food production is related to issues of environmental sustainability and animal welfare, and when consumers do not have the necessary information to choose sustainable food, they are perpetuating not only poor food choice behaviours but detrimental environmental practices (Sadegholvad et al., 2017).

Studies also suggest that adolescents should be exposed to both formal and informal knowledges when it comes to food literacy (Coca, 2021; Gartaula et al., 2020; E. Swan & Flowers, 2015).

High school students experience the interface between food and nutrition informal knowledge at home and with friends, and formal knowledge at school. They are at an age and development stage where they are self-motivated to learn from both (Gartaula et al., 2020). The inclusion of

informal knowledge is especially important because a teen's ability to choose and make healthier food decisions on an individual level is increased when families and communities are also involved in food education (Barbosa et al., 2017). International studies report how parents can influence healthy eating behaviours for teenagers; meaning if the family is involved in the food education process, schools can strengthen their food education (Rathi et al., 2016; Sadegholvad et al., 2017; S. Wijayaratne et al., 2021). The importance of parents was identified not only to help influence young people's eating behaviours, but the parents also have the opportunity to learn from their children. Previous research indicates that adolescents have a direct role in impacting, purchasing, and sometimes preparing meals in households and so teaching them food literacy can influence their peers', family, and their own short and long-term health (Brooks & Begley, 2014; Hunt et al., 2011). Food literacy is especially pertinent to adolescents who are to become parents after or during high school, given their food system knowledge is critical to their child's nutrition and health (Sadegholvad et al., 2017).

Community resources can help develop adolescents' independent living skills and bring extra value to schools by creating extended opportunities and connecting youth with their community. These resources are valuable for students to know and feel comfortable using once they leave school and are living on their own (Barbosa et al., 2017; Fordyce-Voorham, 2011). Other examples of informal food literacy education include engaging adolescents in informal education models such as farmer groups, local service provisions, agri-entrepreneurship, and farmer schools (Gartaula et al., 2020). A good balance of both formal and informal education in secondary schools will provide students with food literacy skills that will lead to better food system knowledge, improved community food security, and greater food sovereignty for current and future generations (Gartaula et al., 2020; Renwick & Powell, 2019).

For students to be able to relate food knowledge, agriculture, social responsibility, and education, they must have experiential learning of these subjects (Gartaula et al., 2020). Food literacy education for high school students is important because it not only helps students establish healthier eating patterns, but it also enables students to consider food-related career pathways and, on a sociological level, they can comprehend and question the food system and related issues (Nanayakkara et al., 2017). The future of food literacy education calls for innovative social and pedagogical developments that include participation from students, teachers, school administrators, government, and the local community, like CFSE and PBE. Integrating a critical framework into food education will develop students' food literacy that can lead to teen health benefits because it will strengthen the relationship between citizens and their food system (Nanayakkara et al., 2017).

Food literacy that is taught in a holistic form will teach adolescents to become critical citizens and agents of change with the skills and knowledge to question where their food comes from, how it affects the well-being of the environment, their personal health, and the well-being of their community (Gartaula et al., 2020; Slater et al., 2018). When equipped with this knowledge and these skills, young people will have the capacity to engage and address issues of food security, sovereignty, and sustainability in their community (A. Smith, 2020).

There is currently limited literature discussing adolescent food literacy practices, attitudes and beliefs, and so adolescent-specific food programming is generally built from previous intervention research or food literacy research targeting adults or children (Brooks & Begley, 2014). According to limited recent studies, senior secondary school food literacy education has helped students to develop healthy eating patterns and prepared them to make wise decisions in relation to food. Brooks and Begley (2014) discuss this in their review of adolescent food

literacy programs which highlights the focus on food literacy in early adolescence and the need for comprehensive food literacy education for students in late adolescence. Other gaps in the literature include the need to account for ethnic differences in adolescents' determinants of eating behaviours and also to examine the impact of Indigenous food knowledge and food literacy on youth food security (Brooks & Begley, 2014; Gartaula et al., 2020; Nanayakkara et al., 2017). One of the few adolescent-specific frameworks that exists, Food Literacy Competencies for Young Adults, will inform the findings of this study to help evolve the broadening understanding of food education in secondary schools' curricula (Anderson & Falkenberg, 2016). This framework will also help meet the demands for a more comprehensive approach to teaching about food; it includes personal and community empowerment, and the cultural and spiritual aspects of food as means of building critical awareness of food issues within the food system (Slater, 2013). This framework's goals extend beyond nutrition prioritization and disease prevention to capture how food literacy can be a mechanism to improve adolescent's well-being and happiness (Falkenberg, 2014).

## **2.6 School Food Education in A Canadian Context**

In Canada, educational standards are determined by provincial legislation. In BC, the province's Ministry of Education sets the education standards through the provincial curriculum for grades K (kindergarten) through grade 12. The standards, or Prescribed Learning Outcomes (PLOs), are outlined by subject area and grade. Teachers then have the flexibility to meet these outcomes through the educational programming they develop to best meet the needs of their students. On a local level, education boards have the authority to create a curriculum in areas that the provincial curriculum does not address (British Columbia Government, 2022a; Rojas et al., 2011). In Canada, where food education programs exist, there is a narrow focus on food preparation,

which is insufficient for providing students with the skills and knowledge they need in today's complex food environment (Slater et al., 2018). This sparse programming reflects insufficient Prescribed Learning Outcomes or teacher programming addressing food system issues and food literacy.

Instead, most school food programming happens in the form of school meal programs. Programs differ depending on socio-economic metrics of the students, and typically rely on either externally funded programs supported by parent and community groups, or provincially funded programs. Some cafeterias are run by private sector contractors, and others are operated by school district employees or as teaching cafeterias (Rojas et al., 2011). Of the Group of Eight (G8), an intergovernmental organization of the world's leading industrialized nations, Canada is the only member-country that does not have a national school food program (Hernandez et al., 2018).

In BC specifically, food education for adolescents exists primarily in Food Studies and Culinary Arts in grades 10, 11, and 12 and focuses on meal preparations, meal planning, eating practices, food trends, food systems, First Peoples' food protocols, environmental considerations, culinary skills, and more (British Columbia Government, 2022a). Though research in BC school food education is limited, a 2014 study in the province revealed that improvements to school food environments are related to healthier food choices and lower body mass indexes among students (Mâsse et al., 2014). The relationship between nutrition and food policies, practices, and resources and dietary intake are not entirely clear, but various case studies on community resilience and food deserts suggest targeting school food environments is a promising solution for obesity and school farms are specifically mentioned as an opportunity to decrease exposure to diet-related diseases like diabetes and obesity (Bakr & Abd Gawad, 2021; Krishnan et al., 2016).

Schools serve an important role in shaping adolescents' dietary habits, thus creating school environments with a focus on healthy eating will support teen's healthy food choices and healthy weights (Mâsse et al., 2014). More broadly, promoting food literacy among Canada's adolescent population as they transition to adulthood is critical to protecting them against the negative impacts of modern food systems, including diet-related diseases, but also food insecurity, and cultural and social disconnect from food (Slater et al., 2018).

The Farm-to-School (F2S) Movement has emerged as one of the largest responses to a call for a more experiential and involved forms of food education in Canada. F2S programs, using the framework of food literacy, engage different forms of interventions to improve student knowledge skills of both individual behaviours and food systems (Coca, 2021; Powell & Wittman, 2018). This development of food literacy skills aligns with the goals of food sovereignty and supports a structural change through food system engagement and a dual approach of individual and collective action (Powell & Wittman, 2018).

Most F2S research has been conducted in countries with national school meal programs. Canada is unique in its absence of a national student nutrition program (Powell & Wittman, 2018). Food literacy and nutrition education have grown from a commitment and mobilization of civil society (Coca, 2021; Powell & Wittman, 2018). Today, the Coalition for Healthy School Food includes more than 200 national, provincial, and local organizations lobbying for a federally funded program that enables all Canadian students access to daily healthy meals at school (*Coalit. Heal. Sch. Food*, 2018). The division of federal and provincial responsibility is being used by the government to defer provision of food in schools to the respective provinces (Powell & Wittman, 2018).



While a national school meal program is still being discussed, Powell & Wittman (2018) observed that there has been an enormous increase in the participation of BC schools in the F2S movement, with various programs operating in parts of the province since at least 2007. These projects grew from collaboration of diverse actors and organizations across the province (Coca, 2021; Powell & Wittman, 2018). Specifically, Farm to School BC (F2SBC) was established amidst this boom in 2007 to link policy, program, and F2S activities across BC. F2SBC is administered by the Public Health Association of British Columbia (PHABC) and is funded and supported by government agencies like the Ministry of Health and the Ministry of Agriculture (Farm to School BC, 2022). F2SBC has three main goals for its F2S programs: (1) to bring healthy and local food into schools; (2) to provide hands-on experiential learning opportunities for children; and (3) to foster connection between schools and their communities (Farm to School BC, 2022; Powell & Wittman, 2018).

The continued support and funding for F2S programming oriented towards food literacy goals from government agencies like the Ministry of Health, is seen as evidence of legitimate support by provincial governments (Powell & Wittman, 2018). This investment from public health officials in F2S programming is because student health is a major concern of the local government and because programming can be incorporated across multiple subjects and involve students of all ages. The curricular connection is a key factor in the maintenance of support for F2S programs amongst schoolteachers and district administrators (Coca, 2021; Powell & Wittman, 2018).

F2S initiatives can challenge current food structures by promoting cultural food practices, food justice, school food production, community involvement, and food preparation. These initiatives not only build a student's individual skills, but continue to teach food literacy that will serve in a

greater movement towards food sovereignty (Powell & Wittman, 2018). F2S serves as a link between individual eating choices and skills, and a social movement towards a food system structure that serves the community (Powell & Wittman, 2018). Powell & Wittman's research shows that stakeholders in BC, such as those involved with Farm to School BC Regional Hub pilot programs, believe F2S programs that foster food literacy in students will increase their understanding of the broader impacts of the food system while also developing individual skills and opportunities.

While BC still faces challenges scaling up local food procurement in schools as a mechanism of poverty alleviations, there has been an abundance of success in creating educational programming supporting food literacy (Powell & Wittman, 2018). A review of F2S programming in BC highlights the need for ongoing research into F2S programming, especially regarding both short- and long-term outcomes for students and other participants as well as the greater context of food literacy as a mechanism to mobilize food sovereignty in younger populations (Coca, 2021; Powell & Wittman, 2018).

## **2.7 School Farms Overview**

As the food literacy movement in food education builds momentum, schools in BC have introduced food education to secondary schools through programs that self-identify as school farms. Different from the school garden, salad bar, or nutrition education common in schools, school farms offer a more experiential and intensive opportunity to incorporate multiple subjects and provide students with an immersive way to learn about their food and agricultural system. In all of the literature of F2S programming in BC, there has been no formal research on school farms as food literacy interventions, making them difficult to report on, scale-up, replicate, etc. The aforementioned reports in previous sections outlined food education's movement towards

more experiential food system education within a food literacy framework and identified the gap and want for food education in secondary schools. School farms in BC offer an intersection of age, pedagogy, formal and informal education, and community support that may fill many of the described gaps in the food education system. They are also seen as sustainable opportunities to support school meals and produce food locally to feed students (Farag et al., 2021), thereby addressing food insecurity among children and adolescents.

This thesis is not the first study to research school farms, but it was the first study conducted in Canada; it was the first to begin defining school farms explicitly, informed by stakeholder experiences; and the first to look at food literacy capacity of school farms and their potential to build adolescent food literacy. In a 2021 book called School Farms: Feeding and Educating Children, Michael Corbett, an education scholar from Canada claimed “*I am in my seventh decade and have never seen a school farm in Canada*” (Corbett, 2021). That is, despite growing research on school farms around the globe, Canadian scholarship on the burgeoning movement of school farms in a BC context appears to be lacking.

There is no formal definition of what constitutes a ‘school farm’, but self-identified school farms are well known in other places in the world and are known as productive means of teaching food system education (S. Blair et al., 2022). Of the rare studies about school farms, one study in Oregon defined school farms as any type of land laboratory and/or feeding facility, regardless of the size, including field crops, greenhouses, livestock facilities, orchards, and ponds (Lambert et al., 2018, p. 201). Another author described a school farm as a significant and effective learning model in a school’s outdoor space that creates a real-life learning environment (Smeds et al., 2015). A previous study on school farms in Texas indicated that the primary use of school farms is to breed livestock, and the farms are used for the housing of animals bred for market (Gilbert,

2013). Similarly, a school farm was described as having two main sections: a planting section and a livestock section (Iderawumi, 2020). The School Farms: Feeding and Educating Children book (which was published during my thesis research) defines a school farm as a community food system in the form of urban agriculture (Bakr & Abd Gawad, 2021; Krishnan et al., 2016) which can serve as either farm-to-school and/or school gardens (Bakr & Abd Gawad, 2021; Farag et al., 2021). Given that facilities and the specifics of the school farm programs vary based on geographical location (D. L. Williams et al., 1985), it is useful to understand a few examples of school farms in other contexts.

### ***2.7.1 Australia***

There are more than 30 school farms operating throughout Tasmania after being introduced by an Australian education official in the early 1900s. The schools are known for their stature in the education system, and their relevance and symbolic presence for rural communities. The farms were initially introduced during a progressive educational movement driven by modern agriculture and the need to preserve rural populations. The Area Schools, as they are known in Tasmania, are still functioning today with very little government curriculum or financial support. In Australia, one of the highest performing secondary schools in national testing is an agricultural high school. While these farm and agriculture schools have yet to establish academic credibility at a national level, they are known as “iconic rural symbols” that represent locally valued actor networks (Corbett et al., 2017; Latour, 2007).

### ***2.7.2 United States (US)***

In the US, land-grant colleges were established in the late 1800s as a result of the Morrill Act of 1862 and the Hatch Act of 1907, which are thought to be the beginning of school farms in the US (Sayre, 2011). However, these school farms are specific to post-secondary educational

institutions and refer to farms on college campuses which often go by other names than ‘school farm’. For the purposes of this study, school farms are self-defined as ‘school farms’ and are on public school grounds for grades K-12. Food production on school grounds in the US often occurs through vocational agriculture programs and their affiliated FFA clubs, though these are not usually identified as ‘school farms’, instead bearing other names like ‘land labs’. There are several examples of US urban agriculture school farms mentioned below and there are many types of farms on school properties at suburban or rural high schools in the US. Because the agricultural and education system and infrastructure for these US farms has a strong history and practice of vocational agriculture, which is different from self-identifying school farms in Canada, the literature on these farms is largely left out of this study.

The Woodlawn High School Teaching Farm in Birmingham, Alabama, is a 2-acre production farm that provides an opportunity to participate in a paid internship for course credit. A program director and farm manager staff the farm where students are responsible for all aspects of food production and sales. The farm includes a greenhouse, bio-retention pond, office space, and produce processing and storage facility (Fifolt & Morgan, 2019).

Denver Public Schools in Colorado grew their food education from garden classes to school farm programs. Initially the garden was used mostly as education tools for classroom learning, but with funding from local nonprofits and local government, a pilot study was conducted to implement its own food system as well as the capital improvements that would be needed to build and sustain a school farm. As a result of the study, additional school farms were constructed through the district. The farms are driven by four key elements: (1) land availability (the plots are larger than gardens and are typically near a school so children can better connect); (2) farmers share their agricultural knowledge with the school and collect data from the plots to

monitor the soil; (3) volunteers help maintain the plots through the growing season (through organized events) and (4) the school's menu helps shape the selection of fruits and veggies which are harvested. The school district pays for chefs to hold cooking demos and workshops around local food and Denver Green School has developed a curriculum that features food- and farm-related educational activities into core subjects (Green Schools National Network, 2015).

The district's pilot F2S program converts unused school land into working farms that produce tens of thousands of pounds of produce for the cafeterias. The district school farm project "appears to be one of the first of its kind" (2015). Unlike the school gardens which exist at many Denver schools as educational tools with schools and community volunteers, the farms are focused on production with contractors in charge of their operation and extensive protocols for food safety. Half of the food from the farms helps cover most of the school's veggie needs during the fall and the other half is sold at the school's farm stand, and used to support community support agriculture (CSA) programs or is donated to emergency food programs (Green Schools National Network, 2015).

How can these school farms elsewhere help us understand the school farms in BC? Established school farms can help us analyze the development of BC's own F2S programs in terms of structure and programming. Similar to BC, the Denver Public Schools, had a high prevalence of school gardens as a tool to teach food literacy education and then saw the opportunity to bring food into the cafeterias. The gardens catalyzed production and food safety plans to grow garden programs into farms (Schimke, 2013). According to the Green School National Network, the distinction is based on plot size, seasonal crops, who maintains the farm (either volunteers or staff), and whether there is an integrated curriculum that features food- and farm-related educational activities (Fifolt & Morgan, 2019; Green Schools National Network, 2015)

### ***2.7.3 Summary of School Farms***

School farms around the world have shown to be viable ways of teaching about the food system and engaging students in their communities to learn. Teachers work to align programming on the farm with science, mathematics, social sciences, and language curricula. It is well-understood in school farm communities that there is tremendous potential to link agricultural education programming with problems of community sustainability, and the need for highly-skilled, well-educated modern agricultural workers (Corbett et al., 2017).

Not only do school farms have the potential to teach food literacy to a vital age group, adolescents, but school farms are known to engage diverse students who may be marginalized in their communities (Corbett et al., 2017; D. L. Williams et al., 1985) because they offer a way for people of different backgrounds and cultures to find purpose, connection, and skills in an educational environment different from traditional formal classroom education. Recent publications on school farms discussed their potential to fight hunger and malnutrition through fresh, local, healthy food access while offering students educational opportunities to develop their agricultural skills, learn, and interact with nature (Enokela, 2021; Farag et al., 2021).

The paucity of research literature on the topic of self-identifying school farms limits our understanding of the potential of school farms to involve diverse students; to create opportunities for new connections and skills; and to engage adolescents in academic subjects using food (Fifolt & Morgan, 2019). To address this knowledge gap, this thesis is focused on school farms in BC with the goal of learning more about the experiences of school farms in secondary schools in Canada, and situating school farm programs in the discussions and movement of food literacy education.

## Chapter 3: What is a school farm? Results of a scoping review

Chapter 3 is a version of a manuscript submitted for publication (revising to resubmit). The co-authors are Gabrielle Edwards, Katherine Yu, Eduardo Jovel, Lisa Jordan Powell, Kerry Renwick, and Annalijn Conklin.

### 3.1 Introduction

Food insecurity (Statistics Canada, 2022), diet-related chronic illness (Loewen et al., 2019) and climate change (*Climate Change Adaptation Plans and Actions*, 2022) have become more prominent in public health and education policy (Agriculture and Agri-Food Canada, 2020; Park et al., 2020; West et al., 2020), leading to the identification of many policy and program gaps in our food systems (Park et al., 2020; Renwick & Powell, 2019; West et al., 2020). Though these gaps may affect all people in society, marginalized populations, such as Indigenous peoples, suffer disproportionately from the health disparities (D. Morrison, 2020) and impacts of our current food system (Dawson, 2020; Settee & Shukla, 2020). While placing responsibility for the problems of the system on individuals serves to detract from the political and corporate drivers of these issues (Rose & Lourival, 2019), there are concerns regarding food system knowledge at the individual and collective community level that are contributing to these food-related problems (Nanayakkara et al., 2017; Renwick & Powell, 2019). In particular, research shows young adults who leave secondary school without consistent food education lack knowledge of basic nutrition, food skills, food systems, everyday food practices or food production (Brooks & Begley, 2014; *LEAF Teenage Years Engagement Survey*, 2018; Sadegholvad et al., 2017). Links have been established between food system knowledge and protecting the environment (Nanayakkara et al., 2018; Park et al., 2020; Sadegholvad et al., 2017). There is also recent research on the importance of socio-cultural competency as a part of food literacy to support



food practices, healthcare, and education involving food systems (Hernandez et al., 2021) and diet-related diseases (Goody & Drago, 2009; Wall-Bassett & Harris, 2017). Studies in both Western and non-Western countries have observed these links and suggested food education is expanded in schools (Fordyce-Voorham, 2011; Sadegholvad et al., 2017). Thus, providing students with a capacity for food literacy, a holistic conception of the food system, will promote understanding and knowledge to improve healthier and more just food systems (P. Farrell, 2021), community food security, and food sovereignty for current and future generations (P. Farrell, 2021; Gartaula et al., 2020; Renwick & Powell, 2019; Rose & Lourival, 2019).

When individuals develop understandings about what they eat and how their food is produced there is potential for different levels of engagement and action when making food choices and interacting with the food system (P. Farrell, 2021; Park et al., 2020; Renwick & Powell, 2019). Some of these choices reflect the social, cultural, economic, and political factors affecting people's access, control, and thus impact on the food system (Cullen et al., 2015; Hernandez et al., 2021; Vidgen & Gallegos, 2014). The expected benefits of food literacy education have led many schools to prioritize and expand basic nutrition education to include broader food system topics of agriculture, ecology, social, and economic food- and health-related topics to navigate today's complex food environments (Harmon & Maretzki, 2006a; Hernandez et al., 2021; Sadegholvad et al., 2017).

There are many different models of food literacy education; examples include educators' use of school gardens, classroom cooking programs, class connections with local farms as part of school food sourcing, and units within home economics courses (Kelly & Nash, 2021; Lam et al., 2019; Pendergast et al., 2011; Powell & Wittman, 2018; Renwick & Powell, 2019). One food-specific education model is a school farm. School farms teach about the food system and

engage students in experiential learning on agricultural production farms managed by or with schools. School farms use experiential learning pedagogies to contribute to food literacy and support food education to ultimately build community food security (Gartaula et al., 2020). According to recent literature in the 21<sup>st</sup> century, school farms are also known to engage diverse students who may be marginalized in their communities (J. Brown, 2001; Corbett et al., 2017; Lambert et al., 2018) because the programs offer a venue for students from different backgrounds and cultures to find purpose, connection, and skills in an educational environment outside the traditional classroom setting (Rose & Lourival, 2019). Yet, despite the potential of school farms to involve diverse students, create opportunities for new connections and skills, and engage students in academic subjects using food system frameworks and related pedagogies, there is a need for research which identifies a common definition, objectives and activities of school farms (Fifolt & Morgan, 2019).

The purpose of this review was to synthesize and assess the scope of published literature on self-defining school farms so as to identify their key characteristics, objectives and impacts that could support future food education programming. Though programs vary to suit local needs, geography, ecology, and culture, this review will aim to create a more unified understanding of self-defining school farm programs as unique food education interventions and begin the process of establishing a common (though flexible) working definition of school farms, as well as identifying commonalities in their curricula and structure.

### **3.2 Methods**

This study followed the PRISMA extension method for scoping reviews (Tricco et al., 2018) (PRISMA-ScR) as a method to synthesize and assess the scope of literature on school farms. Scholarly and grey literature from primary sources were searched within three bibliometric

databases (CAB Abstracts & Global Health, Web of Science Core Collection (WSCC) and Education Source), with no limitations. These databases were chosen through pilot searches of “school farm\*” based on their interdisciplinary specializations and their abundant search results. Hand-searches from retrieved full-texts were followed-up for eligibility screening. Search terms were determined in consultation with a University of British Columbia reference librarian with subject-area specialization in agriculture and agroecology.

The purpose of this review was to understand self-defining school farms as a unique and specific food education intervention different from other models like school gardens or farm-to-school programming popular in primary and secondary school food education. Though the inclusion of similar terms like “campus farm” or “university farm” may have offered expanded insight on the broader idea of farms on school properties, the piloting process indicated that including all “school” synonyms resulted in unmanageably high numbers of results (Table 1). The goals of the research team are not to better understand longstanding farms at universities and colleges, such as those at land grant institutions, which have been studied for decades. Though the occasional reference about university farms used the phrase ‘school farm’(Sayre, 2011), for this review, we focused on farms which consistently self-described as “school farms.” In the team’s ongoing empirical work, these programs are mostly at K-12 schools; however, some self-described ‘school farms’ either did not specify a grade-level focus or extended across educational levels. Though it was not a search criterion, this review is meant to address the school farm movement happening predominantly across grades K-12, rather than on university or post-secondary campuses, as their identities, structures, and objectives differ greatly. To ensure consistency and replicability, the librarian and research team decided to limit the search to only ‘school farm\*’ which captured a wide literature on education, science, health, and agriculture and remained

specific to self-defining school farms. Separate searches were performed by myself and two other independent reviewers in October 2021 (SB, GE, KY).

Our scoping review included all literature published in English from academic journals, magazines, newspapers, dissertations, reports, and books examining characteristics and principles of a school farm (e.g. the definition, structure, goals, objectives, curriculum, etc.)

There were no exclusions for publication dates, as we wanted to include all of the known literature on school farms in the databases. Sources were published between 1916 and 2019.

Articles were excluded if they were book reviews or did not have a direct reference to a characteristic or defining aspect of the program. Records were retrieved and managed using Covidence web-based software. All three reviewers further screened references of all included publications, and additional full-texts were retrieved for a complete examination. Uncertainties of publication eligibility were resolved by consensus among all reviewers. Eligible full-texts were retrieved and read for inclusion; references of all included publications were further screened by all three reviewers, and additional full-texts were retrieved for full examination.

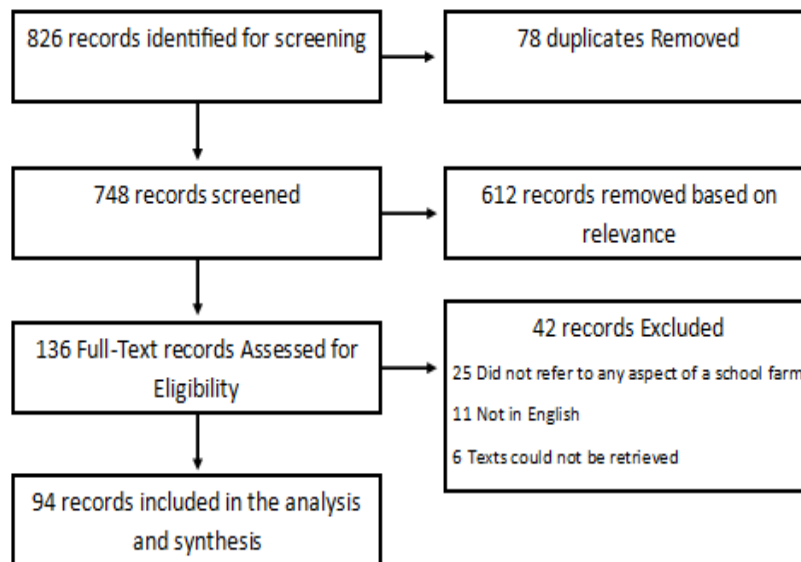
Three reviewers (SB, GE, KY), myself included, extracted data from included studies using a standardized form in Excel. Key *a priori* headings were: citation, database, study location, the population of school farm, definitions of school farm, scale of school farm, program purpose/objectives, the structure of program, curriculum, and key findings. I compiled duplicate extraction sheets and verified with the other two reviewers (GE, KY). We analyzed the data through narrative synthesis and graphical display using Covidence software (Covidence, 2021).

*Table 1. Results of piloting searches*

Search	Database	Results
((school*) OR (academ*) OR (university*) OR (colleg*) OR (post-secondary) OR ("post secondary") OR (campus) AND (farm*)). Searches restricted to English	Web of Science	2,046,838
	CAB Direct	365,058
	Education Source	3,086,829

### 3.3 Results

After removing duplicates (n=78), our searches identified 748 unique records for the title and abstract screening. We retrieved 136 full-texts for eligibility assessment, and included 94 publications on school farms in the scoping review. We excluded 42 full-texts because the subject was not school farms (no detail on structure, programming, or definition) or the publication examined disease or illness from school farm proximity without information about the farm itself. A summary of our search strategy is given in Figure 1 below.



*Figure 1. PRISMA flow diagram of search strategy and results*

### 3.4 Summary of scientific and grey literature on school farms

A majority of the included studies (n=74, 79%) were editorials, newspapers, or magazine articles, and only 14 were peer-reviewed original studies (Alcock, 1977; Corbett et al., 2017; Fifolt et al., 2018; Fifolt & Morgan, 2019; Dick Foeken et al., 2010; Konoshima, 1995; Lambert et al., 2018; Paffarini et al., 2015; Twenter & Edwards, 2017; Warsh, 2011; D. L. Williams et al., 1985; Wydler, 2012; Yopp et al., 2018) (Figure 2). The literature on school farms covered more than 100 years over two centuries, thus across changing socio-cultural periods. Several notable differences were between articles published at the beginning and during the twentieth century versus those published at the beginning of the twenty-first century (Figure 3). From 1916 to 2009, articles were mostly editorials and accounted for 77% of the total literature. Between 2010 to 2019, 79% of all empirical peer-reviewed studies found in this review were published. Editorials were published in two main sources: *Agricultural Education Magazine* and *The Times Educational Supplement*. Overall, most of the literature on school farms concerned programs in North America and the UK, although publications came from 12 other countries (Alcock, 1977; Ambroise et al., 2016; Aniebiat Okon, 2017; J. Brown, 2001; Carten, 2015; Corbett et al., 2017; D. W. J. Foeken & Owuor, 2007; D Foeken et al., 2009; Dick Foeken et al., 2010; Konoshima, 1995; Mabee, 1974; Olaitan, 1984; Paffarini et al., 2015; “School Farm in the Transvaal: Lord Milner School Farm.,” 1943; “School Farms in India.,” 1938; Udo, 1979; Vazquez-Torres, 1939; Wydler, 2012).

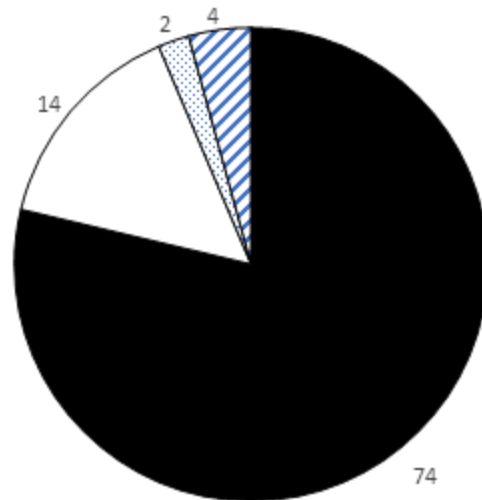


Figure 2. Distribution of school farm literature by type of publication. *Solid Black, editorials and news; White, peer-reviewed articles; Dotted, textbooks; Hashed, other (e.g. governmental report, dissertation, etc.)*

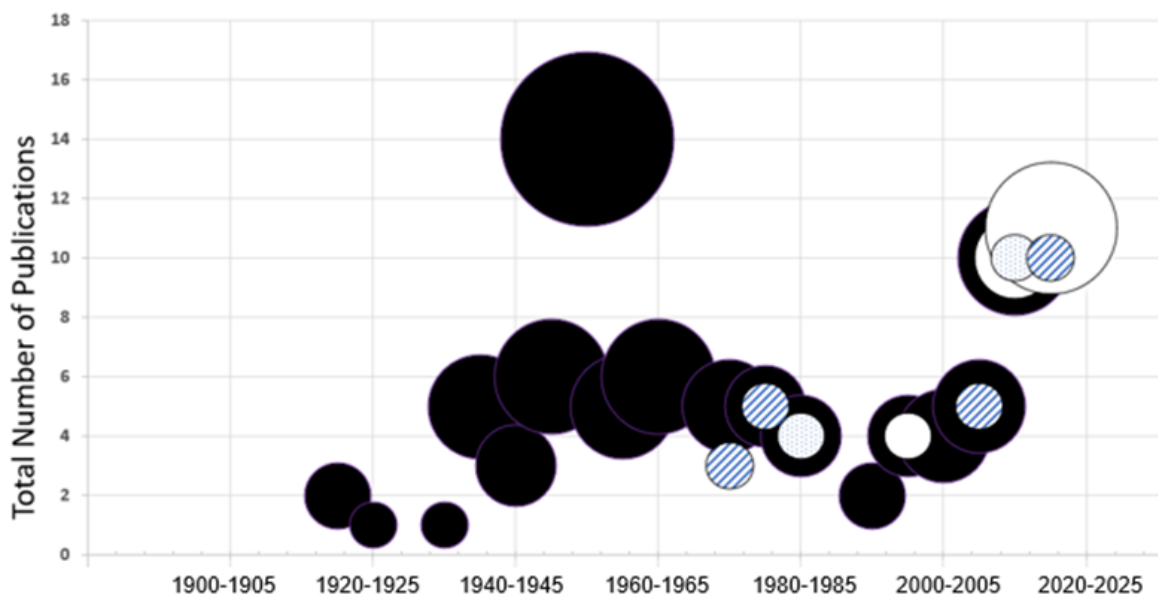


Figure 3. Bubble plot of the 100-year literature on school farms across the globe. *Solid Black, editorials and news; White, peer-reviewed original articles; Dotted, textbooks, Hashed, other (e.g. governmental report, dissertation, etc.)*

Across the literature, no clear definition of a school farm was provided, with one exception (Corbett et al., 2017). Corbett et al. defined five types of school farms as follows: (1)

Agricultural Education Centers (AEC) are school farm operations with multiple activities (e.g., livestock, horticulture, aquaculture, etc.) (2) Specialized Small Farm Operations (SSF) are smaller farms limited to specialized activities. (3) School Gardens are horticultural operations with limited but engaging experiences for students. 4) Agricultural Display/Experience Facilities (ADEF) are usually short-term off-site farm programming operations and (5) School-Based Land Holdings (SBLH) which are not for educational purposes but may provide income for schools.

The size of school farms varied across an enormous range. About 69% of farms in the literature noted their size reporting a range of 0.5-750 acres ([Appendix A](#)). School gardens are usually smaller than two acres (Laurie et al., 2017), and only one school farm (Summers, 2013) out of the reported 65 was smaller than two acres. Also, while most literature focused on rural school farms, eight publications explicitly described their programs as being in urban environments (Fifolt et al., 2018; Fifolt & Morgan, 2019; D. W. J. Foeken & Owuor, 2007; D Foeken et al., 2009; Dick Foeken et al., 2010; Hammer, 1974; Warsh, 2011; Yopp et al., 2018).

### **3.5 Study populations**

Almost half of the literature described school farms for secondary students (grades 9-12) (Adams, 1980; Ahalt, 1951; Ambroise et al., 2016; Bressler, 1948; Cazaly, 1951; Clark, 1951; Corbett et al., 2017; Crandall, 1953; Duff, 1970; Eckelberry, 1949; J. Farrell, 1983; Fifolt et al., 2018; Dick Foeken et al., 2010; Grambril, 2016; Hagenbuch & Brannaka, 1952; Hammer, 1974; Hutton, 1951; Jensen, 1951; Juergenson, 1953; Kabler, 1954; Martin & Dormody, 1992, 1994; McGavin, 2002; M B McMillion, 1975; “New School Farm for Boise.,” 1916; “School Farms in India.,” 1938; Newnham, 2000; Nicklas, 1960; Orhwall, 1972; Pack, 1943; Snell, 1955; Spilsbury, 1952; Stump, 1976; Summers, 2013; Tearle, 2013; Thomas, 1996; Twenter & Edwards, 2017; Udo, 1979; Warsh, 2011; Welch, 1953). While, all education levels were



addressed by the programs reported in the literature, many publications did not report the grade of the program's target population ("Boise's Progress," 1917; Booska, 1960; B. L. Brown, 1949; Bryant, 1960; Carten, 2015; Day, 1921; Green Schools National Network, 2015; Haigh, 1997; Haight, 1961; Hohman, 1961; Johnson, 1947; Mabee, 1974; Olaitan, 1984; Puckett, 1977; Spearin, 1950; Stump, 1984; B. G. Swan, 2004; Walters, 2014). Since synonyms for 'school farm' that would have captured postsecondary institutions were not included, the vast majority of school farms in the review address grades K-12. Regarding subpopulations, more than 41% of publications mentioned the school farm programs were educational opportunities for boys specifically. No article mentioned school farms exclusively serving girls, however one 2016 report from France indicated more girls than boys participated in the school farm program (Ambroise et al., 2016). Another study in Switzerland (Wylder, 2012) showed that girls found most school farm topics more interesting than the boys in the same program ([Appendix A](#)).

### **Early characteristics of school farms**

Editorial articles accounted for 90% of literature from 1916-2009. School farms in this period were described as mainly being vocational agricultural programs for boys or young men. Only 8% of these articles mentioned girls or women as part of their student population. School farms were supported by a combination of school districts, student agricultural organizations (like the National FFA Organization (FFA) (Adams, 1980; Ahalt, 1951; Alcock, 1977; Balloun, 1939; Bearden, 1971; Crandall, 1953; Hagenbuch & Brannaka, 1952; Hammer, 1974; Kabler, 1954; McDonald, 1951; Nicklas, 1960; Orhwall, 1972; Puckett, 1977; Snell, 1955; Spilsbury, 1952; Stump, 1976; D. L. Williams et al., 1985), and on-site enterprises. In literature published before 2000, the focus of school farms was on both animal husbandry (Ahalt, 1951; Duff, 1970; Eckelberry, 1949; J. Farrell, 1983; Haigh, 1997; Haight, 1961; Johnson, 1947; Juergenson, 1953;

Nicklas, 1960; Puckett, 1977; Spearin, 1950) and crop production (Ahalt, 1951; Dickson, 1939; Duff, 1970; Eckelberry, 1949; J. Farrell, 1983; Haigh, 1997; Johnson, 1947; Juergenson, 1953; Kabler, 1954; Nicklas, 1960; Puckett, 1977; Spearin, 1950) education, with a secondary focus on experiential education, construction, farm maintenance, and farm mechanical training (Ballard, 1960; Garvie, 1957; Haight, 1961; Jensen, 1951; Johnson, 1947; Martin & Dormody, 1992, 1994; “School Farm in the Transvaal: Lord Milner School Farm.,” 1943; Spilsbury, 1952; Stump, 1984). Interdisciplinary courses (Day, 1921; Hammer, 1974; McGavin, 1995; “New School Farm for Boise.,” 1916; Pack, 1943; Sherman, 1955, 1956; Snell, 1955) on the school farms were mainly science (Adams, 1980; Ahalt, 1951; Balloun, 1939; Booska, 1960; Clark, 1951; Crandall, 1953; Hagenbuch & Brannaka, 1952; Haight, 1961; M B McMillion, 1975; Puckett, 1977; Sherman, 1956; Snell, 1955; Spearin, 1950; Vazquez-Torres, 1939) and math (“Boise’s Progress,” 1917; Snell, 1955). Consistent topics across school farm curricula included: farm management (Adams, 1980; Booska, 1960; Bressler, 1948; Cazaly, 1951; Cross, 1939; Dickson, 1939; “Harrow School Farm.,” 1953; “New School Farm for Boise.,” 1916; Jensen, 1951; Johnson, 1947; Nicklas, 1960; Stump, 1984; Vazquez-Torres, 1939; Welch, 1953), farm accounting and business (Eckelberry, 1949; Jensen, 1951; Martin B McMillion, 1994; Snell, 1955; Vazquez-Torres, 1939), and environmental conservation (Bressler, 1948; J. Farrell, 1983; Garvie, 1957; Hutton, 1951; Mabee, 1974; McDonald, 1951; M. McMahon & McMahan, 1949; Stump, 1976, 1984; D. L. Williams et al., 1985). Historically, school farms were described as being a mechanism for building and contributing to the local community through resource-sharing and also providing financial opportunities for students (Alcock, 1977; Bressler, 1948; *Climate Change Adaptation Plans and Actions*, 2022; Kabler, 1954; Lam et al., 2019; Lambert et

al., 2018; Olaitan, 1984; Pack, 1943; Paffarini et al., 2015; Rose & Lourival, 2019; Sadegholvad et al., 2017; Warsh, 2011; Welch, 1953).

### **Recent literature on school farms**

Similar to earlier publications, literature on school farms from 2000-2019 described programs that mainly addressed animal husbandry (Grambril, 2016; Koplinka-Loehr, 2015; Sayre, 2011) and crop production (Grambril, 2016; “Lancing Farm Project, 30 Years On,” 2014; McGavin, 2002; N. Morrison, 2008a). Although the literature still discussed vocational agricultural training, we found that recent literature after 1999 focused on interdisciplinary learning. (Udo, 1979; Yopp et al., 2018) and experiential education (Alcock, 1977; Corbett et al., 2017; Fifolt et al., 2018; Lambert et al., 2018; Marley, 2009; Newnham, 2000; Parkin, 2005; Sayre, 2011; Summers, 2013) and an expansion of interdisciplinary subjects to include writing (Newnham, 2000; Parkin, 2005; Tearle, 2013) and technological education (Newnham, 2000).

Publications in the new millennium, however, reflected new objectives and curricular focus on nutrition and healthy eating. The idea of nutrition or healthy eating was first mentioned in a 2008 publication (N. Morrison, 2008b), except a South African case study in 1977 that described school farms as a solution for malnutrition (Alcock, 1977). The new focus on nutrition and healthy food education grew in prominence among school farm objectives throughout the early 2000s (Corbett et al., 2017; Fifolt et al., 2018; Dick Foeken et al., 2010; Jenkin, 2014; Summers, 2013; Walters, 2014; Wydler, 2012).

Additionally, environmentally focused objectives, including terms like “ecology” and “sustainability,” were referenced among studies published in the 1980s and 1990s, mainly about Zuni people’s cultural values on their school farm (Martin & Dormody, 1992, 1994; Stump,

1976). The literature from the 2000s described various themes as the foundation of modern sustainable food education, including environmental and ecological values (Ambroise et al., 2016; Parkin, 2005; Wydler, 2012), education on sustainable farming (Hohman, 1961; Juergenson, 1953; Martin & Dormody, 1994; Nicklas, 1960; Snell, 1955; Stump, 1976), understanding the food system (Duff, 1970; Hagenbuch & Brannaka, 1952; Kabler, 1954; Nicklas, 1960; Orhwall, 1972; Snell, 1955; Welch, 1953), and building a relationship with the land (Hagenbuch & Brannaka, 1952; Kabler, 1954; Snell, 1955). Some newer literature has also identified food citizenship and social and political empowerment of students as an objective of school farms (J. Brown, 2001; Corbett et al., 2017; Warsh, 2011).

Although the necessity and value of community involvement remained a common theme across school farm literature (Ahalt, 1951; Alcock, 1977; J. Brown, 2001; Cazaly, 1951; Corbett et al., 2017; Eckelberry, 1949; Fifolt & Morgan, 2019; Hutton, 1951; Juergenson, 1953; Kabler, 1954; Marley, 2009; Olaitan, 1984; Parkin, 2005; Puckett, 1977; Sayre, 2011; “School Farm in the Transvaal: Lord Milner School Farm.,” 1943; Sherman, 1956; N. V. W. Smith, 1956; Summers, 2013; Thomas, 1996), there was a shift in the roles of different community partners from the past. It was notable that literature from 2000 to 2019 rarely mentioned school districts (Martin & Dormody, 1994; Walters, 2014) and their essential role in financial and managerial support that in the past was considered necessary to run a successful school farm. School farms in the 2000s appeared to be functioning as individual entities separate from national agriculture-related student organizations, with just a few mentions of FFA (Lambert et al., 2018; D. L. Williams et al., 1985) and the Young Farmers Club (D. W. J. Foeken & Owuor, 2007; Dick Foeken et al., 2010; Newnham, 2000; Parkin, 2005) as integral community partners. Finally, it was notable that literature from the 2000s did not report the gender of student participants, except for 11 studies

(Ambroise et al., 2016; Corbett et al., 2017; Fifolt et al., 2018; Lambert et al., 2018; Marley, 2009; Newnham, 2000; Sayre, 2011; Summers, 2013; Twenter & Edwards, 2017; Warsh, 2011; Yopp et al., 2018); of which seven exclusively mentioned boys (Corbett et al., 2017; Fifolt et al., 2018; Lambert et al., 2018; Marley, 2009; Summers, 2013; Twenter & Edwards, 2017; Yopp et al., 2018).

### **Empirical research on school farms**

Empirical papers of 14 original studies were included in this review. These spanned 40 years in the literature (1980-2010) used quantitative and qualitative methods and included multiple countries ([Appendix B](#)). Most empirical studies were qualitative, commonly a case study, using interview methodology for data collection. In addition to agricultural, experiential, and environmental education as school farm objectives ([Appendix B](#)), some programs aimed to produce food for school meals (Alcock, 1977; Corbett et al., 2017; Dick Foeken et al., 2010), school feeding programs (Dick Foeken et al., 2010), or local markets (Corbett et al., 2017). The central proposition of school farms across these studies was that school farms create a microcosm for a food economy (Alcock, 1977) while improving community engagement (Corbett et al., 2017), agricultural literacy (Lambert et al., 2018) and access to healthy affordable food (Dick Foeken et al., 2010).

Many of the peer-reviewed studies also suggested behavioural effects of school farm education on students. These studies showed that school farms promote responsibility (Fifolt et al., 2018), self-sufficiency (Alcock, 1977), and self-efficacy (Fifolt et al., 2018) amongst students through the process of both group work and individual projects on school farms. Engaging students in inquiry-based and experiential learning is thought to promote leadership (D. L. Williams et al., 1985) and give students the skills to become agents of change (Fifolt et al., 2018) and active

citizens (Warsh, 2011) in their communities. While studies rarely reported the social demographics of their populations, two studies concluded that school farms gave educational and experiential opportunities to diverse groups of students (Lambert et al., 2018; D. L. Williams et al., 1985) who may not have otherwise had access to agricultural, environmental, or experiential learning. In one study, 91% of parents supported school farms after seeing survey results of the education benefits of farming activities in kindergartens and primary schools (Konoshima, 1995).

On a systemic level, school farms are thought to have a “powerful symbolic presence” in rural communities because they provide relevant and vital curricula and pedagogy and serve to support rural and educational policy-making (Corbett et al., 2017). In addition, studies reported that school farms diversified business strategies on farms and catered to the growing interest in local food and food-based issues (Paffarini et al., 2015) like malnutrition (Alcock, 1977) and food deserts (Twenter & Edwards, 2017).

### **3.6 Discussion**

This scoping review has shown how, despite the large body of literature on self-defined ‘school farms,’ a clear understanding of what defines a school farm, robust evidence of their impact, and their role as potential education and social research frameworks is still lacking. As described before, only one publication defined ‘school farm’. This review showed that school farms are being used in many different geographic regions, ecological environments, and cultures to address environmental, economic, health, agricultural, socio cultural and educational issues. However, most of the published literature on this topic comes from editorials and other grey literature such as news and magazine articles and reveals a need for more research on school farm projects. It is important to note that 77% of the grey literature came from two publications,

one, a magazine (*TES*, n.d.) (n=13), and the other, (n=44) a journal, whose goal is to exchange professional news and views, be a sounding board for new ideas and review publications, or review publications (National Association of Agricultural Educators, n.d.). These publications were based out of England and the US, respectively, and indicate that the majority of information about school farms was written and disseminated in these two countries. The proportion of editorial articles from two sources begs the question whether local politics, policies, culture, and educational frameworks are favored in this review due to the lack of diversity in publishers and editorial staff.

Although school farms have a long-term role as community-based solutions and the potential to create both academic and food education opportunities for students, there was limited research evaluating the management, structure, role, or effects of school farms.

### **Food literacy and school farms**

The prevalence of school farm themes related to nutritional, environmental, and community health in the new millennium aligns with trends in food literacy education (Hernandez et al., 2021; Rose & Lourival, 2019). Currently, food literacy education focuses on two main themes: (1) individual knowledge, choice, and skill, and (2) collective action, knowledge, and participation (Corbett et al., 2017; Flowers & Swan, 2016; Hernandez et al., 2021; Nanayakkara et al., 2017; Park et al., 2020; Powell & Wittman, 2018; Renwick & Powell, 2019; Truman et al., 2017). The first addresses a student's food skills and knowledge of food, and the second refers to how students function as informed members of critical food contexts. Our finding of socially- and environmentally-focused themes and food system education, and the past focus on vocational agricultural training, mirrors the evolution of the definition and themes of food

literacy more broadly. Therefore, school farms seek to fill critical gaps in our food system by providing students with both individual and systemic food education. Through interdisciplinary learning and hands-on work, students learn how to participate in their local food system as scientists, policy advocates, writers, artists, farmers, horticulturists, trades people, business owners, or individuals who can grow, share, and cook their food.

Our scoping review also found that reported impacts of school farms are similar to those described for school gardens. School gardens and other farm-to-school initiatives have been shown to engage students in nutrition, food security, public health, and ecological sustainability (Fifolt & Morgan, 2019; C. D. Hoffman & Dick, 1976; J. A. Hoffman et al., 2017) and improve students' food literacy and self-development; including confidence, resiliency, and self-sufficiency (D. Blair, 2009; Lam et al., 2019). While the processes of experiential education and interacting with outdoor spaces are similar, and the farms and gardens provide hands-on opportunities to learn about the food system and develop food literacy, this scoping review revealed novel characteristics of school farms that are distinct from other types of outdoor food education programs.

Of the 94 articles in this review, the two articles describing Green Schools National Network and Jones Valley Teaching Farm offered the only distinction between school gardens and school farms (Fifolt & Morgan, 2019; Green Schools National Network, 2015). The school farms are more extensive than gardens, and the production of fruits and vegetables is more significant because the purpose is to feed people rather than using the production of food just as an educational tool. Unique features of school farms are that they grow seasonal crops rather than low-maintenance perennial plants, like herbs; have dedicated staff and volunteers to manage and



maintain the farms; and use an integrated curriculum that features food and farm-related educational activities (Fifolt & Morgan, 2019; Green Schools National Network, 2015).

School farms can be distinguished from other food literacy interventions by their vocational agriculture training and/or scale of production which is prevalent across the literature.

Specifically, school farms focus on animal husbandry, crop production, and the whole food system rather than small-scale gardening or just food preparation and consumption. This supports the idea that school farms provide a unique educational experience that can go beyond building food literacy. School farms give students opportunities for experiential food education, and also prepare students with the professional skills, knowledge, and attributes to be employable within the agricultural sector.

Though research is limited, school farms are postulated in more recent literature to have a range of benefits to students. Some studies suggested that school farms engage diverse populations of students through new food connections and skills to support academic performance (Fifolt & Morgan, 2019). As a means of educating students in a community-based setting, school farms provide an educational experience where students of different backgrounds have the opportunity to learn, share, and excel in skills and knowledges that are otherwise absent in the conventional setting of a formal classroom (Gartaula et al., 2020; Harris & Barter, 2015; Rose & Lourival, 2019).

A 2020 study on the evolution and expansion of food literacy notes that more than half of the United Nations Sustainable Development goals are related to food and nutrition (for example, the environment, food security, health, consumption and production patterns). It also emphasizes that our food systems must be reassessed in the global context (Rose & Lourival, 2019).

Programs like school farms call on nontraditional pedagogies, such as land- and place-based and

critical food system education to help fill gaps in traditional food education and develop students' awareness to build a critical consciousness about one's role within their food system (Crosley, 2013; Gruenewald & Smith, 2014; Harris & Barter, 2015; Rose & Lourival, 2019). Critical and transdisciplinary learning opportunities, like those on a school farm, infuse education with a sense of civic obligation and community participation through symbiotic teaching and learning practices shared by diverse agencies, institutions, and people (Rose & Lourival, 2019). Participating in transformative environmental and food-based education is critical to promoting a raised consciousness around food system topics and encouraging food and ecological literacy (Mier y Terán Giménez Cacho et al., 2018; Rose & Lourival, 2019). These recent studies on experiential food and environmental learning approaches show how school farms are growing with the food literacy framework, embracing informal food knowledge alongside formal curriculum, and acknowledging and attracting all types of students to engage with their community, place and culture via their food system.

### **3.7 Strengths and weaknesses**

This scoping review was limited to three bibliometric databases and did not include a search of school farm organization websites. As a result, more community-based knowledge and program implementation is missing from this review. However, this review used a broad search term to capture a wide range of literature on food, agricultural, and environmental education relevant to school farms. Moreover, the focus on self-defining school farms meant that we excluded other similar school agriculture and food production education models or school cooperatives (Conroy et al., 2019; Krogh & Jolly, 2011; T. Wells, 2019) that may have provided further insights into this topic. Especially in the field of post-secondary, university, and college farms, there exists broad literature on agricultural education programs (Sayre, 2011). Though these programs

generally do not self-define as school farms, a couple post-secondary farms were included in this review due to their appearance in the systematic search. A limitation of this review is that while it may include diverse programming sporadically based on search results, it will not report on the depth of literature that exists for other unique and nuanced programs like university campus farms. Future research is needed to explore the different types of agricultural education in schools to define school farms better and provide determinants for comparing diverse farming and food education models. Another limitation is that urban school farms are not included in many statements that refer specifically to rural communities, though both urban and rural farms share some characteristics. Urban school farms are becoming more popular, as indicated by the six articles on recent programs (Fifolt et al., 2018; Fifolt & Morgan, 2019; D. W. J. Foeken & Owuor, 2007; D Foeken et al., 2009; Dick Foeken et al., 2010; Yopp et al., 2018), but in the scope of this review there was not enough information to broaden statements about rural education, policy, or community to include urban school farms in generalized statements.

Notwithstanding these limitations, this review used a systematic process of searching and data extraction to ensure a comprehensive overview of the breadth of literature on self-described school farms. This review included multiple databases of literature covering a wide range of topics, along with hand-searching reference lists of all included publications. Additionally, various reviewers assessed records from the search for eligibility, thereby ensuring replicability of the review and results.

### **3.8 Conclusion**

School farms have been used worldwide as educational programs to teach students about food systems and engage them in their communities. Most school farms provide essential life skills and behaviours that address health, environmental, and economic issues related to food and

agriculture. School farms have potential as sustainable food education models and pedagogical frameworks through expanding core curricula from science and mathematics to include social sciences and humanities courses that students need to graduate from primary and secondary school. Despite growing attention to school farms over a century of literature, particularly across North America and the UK, empirical evidence is only recent and primarily qualitative. More robust evaluation research is needed that uses mixed methods and community-based approaches to determine the efficacy, experience, and food literacy effects of school farms as experiential food and agricultural education for students, and assess the impact on human and environmental health. Future questions could include: what are the effects of school farms on students' food literacy, as well as on agricultural literacy, nutritional health, food security, environmental education, and socio-cultural topics like antiracism, Indigenous food systems, gender, equity, diversity, and inclusion issues. A first step is to establish community-based consensus on a working definition of a school farm, and its roles and goals to promote food literacy. Based on this review, there will likely be consistent characteristics of school farms worldwide, but it will be important to account for the geographic, cultural, and ecological diversity of school farms based on local knowledges, ecosystems, and needs.

## Chapter 4: Methods for Qualitative Interviews

I used a qualitative community-based research approach to address my two main research questions: 1) How do stakeholders in BC define school farms? and 2) Do school farms have the capacity to build adolescent food literacy? This Chapter 4 details the methodology used for this portion of the research.

### **4.1 Community-Based Research using Semi-structured Interviews**

My thesis uses a community-based research (CBR) approach involving key stakeholders with whom I developed strong relations in advance of my Master's work. Community-based research is an iterative collaborative process between the university and the community, where both parties work together to define opportunities to generate locally-produced knowledge in order to make appropriate and mutually-desired change. The non-traditional approach combines disciplinary expertise and multiple perspectives to address complex food system issues (Rojas et al., 2011). CBR necessitates community input in all phases of the research. In the case of this project, my research proposal, questions, interview questionnaire, and sampling was developed through multiple conversations, editing and feedback sessions, and feasibility interviews with members of the school food education community, including members of Farm to School BC and the Provincial Health Authority of BC, school districts in the province, school farm programs in the province, and the Coalition for Healthy School Food Canada. Collaborating with a community-based nonprofit is pivotal to gaining a better understanding of school farms in BC because the communities' knowledge and experience of, and relationship to, a subject are key to uncovering key questions and challenges and developing research objectives that ensure the project has practical outputs and locally-produced results to devise appropriate actions and

change that are acceptable to the community affected (Roche, 2008; Rojas et al., 2011, 2016, 2017).

There is such a diversity of programs that go by the name ‘school farm’, that the foundational structures and characteristics of the programs are variable. Qualitative research methods were chosen to be able to capture the nuances of the experience of stakeholders within these programs, identifying similarities and understanding the differences as well as the reasons for differences in school farms’ structures and stakeholders’ experiences. The definition of food literacy is robust and evolving and given the absence of consensus or consistent definition of school farm, it would be difficult to understand how each of these unique programs was operating, identifying, and relating to the broad framework of food literacy through quantitative surveying or measurement without consistent variables, frameworks, or definitions to act as constants.

After I collected my data, I send all programmatic figures used quotes to participants to be member-checked or verified for general feedback and consensus-building. This verification process adds rigor and validity to my findings. In collaboration with Farm to School BC, we are organizing a dissemination event, where stakeholders involved and impacted by the findings of my research will be able to reflect, react, and plan for next steps regarding research, practical programmatic change, and policy advocacy related to school farms.

These final steps of verification and partnered dissemination address key principles of CBR: promoting co-learning and capacity-building among all partners; using iterative processes to define development; and involving all partners in the dissemination process, despite the added time for processing and commitment (Roche, 2008).

## **4.2 Participants and Recruitment**

Through my connections with FSBC and my Supervisory Committee, I sought and received guidance and feedback from 15 people involved in school farms in BC; they reviewed, edited, and provided input on my proposal, research questions, interview guide, and sampling of stakeholder groups.

Throughout the community-based development of this project, the three main defined stakeholder groups of school farms were school district staff, school farm staff, and community members. Based on the relationships developed throughout the community feedback process, I was introduced to the majority of my school farm staff participants, which in some cases were also school district staff. For community members, the school farm staff sent the research summary to volunteers and alumni students to help with recruitment. In order to receive my ethics approval, I had to receive approval from each of the four school districts individually. The process of working with the school board and school administrators for approval also connected me with school district staff. This sampling method was both purposive and snowball sampling based on my intentional selection of participants based on pre-existing relationships and knowledge, with the remaining participants recruited through referral to the project.

*Table 2. Participants in school farm Interviews*

	SCHOOL DISTRICT A	SCHOOL DISTRICT B		SCHOOL DISTRICT C	SCHOOL DISTRICT D
	School Farm 1 & School Farm 2	School Farm 3	School Farm 4	School Farm 5	School Farm 6
<b>Community Members</b>	n=1	n=1		n=1	n=1
<b>School District Staff</b>	n=1	n=1	n=1	n=1	n=1
<b>School Farm Staff</b>	n=2	n=1	n=1	n=2	n=1

### 4.3 Semi-Structured Interviews

Qualitative semi-structured interviews were designed to have a few focus points to ground the interview in the structure, experience, and teaching on school farms, while allowing stakeholders to share the reality of working on a school farm and the subtleties regarding curriculum, funding, staff, operations, feelings, etc. (Galletta, 2013).

Interview questions ([Appendix C](#)) were designed based on food literacy definitions, food education frameworks, and research questions shaped by the community and my committee. The interviews covered topics ranging from education, nutrition, agriculture, mental health, organizational management, community knowledge, climate change, and environmental science to identity and cultural traditions. At first, I gave space to interviewees and encouraged



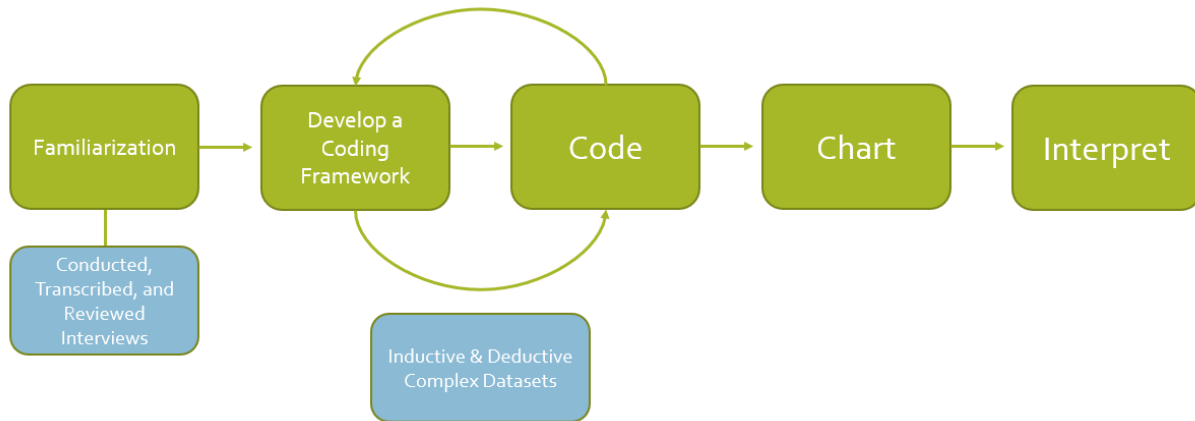
anecdotes. For example, my first question was: “*Tell me about your experience and knowledge of (insert name) school farm?*” This allowed for participant narrative, trust development, and so interviewees could explore personal experiences through guided but “flowing conversation” (Rubin & Rubin, 2004), where feelings, tensions, and reactions were captured in a more candid conversation. Then, questions sought to address the research questions and broader ideas of food literacy, often referring back to ideas from the participants’ responses to create a cumulative and iterative conversation (Galletta, 2013). An example of a more specified question driven by definition and research question is: “*Which skills, knowledge, or behaviours taught at the school farm do you think are most important for adolescents to learn? Why?*” with the probe, “*Do you feel adolescents would learn these skills elsewhere if they were not participating in the school farm? Explain.*” Interviews were conducted via zoom due to COVID-19 safety protocol and recorded for transcription.

After community review, I did pilot-testing of my Interview Guide with two individuals. I first interviewed Gabrielle Edwards, a PhD candidate in the Department of Curriculum and Pedagogy who is currently working with a school farm and was also a teacher with Agriculture in the Classroom. She provided feedback as to whether the questions were smooth and comprehensive and appropriate for the experienced participants. Following her remarks, I created a final interview guide (Appendix A) which was subsequently also reviewed by a school farm staff member from one of the included districts in a second pilot interview I did.

#### **4.4 Data Analysis**

Although the breadth of information and ideas surpassed the domain of my two research questions—helping to further define school farms and provide context for the challenges and goals of the programs—I was able to accommodate the narrower intentions of the research

questions and provide space for people's narratives using Framework Analysis. I chose Framework Analysis for two specific reasons: 1) to account for the various layers and complexities of the groups I would analyze in my data; and 2) to organically tell the story of each school farm and school district, while also having a mechanism to compare stakeholder groups across all four districts and six school farms. This is because Framework Analysis is used for analyzing large, complex qualitative datasets, across multiple jurisdictions or geographies, and raises both inductively and deductively derived themes from cross-sectional data using both description and abstraction (Goldsmith, 2021). More specifically, by using a developed framework I could examine the data inductively from participant's accounts and deductively from the reviewed literature and community feedback summarized within a context that supported specific research questions (Gale et al., 2013). Framework analysis, which was developed initially as a method for social policy research, extracts targeted answers about specific populations for ease of application to a policy or practice (Ritchie & Spencer, 1994). In this case, the operation and educational opportunities on school farms would be considered the practice. Framework analysis is becoming a more common method in health research because of its versatility when dealing with multi-disciplinary and mixed method studies (Gale et al., 2013), which is relevant based on the interdisciplinary nature of this project. Framework Analysis is conducted in five stages; familiarization, identifying a thematic framework, indexing, charting, and mapping and interpretation (Gale et al., 2013; Goldsmith, 2021; Ritchie & Spencer, 1994). Each step is detailed below (Figure 4).



*Figure 4. Framework Analysis Process*

#### **4.4.1 Familiarization**

For the first step to familiarize myself with the data, I conducted and transcribed all 16 interviews plus 2 pilot interviews (which was the equivalent of nearly 20 hours of data), taking notes of ideas and consistencies as I transcribed.

#### **4.4.2 Identifying Thematic Framework**

Though there is an element of open coding and thematic grouping, Framework Analysis is different from other inductive thematic analysis methods like Grounded Theory because the framework method is not seeking to generate social theory (Gale et al., 2013), but aims to answer research questions about specific practices within a population.

There are two phases to identify the thematic framework—one to create an analytic framework and another to apply the framework (Goldsmith, 2021). I used a deductive approach based on the literature, community feedback, research questions and interview guide, and my first impressions of the data after familiarization to construct the first iteration of the framework. Then, as I was coding, I applied the framework to assign the data to the pre-determined categories. Meanwhile, I used an inductive approach to generate themes from the data through unrestricted coding to

account for any ideas that did not fit within the framework (Gale et al., 2013). Having the data both described and abstracted allows for cross-sectional analysis to identify key patterns and also interpret them across the framework categories (Goldsmith, 2021) of food literacy and school farms' defining aspects. This first phase of framework construction, framework overly, and open coding also served as a familiarization process as I combed through the data to see if my initial framework was appropriate. As with all methods, there are weaknesses and biases. Because I was the only person coding, there is the chance that someone else may have come up with different codes and assigned them to different themes (Gale et al., 2013). To mitigate this, I coded 12 interviews until I reached saturation. No new codes were discovered after the tenth interview. After reading through 12 transcripts, there were 49 total ideas or topics that continued to come up, including the ideas within the original framework.

After coding 12 interviews, it was clear that my initial framework was non-inclusive of many recurring ideas but included topics and categories that did not appear as frequently in the data as predicted. Thus, I undertook the iterative process of refinement to make sure that the framework remained focused on the research questions, included major themes and ideas, but did not superimpose conceptions of what the results "should" hold. After refining the framework, creating new major themes, consolidating codes, and deleting irrelevant themes, I had a framework that focused on school farm infrastructure, distribution, education and curriculum objectives, student demographics, pedagogies, programmatic structure, school farm management, challenges, and goals of a school farm. I then re-read the remaining 4 transcripts to make sure the new framework could be applied and that no other major themes were outstanding. Finally, I refined the framework one more time, by combining categories to come up with the major themes of: 1) school farm characteristics, which included staff structure, physical

structure, production and distribution, program structure, and student demographics; 2) school farm education, which included food literacy concepts, interdisciplinary subject integrations, and personal development; 3) school farm impact on students, which included professional, academic, and personal impact; and 4) challenges and goals for future school farms.

#### ***4.4.3 Indexing & Charting***

My third phase of Framework Analysis involved me overlaying the final framework across all data to be able to index codes into a matrix based on their corresponding theme within the framework. This final round of reviewing codes in the data acted as another layer of validation that the data was being organized consistently and in depth. The chart was broken down into the major themes and categories, as well as school district, farm, and stakeholder group. A case is an individual interviewee. Individual cases were analyzed first to keep participant's ideas contextualized within their case so they could be comparable across all the cases (Gale et al., 2013). Then school farms were analyzed within districts to provide results for shared districts. Finally, school districts were compared to each other.

#### ***4.4.4 Data Synthesis***

I used the mapping and interpretation phases of Framework Analysis for narrative synthesis of my interview data.

**Mapping:** I used several different methods for mapping due to the complexity of the data and the different entities to compare and contrast. For the school farms' staff and programmatic structure, I created organizational diagrams (organograms) for each district. Nuances such as who funded each program, whether students received credit or compensation, the seasonal timing of programs, and grades taught were all expressed in this phase of mapping. Food distribution

channels, demographics, and food literacy concepts were mapped in a table for each school farm which was also organized by district. Challenges and goals were organized by stakeholder group to visualize how different participants view the obstacles and future objectives of the programs.

**Interpretation:** This last phase of the Framework Analysis meant that I finally combined all of the analysis of the data through narrative synthesis.

## Chapter 5: Findings on British Columbia’s School Farm Structures

A school farm is made up of many stakeholders including school district staff, school farm staff, and community members. Programs are developed to function within multiple systems and have varied physical infrastructures and business models. In an effort to understand the diversity of structures, I will describe all six of the school farms and their shared and contrasting challenges and goals. I will also discuss why school farms in the province are built on secondary school property or to serve secondary school students.

*Table 3. Overview of British Columbia School Farms*

	<b>School District A</b>	<b>School District B</b>		<b>School District C</b>	<b>School District D</b>
	<b>School Farm 1 &amp; School Farm 2</b>	<b>School Farm 3</b>	<b>School Farm 4</b>	<b>School Farm 5</b>	<b>School Farm 6</b>
<b>Size</b>	About 0.5 acres	2000 ft <sup>2</sup>	About 1/3 acre	5 acres	8 acres
<b>Responsible for Farm Management</b>	Non-Profit Organization	Non-Profit Organization	Private Business	School District	Non-Profit Organization
<b>Educational Offerings Organized by</b>	Non-Profit Organization & School District	Non-Profit Organization & School District	Private Business & School District	School District	Non-Profit Organization & School District
<b>Teacher-Champion?</b>	No	Yes	Yes	Yes	Yes
<b>School Year Program?</b>	Yes	Yes	Yes	Yes	Yes
<b>Summer Programming</b>	Yes	Yes	Selected students are invited to an apprenticeship	Yes	Yes

## **5.1 School Farms 1 & 2 Overview:**

There were two school farms included from School District A: School Farm 1 and School Farm 2. Both school farms were managed in partnership between the school district and a community non-profit organization (NPO). Because the programming offered by the NPO is the same across both school farms, the data will be reported together. Participants from this district included a school district administrator, two management staff of the NPO, and a community volunteer who is involved as a Community Supported Agriculture (CSA) share member of the farm and who helps with farm maintenance and leading field trips (Table 2).

According to the School District A stakeholders, it was necessary to have buy-in from school district staff across education departments for the school farms to operate. Within the school district, the Director of Instructions helped set up the school farm courses for credit. Anything not physically connected to the school buildings that was on school district soil was under the purview of the Grounds Maintenance Department. So, anything modular, like handwashing stations, sheds, etc. could only be built through permission from this department. Buildings used or built for the school farm were under the purview of the Facilities Department. There were 13 separate employee union groups with collective agreements that needed to cooperate for mixed-department projects like the school farms to address questions of ownership, funding, payment responsibility, and maintenance. The NPO leased the school district land without day-to-day oversight, but any changes the NPO desired or needed for the space required permission from the school district.

The farms in School District A were about 0.5 acres, with 44 raised beds, drip and in-ground irrigation, sprayers, and large farm tools. The farms were divided into food production, food education, and learning landscape areas. Food was produced for a 20-week CSA for 64 people



and there was a location at one high school where students could access fresh produce for free. In the summer programming, students used farm produce to prepare meals twice a week for about 50 people involved in the programming. School farms in District A worked with other NPOs to provide food for people in need. One partnership involved students working with professional chefs to cook reasonably priced meals for the school students and staff. School District A farms donated excess food to community access programs, and would often intentionally grow food for donations. Table 4 summarises how the different school farms distributed food grown on site. The school farms' partner NPO funded full-time staff for its production and educational programming and was responsible for other programming in the province of BC outside of School District A.

Table 4. Food distribution channels for School Farms in British Columbia

	District A		District B		District C	District D
	School Farm 1	School Farm 2	School Farm 3	School Farm 4	School Farm 5	School Farm 6
School Meals (Salad or Soup Bars) / School Cafeteria	x	x	x	x	x	x
Food Studies/ Culinary Arts Programs	x	x	x	x	x	
Markets/ Farm Stands	x	x	x	x		x
Restaurants			x	x	x	x
Community Supported Agricultural Programs (CSAs) or Veggie Boxes	x	x	x	x	x	
Community Food Access Programs (food banks, free donations, etc)	x	x		x	x	x
Student participants take home food					x	x

There was school-year programming and summer programming run by the local NPO on the school farms (*Figure 5*). There was no set curriculum during the school year, and instead the school farms facilitated field trips, field classes, customized courses, and created classroom settings for teacher and students to achieve the goals and requirements of core curriculum and graduation. Summer programming was both a youth leadership program with a stipend for participants and an accredited course funded by both the local NPO and school district (*Figure 5*).

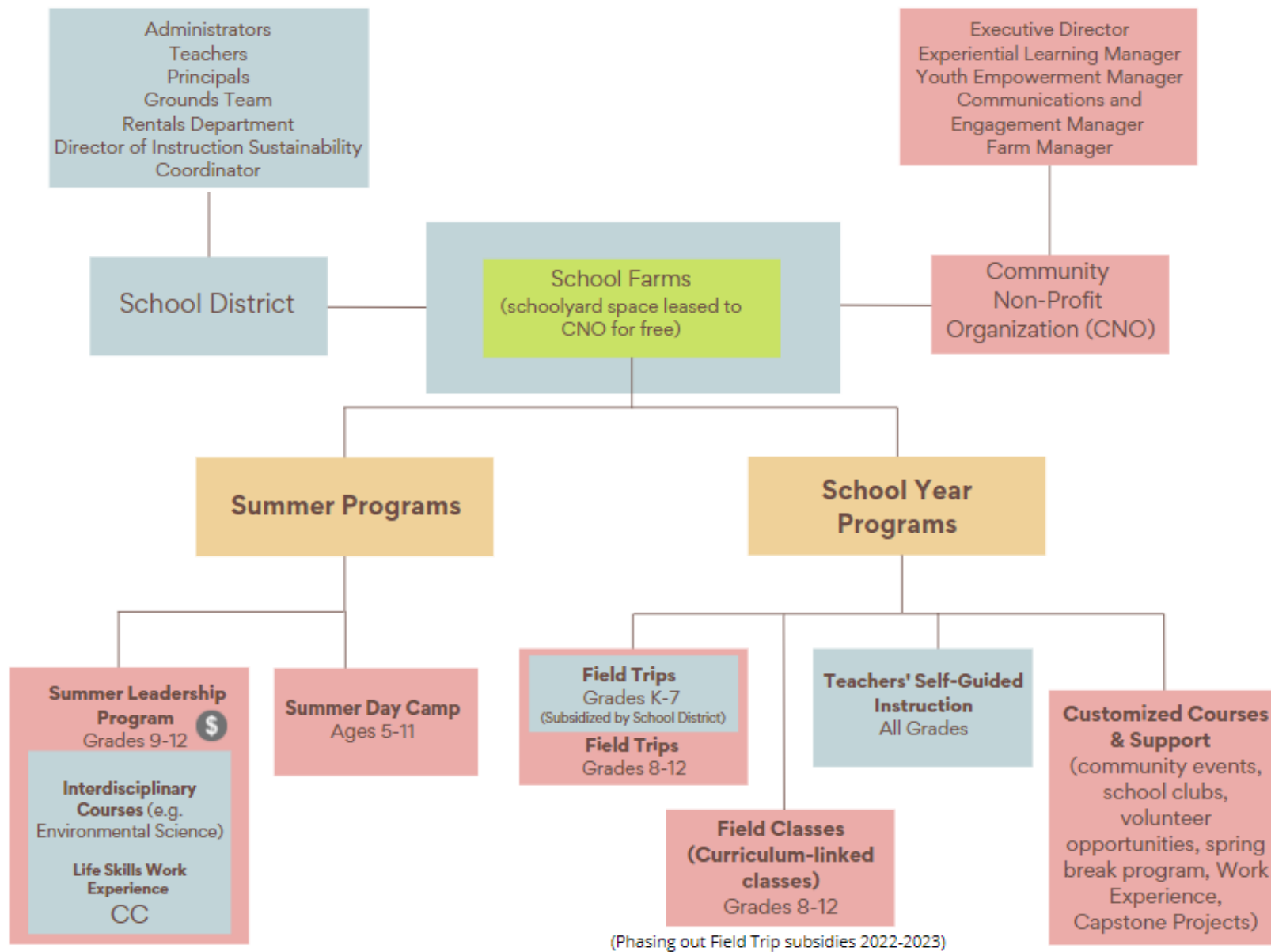


Figure 5. **Organizational Diagram of School Farms 1 & 2.** Pink, funded by the community non-profit organization; Blue, funded by the school district (school district); Course Credit (CC), students receive course credit for participating in programming. \$, students receive compensation for the program

## 5.2 School Farm 3: An Overview

The second school district, School District B, hosted two school farms featured in this study, School Farm 3 and School Farm 4. School Farm 3 was managed by a local non-profit organization (NPO) (a different one from School Farms 1 & 2). Study participants of School Farm 3 included a management staff member of the NPO; a community member who is also an alumna of the school farm program; and a school district member who integrated courses with school farm programming (Table 2).

School Farm 3 started as a courtyard garden run by a teacher champion in the school. With the help of an NPO and a partnership with a local agricultural business that builds container farms, the school was awarded a large grant by a local foundation to expand the courtyard growing space to build a micro-farm to test a scalable schoolyard farming model. The purpose of the micro-farm expansions was to:

*“prove the efficacy and value of having large-scale food production in schools and ideally work towards some kind of longer-term systems change where there could be more in-ground farms in the region linked to education and school food programs”*  
(School Farm 3 Staff).

The micro-farm was a dedicated quasi-commercial space for growing greens for sale. The micro-farm was chosen as the production space because since it is modular and there is no permanent infrastructure or changes being made to the district's property; it was easier for the school district to approve the implementation of the school farm. The growing area of the school farm was about 186 m<sup>2</sup> with walking paths, with between 200-250 growing containers. Each container was about 46 cm diameter. There were about 50 containers per row.

School Farm 3's programming was split up into schoolyear workshops, field trips and an 8-week Work Experience program in the summer open to all high school students in the district. The

schoolyear programming consisted of harvest sessions for 8 weeks in the fall and 10 weeks in the spring, where students could come out to learn about the food system and participate in harvesting food to use for the school meal program and workshops. Workshops included canning, composting, food security, and tours of the micro-farm. Figure 6 below describes the farm's staff and programming structure.

The summer program was funded by a district department which oversaw career paths and career studies. The program was 2.5 days a week over 8 weeks, where students helped care for the micro-farm, and then signed up for weekly shifts to sell produce at the partner businesses' markets. A couple times throughout the summer, students also brought food to sell at a larger local farmer's market where they answered questions, handled the produce, and processed payments. The school farm also sold produce to a local restaurant (Table 4).

There were various workshops throughout the summer program (i.e. food security, cooking, and preservation) and the school ran field trips to the local farms. The summer program could either be taken for volunteer hours or for credit as a Work Experience course, which students needed to graduate. The school district received money from the government for each student who completed the summer credit, and a percentage of that money was allocated to the NPO, who ran the summer programming. A school farm staff member described:

*“The summer program is like a much more in-depth and like full scope experience for those students, and they really get to engage deeply with a lot of different aspects of food and growing and cooking and selling and eating and preserving.” (School Farm 3 Staff)*

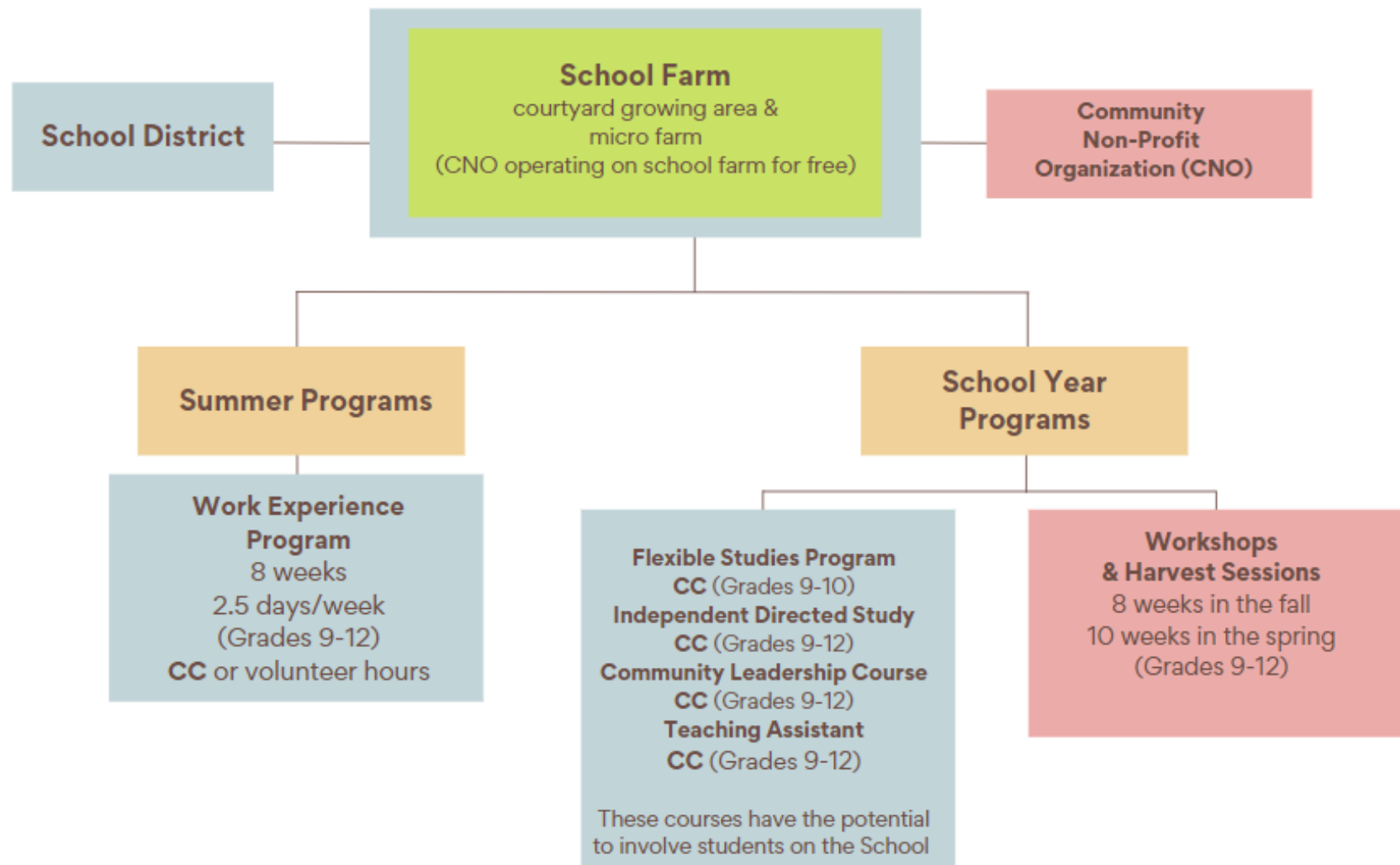
While there was no formal school farm course run by the NPO during the year, the teacher champion integrated the use of the school farm into a few different courses offered by the school district. The Flexible Studies Program (grades 9-10) was a community-organized program that students could apply for that integrated physical sciences, life sciences and the humanities. The

course ran every afternoon for two years in a row. If students wanted extra credits, they could do an independent directed study. Students could also take a Community Leadership course (grades 9-12) and Food Studies course (Grade 9-12) which worked with the school farm, or they could sign up to be a teaching assistant and receive a credit to assist the teacher champions in running the school farm programs.

A school district member emphasized the importance of all the different avenues in which students could get credit by working on or with the school farm:

*“[The school farm] really needs to be part of a curriculum. The curriculum is already very full, so I suggest it be connected to something that students are already doing or something they can get credit for that isn't all outside the timetable. I don't think it works if it's all after school or at lunch, it needs to be embedded in something existing that they already have to take like science nine or ten. You can learn a lot of science through gardening/farming. If you make a school farm garden credit part of something students already have to take, to get your benefitting workforce, and it's embedded in that, and then you have the coordination of the school farm garden with a community partner that can keep it going during the summer, then it's incredibly doable.” (School District B Staff)*

As a result of these accredited programs, the school offered a salad bar program and, since the COVID-19 pandemic, a harvest box program. Students in an Independent Directed Studies and the Leadership course were responsible for running the salad bar and harvest box program. They harvested and organized the vegetables, washed and packed the food, and weighed any purchased items. They made homemade salad dressing each week.



*Figure 6. Organizational Diagram of School Farm 3 Pink, funded by the community non-profit organization; Blue, funded by the school district; CC, students receive course credit for participating in programming*

The salad and soup bar at School Farm 3 served more than 100 people per week in the school and was the alternative to the hot lunch program which was typically reheated frozen foods. For the harvest box program, the school district purchased food from a local food hub using “farm bucks,” which gave them a discount on the price of the food. The NPO sold the food to the farm hub, which meant the school district bought back the food the school farm was growing at half price. The NPO made a full profit which left the program with a buffer to offset the cost of purchasing materials and ingredients for the harvest boxes or to afford other veggies purchased from the food hub that the school farm was not growing. The farm bucks discount also allowed the program to sell the harvest boxes at an affordable price to staff and families. The harvest boxes were sold to 12 teachers and 12 families, which was the program’s capacity and was easy to organize, since food is usually ordered in dozens. Some of the money made on the harvest box program was used pay the NPO to lead workshops during the school year. Students could also participate in the garden club which was run by the NPO stakeholders, but was not an accredited course.

Regarding School Farm 3 ’s food distribution, a school farm staff member reflected:

*“in the interest of trying to figure out some kind of sustainability model, we have been selling the food that we are growing to the schools. And so, the idea with that was to create a bit of a circular revenue generation system that could at least cover the maintenance and production at the sites. As of right now, it is, but that's it. It's not covering wages. it was a challenging idea to pitch to the school... 'you're growing it here, we're giving you free land and free water like, why do we have to pay for this?' and schools don't have a lot of money...whereas with a system like School Farm 4, the farm is part of an existing revenue-generating business, and in a lot of ways I think that's way more sustainable. What we're doing is being funded by grants right now, and when those run out, I don't actually know what's going to happen...” (School Farm 3 Staff)*



Issues and needs surrounding sustainable funding were a consistent theme across all farms which will be discussed in more depth in [Chapter 8](#).

### 5.3 School Farm 4 Overview

In contrast to School Farm 3, School Farm 4 was managed by a sole proprietorship business in the community. Participants for School Farm 4 included the private farm partner and a culinary art teacher from the school district.

For School Farm 4, a local farm and business leased and operated the land on the school district property. In exchange for getting to use the land and keeping the profits of food sales, School Farm 4 offered free educational programming to the district. School Farm 4 was the only model in this study operated by a private business. The site was used as an extension of the farmer's headquarter farm site which is located on a nearby site. Because the school farm was maintained as a full-time production farm, it was consistently productive, taken care of by a private staff, and was financially self-sufficient within the terms of its lease. When negotiating the size of the farm, School Farm 4 calculated how much land they would need to produce enough food to sell to fund educational programming and determined that  $\frac{1}{4}$  to  $\frac{1}{3}$  of an acre would grow enough produce to be able to pay for the whole operation to exist. The farm started with a \$10,000 grant which paid for built structures that are now owned by the school including a fence, greenhouse, irrigation, and some soil. The farm also had a 10-foot diameter Indigenous medicine garden. The farmer believed that the school's buy-in was based on the idea that they:

*“wouldn't have to do anything. [The school farm] wasn't going to ask them for anything, they weren't going to ask for money” (School Farm 4 Staff).*

They continued,

*“this isn't a big profitable grinding capitalist endeavor that's using school land to line our pockets. It's coming from a good place and we have a lot to*

*offer these students and we have a long-term vision to try to create a more integrated curriculum” (School Farm 4 Staff).*

About 80% of the produce from School Farm 4 was sold to restaurants, sold in CSA boxes, sold in upscale local restaurants, or donated to the food bank (Table 4).

The farmer opened up the site one day a week for teachers in the district to sign-up for a slot to come for educational programming. Teachers were invited to bring in their own curriculum to tie in to farm sessions for which School Farm 4 provided materials and recommendations.

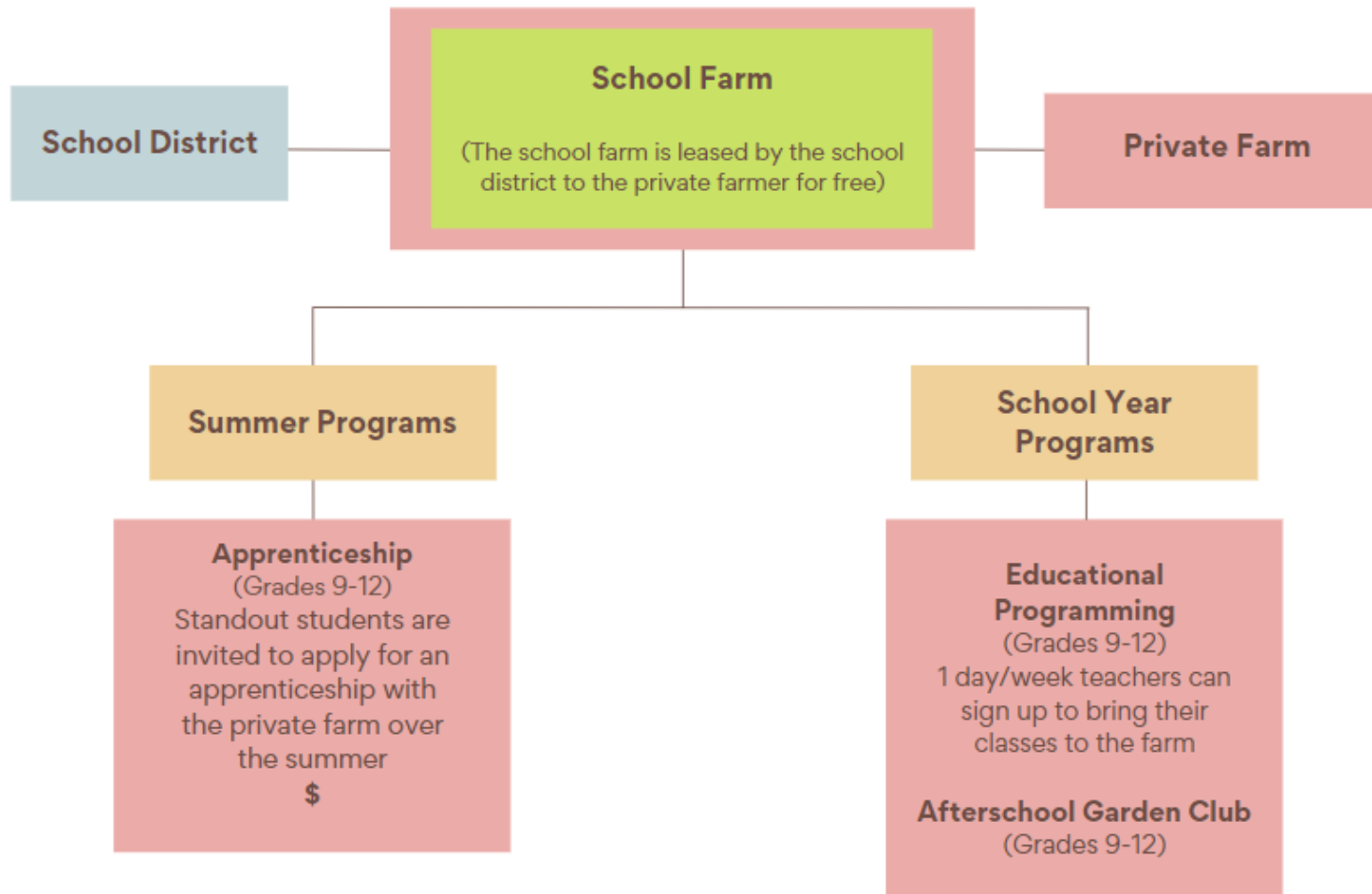
Otherwise, School Farm 4 Staff lead students through the necessary activities on the farm for that day, grounding students in an intentional sharing and stretch circle at the beginning of class before engaging them in farm work. Students and teachers were invited to take and use as much produce as they would like during their visits. The food studies teacher is the teacher champion at School Farm 4 and worked hard to integrate their classes with school farm activities. The teacher brought classes down to harvest the produce for class activities.

Reflecting on the program’s set up, a district teacher said:

*“We were so lucky we had a supportive and sympathetic school district, and also have a professional urban farmer who manages this whole [school farm]. Like I don't think about planning it. I don't plan where it goes, I don't think about how we get a harvest, or how are we are going to do this. Like none of that is my worry. I don't think about having to water it at five o'clock in the morning through the summer. So, if we didn't have that relationship, of a farming professional taking it on, I don't see how this is actually possible”*  
*(School District B Staff).*

Though there was not academic credit for a specific school farm course with School Farm 4, students who were keen on working on the farm were invited to join the school’s after-school garden club to continue working with the farmer and culinary arts teacher. Students with exceptional commitment and dedication to the project were invited to participate in a paid

apprenticeship over the summer. Error! Reference source not found. depicts the program's staffing and program structure.



*Figure 7. Organizational Diagram of School Farm 4. Pink, funded by the private farm partner; Blue, funded by the school district; \$, students receive compensation for the program*

#### **5.4 School Farm 5 Overview:**

There was one school farm included from School District C which was owned and managed by the school district. Participants from this district included two teachers from the school farm; a community member who used to be a university professor and taught and helped at the school farm as a volunteer; and a food studies teacher who worked with the school (Table 2). The school farm staff were employed teachers within the school who brought their courses out to the farm during the school year. These high school teachers as well as teachers from the middle school and elementary school were employed by the school district over the summer to run programming exclusively on the farm. For clarity, though all of the teachers involved in the school farm were school district employees, the two champion teachers who ran and maintained the farm in School District C are referred to as school farm staff since they operate the farm. The culinary arts teacher had their Red Seal, a provincial trade certificate that shows a person has the knowledge and skills to practice their trade in Canada. They worked as a chef to prepare food from the farm to sell during lunchtime and are considered a school district member since their job did not require their participation with the farm. Specific teachers were hired in the summertime and were responsible for operating the farm and teaching all of the school farm courses.

The farm was five acres of the school district's land. The farm consisted of two acres of sweet corn, two acres of vegetable beds, large bushes of a variety of berries, beehives, a greenhouse, a pump, an irrigation system, a fridge, and steel boxes for storage. There were six raised beds designated for the elementary and middle school students. The school farm also raised chickens, turkeys, duck, quail, and rabbits.

Students had the opportunity to take 5 agricultural courses throughout the year (this varied slightly on a year-to-year basis) (Figure 8).

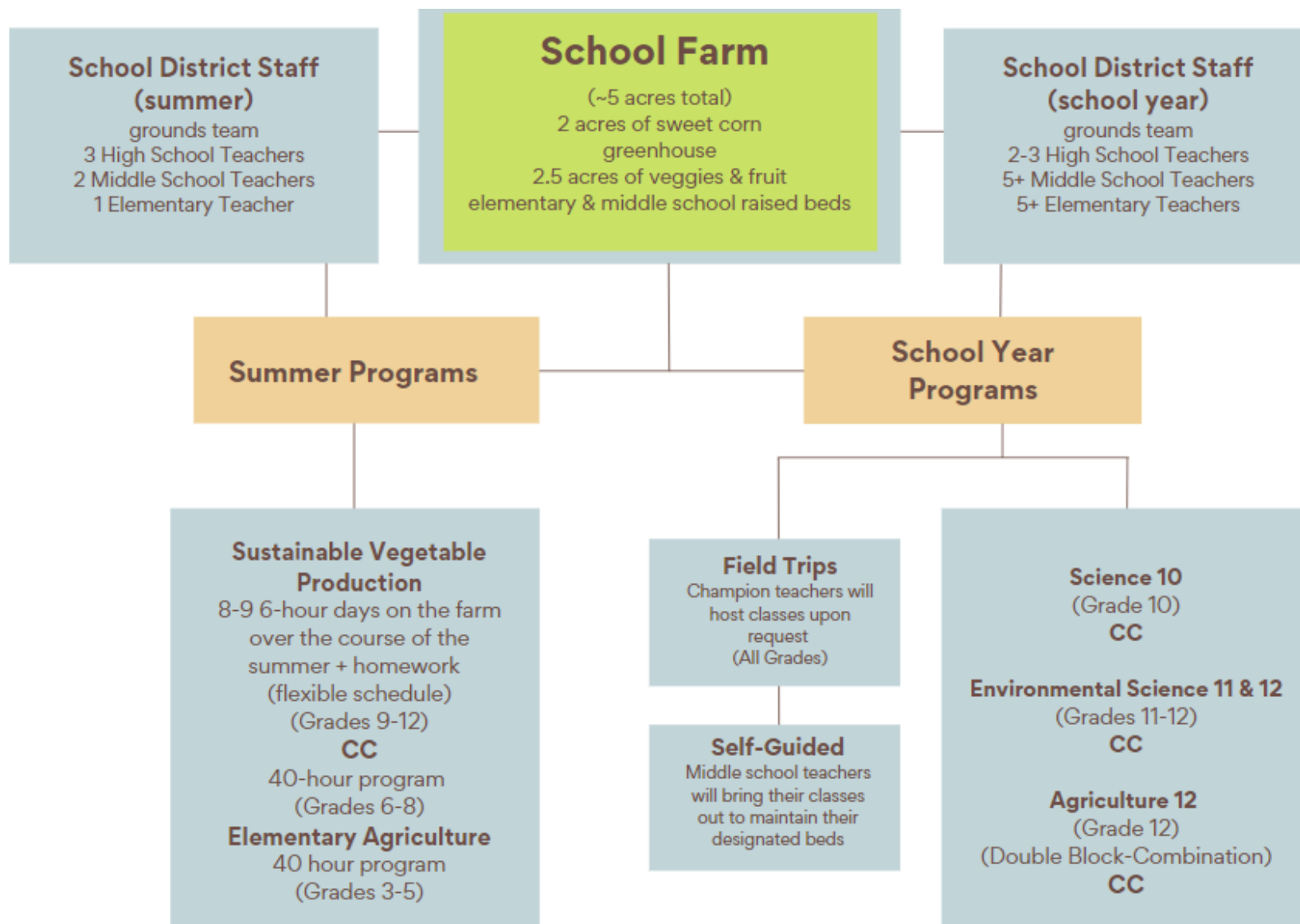


Figure 9. **Organizational Diagram of School Farm 5.** Blue, funded by the school district; Course Credit (CC), students receive course credit for participating in programming.

One of the courses allowed them to get credit for a local university agriculture course. First semester courses involved with the farm finished gleaning the summer harvest and focused on the greenhouse and classroom learning of agriculture. Then in February, the second term course started with book work and moved into planting seedlings. The majority of the production happened during the summer program. The school farm teachers hosted classes on field trips and gave tours throughout the year to allow for more teachers to get involved. For the elementary and middle school teachers who had their own raised beds on the farm, the teachers would go through a training with the school farm teachers so they could manage their gardens and come with their classes independently.

During the summer, Sustainable Vegetable Production (grades 6-12) was taught. These courses were Board Authorized, which means their customized curricula had been approved by the government. Recently, the average number of students that participated in the summer program was 90 high school students, 25 middle school students, and 25 elementary school students.

For the summer programming, grade 8 students were recruited so they could start taking high school courses before actually getting to high school. They had the opportunity to meet teachers they were going to have in the coming years and met new friends before entering the secondary school. Students in grades 8-12 came eight or nine times over the summer for six-hour days. The culinary arts teacher came in to do cooking days and students were required to take food home and prepare it as part of their homework. Students could choose their own schedule throughout the summer and could sign up for whatever eight days worked best for them. This allowed students the flexibility to enjoy their summer breaks and also earn course credit, and it dispersed the 90 students so there were less people on the farm at any one time, which allowed the school farm teachers to take a week off or go on summer holiday.



The school farm was funded through grants and the government funding per student enrolled in a course. Two large grants helped pay for a water well, irrigation equipment, drainage, wash station, sink, shed, and student shelter. Every year, the school farm negotiated with the school district how much funding the school farm would receive per student to determine how many teachers they can pay. The school farm teachers worked out that if they could recruit about 85 students, they could fund staff for the program, and would have enough funds for supplies. One teacher described:

*“We have like a bit of a target to when we're recruiting because we do recruit quite a bit in the spring. We're going to the middle schools, because students in middle school are in grade six to eight at our districts. I talk to a lot of my grade 10 science classes.... And then for the summertime, we recruit by traveling to the middle school. We've had assemblies, where the principle lets us talk to the whole group of grade 8s. That's been the easiest.” (School Farm 5 Staff)*

The main fundraisers for the school farm were a Mother's Day Plant Sale and a 14-week CSA for 30-40 people. Running the CSA,

*“students get to experience selecting produce, packaging it, putting it together in bins and selling it. They get that marketing piece of how humans interact with nature and utilize resources, but also how they can create capital from them” (School Farm 5 Staff).*

The farm also sold produce to the cafeteria and culinary programs, and resource programs; they do some public sales; and the students took a lot of produce home (Table 4). A community member reflects on the fundraisers:

*“Most of what is either sold by a fixed price or received by donations gets plowed back into the program... And that what makes the program resilient. The program is not reliant on handouts. And that's what makes it incredibly strong. And that's why it's still there.” (School Farm 5 Community Member)*

The culinary arts teacher would see what was growing on the farm and then would pay the farm the market price from their course budget *“so the money stays in the school and [the projects]*

*fund each other*” (School Farm 5 Staff). Students would go pick food on the farm then bring it back to class and prepare it where they sold it as a menu item at lunch. Students who made the food in class would often purchase the meals in the cafeteria. Sometimes, there was excess food, so the school farm would donate it to the culinary arts program and in exchange the culinary arts course would cook food for the school farm courses to share. There was a reciprocal relationship between the programs:

*“So often we'll just work together and then you know [the culinary arts teacher] helps us out because sometimes she'll make a meal for our class... we raised turkeys one year, and we had a big turkey roast for thanksgiving and we added vegetables and [the culinary arts teacher] made the turkey, so my class got to enjoy that together. So, then, we give back. It's kind of a fun give and take. ” (School Farm 5 Staff)*

The school farm also grew and distributed food to community access programs, including one NPO that made soups and food for 850 food-insecure students every day within the district. They also prepared bins for NPOs supporting women and families transitioning out of abusive situations and food donations for any community members or organizations that volunteered with the school farm. The school farm inconsistently sold to restaurants and local grocery stores but had to rely on people donating their time and appropriate vehicles to transport the food.

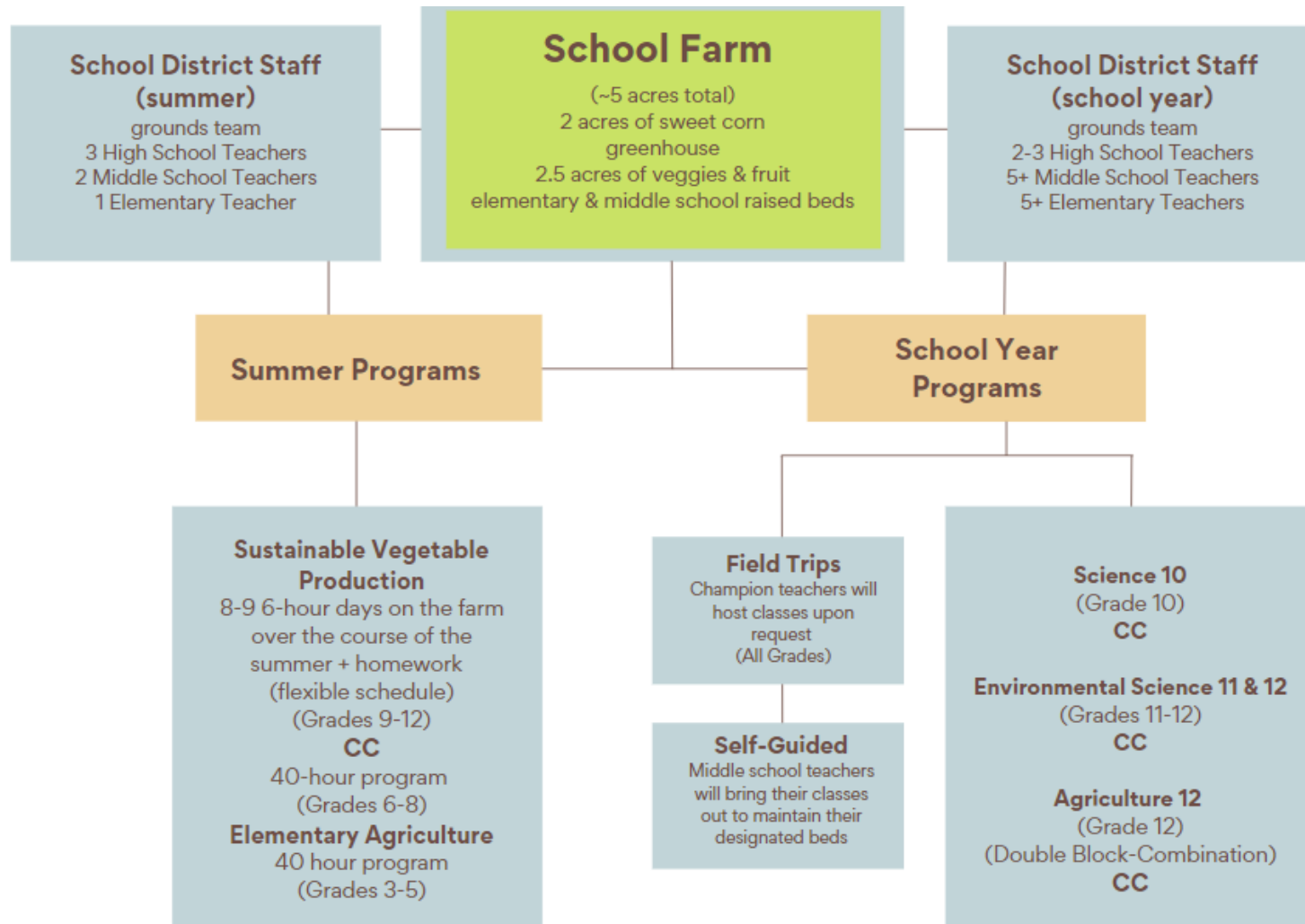


Figure 8. **School Farm 5 Organizational Diagram.** *Blue, funded by the school district; Course Credit (CC), students receive course credit for participating in programming*

## 5.5 School Farm 6 Overview:

There was one school farm included from School District D. This School Farm 6 was owned and managed by the school district. While the school farm had designated staff, these staff were teachers employed by the school district. Since the pandemic, the school district partnered with an NPO to bring in a farmer who maintained the production side of the farm and occasionally taught workshops on soil health. As one participant said it best, since bringing on the NPO farmer, *“everyone at the school and the community apparently were like ‘yeah, this is by far the most productive they’ve seen the site’ (School Farm 6 Staff).* The teachers brought the farmer up to speed on the history of what the school farm had planted over the last few years and the resources they could access locally, and the farmer was running the whole farm operation.

Participants from this district included a school farmer, the school farm program coordinator and teacher, and a community volunteer who worked with the program and is also a retired teacher.

The school farm was located on about an acre of an 8-acre parcel owned by the district which used to be a primary school. There was a main building with a meeting space, classrooms, two industrial size refrigerators, a kitchen, gym, and offices. The farm had a hoop house, a semi-permanent structure which can act like a greenhouse to extend the growing season. The added infrastructure of having a building versus just a farm increased costs because they needed to hire a custodial staff and pay the operating costs of the building. There were outdoor learning opportunities off the farm as there was a dog park and School Farm 6 is a couple of blocks from the ocean, so students were allowed to walk with a teaching assistant down to the water.

School Farm 6 hosted school-year programming and summer programming. Students received 4 course credits (50% of their total annual credits) by attending school farm school-year programming. Their schedules alternated between Day 1 and Day 2 classes, like an academy, so

they came to the farm during Day 1 days and returned to their traditional courses at the high school for Day 2. In September, October and early November, students were mostly learning outside, and then late November, December, January, and February was intense classroom learning with experiential activities inside and occasionally outside. Then, in March, April, May, and June, classes were back out on the farm. It was noted that there was a decrease in Grade 12 students in the program because the school farm program required them to miss out on 50% of their senior year, which meant they missed out on graduation events at school. The full-time participants on School Farm 6 were in grades 9-12. In every grade through grade 7 in the district, classes did at least one field trip day on the farm.

The summer leadership program was run by three interns from the partner NPO who came in early June for a crash course on the farm before running the programming for 6 weeks. The summer students spent half the day doing farm work and the other half of the day in courses or workshops. Student participants were paid a stipend at the end of the summer. Figure shows the structure and staffing for School Farm 6.

The program coordinator was a classroom teacher who made connections to agriculture and farming and then also ran the farm program, sourcing seeds and materials, and planting everything prior to the farmer coming on board. The coordinator reflected,

*“my role was sort of a lot...I'm sure that you're finding talking to a lot of people that are working on school farms that their roles are more than one thing” (School District D Staff).*

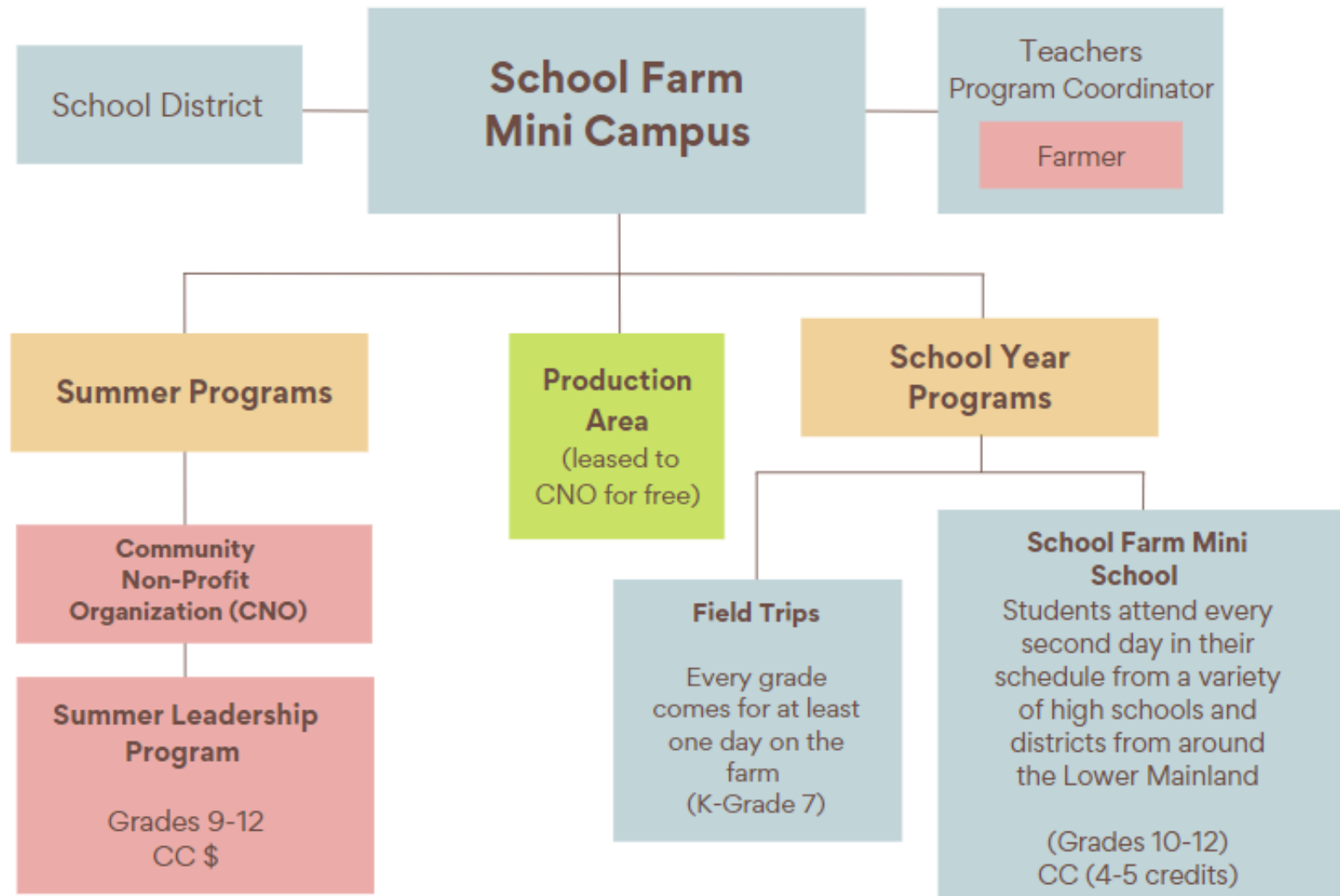
School farm food was sold through an honor box farm stand, a 25-person CSA, and what didn't sell was given to the NPO's 68-person CSA. Excess food was donated to the local food bank.

Proceeds from the farm during the growing season went to the NPO for the management of the farm. Guidance counselors also informed parents that they were welcome to a weekly full bag of

food is they wanted it. The school farm partnered with another NPO where a chef came in a few days a week to help the kids make lunch for the 25 people in the program (Table 4).

There was no interview process for students to be a part of the school-year school farm programs. Many students wanted to continue their work from the summer programming and signed up for the courses during the school year. Students could contact their guidance counselors to sign up or they could be referred by their guidance counselors or school administrators. School Farm 6 hosted site visits and an open house so parents, students, and counselors could come and view the farm together and ask questions before signing up.

The School Farm 6 program was free because the district wanted there to be “*equitable access to food knowledge*” (School District D Staff). Funding for the farm program came largely from School District D. They paid for teachers, education assistance, a part-time administrator, the operating costs for the building, bussing, supplies, custodians etc. The local farmer institute hosted an annual gala and donated the proceeds to the school farm to support students who wanted to become local farmers. Community members also helped fund and support the program; a seed company offered discounted seeds; and a local hardware store offered students discounts on gloves and equipment.



**Figure 9. Organizational Diagram of School Farm 6.** Pink, funded by the community non-profit organization; Blue, funded by the school district (school district); Course Credit (CC), students receive course credit for participating in programming; \$, students receive compensation for the program.

## 5.6 School Farms in Secondary School

All six school farms in this study were operated either on high school grounds or were specifically for teaching high school students. The most common reasons stakeholders believed school farms occurred most frequently at secondary schools was because high schools generally had more space and because the students were older and stronger and therefore more physically capable of effectively doing large scale farm work. Other reasons school farms were focused on secondary school students included:

*“at that older age in secondary school you can start to have more of an appreciation for the complexity and all the components of agriculture, and you can teach more in depth, right, it doesn't have to be like so surface level. You can start to teach more complicated topics and subjects around agriculture and food systems, and having a farm space to do that on is important, and especially as like you know they start to graduate and move on to be adults. Really having that connection to food; where their food comes from; how physically difficult it is to grow food; like those are all really, really valuable.”*  
(School District 6 Staff)

and

*“high school lends itself well to giving credit to students for engaging in running a garden or salad bar program or harvest box program...at the high school level the students can learn the skills for school farm garden operation requirements, they still need [the NPO] personnel or a teacher to guide them and coordinate the operation but the students can do what is needed actually very effectively.”* (School District B Staff)

Participants believed adolescent students were capable of learning the intellectual and physical skills of farming and they were at an age where they will soon be independent adults and so the skills learned on the school farm would be valuable to students as they moved into their next phase of life after secondary school.

Despite the focus on high school students, participants also commented on the benefit of including younger age groups in the school farm programs.



*“Junior high is probably as good if not a better fit for doing some of these farming programs because I think by grade 11 and 12, a lot of students have got some preconceived ideas about land and food sustainability, whereas in junior high I think there's still a little bit more of a chance to both inform and maybe influence kids in terms of farming skill sets... a lot of young teenagers beliefs are really sort of cogitating and really starting to both develop and harden in that really formative time of sort of 12 to 15, and none of them ever get to come to a farm. I think it should be done sooner.”*

*(School Farm 5 Community Member)*

*“I think having growing spaces in younger schools is really important to starting people out young... I think if they had been exposed to that at a younger age it would be more normal for schools to have outside spaces and to go outside, get a little dirty sometimes, and learn about food.”*

*(School Farm 3 Community Member)*

According to participants, exposing students to farming and growing food at a younger age would support experiential food education initiatives in secondary school since students would have a basis of knowledge and familiarity with the setting and concepts.

## Chapter 6: School Farm Education in British Columbia: Food Literacy Concepts, Interdisciplinary Methods, and Pedagogical Approaches

One of the major themes of this research was school farm education, including food literacy concepts, which academic subjects are taught on school farms, and the pedagogical approaches used to teach on the farms. A common idea from younger interview participants, one of whom is an alumna of a school farm and the other who is now a school farmer, was the lack of food education in their past experience:

*“I don't think we really ever talked about like plant farms, where food comes from, which I think is a really important perspective to have because it helps you like make educated decisions on what you're eating and like where what you're eating is coming from and like, the health implications that has for you. But also like, for the farmers and stuff and just like how it's probably better for the environment to buy an apple that was you know grown in BC rather than grown in New Zealand and flown halfway around the world. We didn't really have that kind of education, so I feel like that's pretty lacking. I feel like everyone has to eat their whole life so they might as well make educated conscientious decisions around food, which I think if, like I hadn't done any of the garden stuff or the work on the school farm in the summer, I don't think I would have been well equipped to really understand the food system.”*

*(School Farm 3 Community Member)*

*“I think the focus on food education is definitely placed on like preparing food for yourself, which obviously is super important, and there was a little bit on like picking healthy foods and stuff and like you know balanced plates and eating veggies and eating the food group, like the different food groups, but it wasn't super emphasized like how to really know how to pick out the foods.”*

*(School Farm 3 Staff)*

These participants used their own lack of food system education experience to indicate the necessity for more holistic knowledge on the food system and the importance of school farms in food education.

## 6.1 Food Literacy Concepts

When describing their school farm programs, interview participants offered detailed accounts of food literacy concepts. Though most did not specifically name their course objectives as ‘food literacy,’ their course objectives coincided with many of the categories of food literacy as discussed in Chapter 2 in the literature review. The main categories in this theme were nutrition, cooking and processing food, food production, food distribution, food and the environment, food and society, food and culture, and food and economics (Table 5). While these categories are broken up for the sake of clarity, food literacy objectives were often discussed across multiple categories in a systemic way:

*“So, they got to go learn about Indigenous food systems and restoring of land...there’s always a few students that their eyes get really opened to the issues connected to food in a way that they hadn’t thought about before. Some of the youth themselves are coming in already with that lens because of their own cultural backgrounds and experiences, and so they’re bringing [food system issues] up themselves.” (School Farm 3 Staff)*

*“You have to consider the whole food system, because the economics and the demographics of your area, the geography and the soil composition, the amount of sunlight you get, the access that you have to materials, all of that determines what you’re going to do, what you should plant. It’s impossible for them to be separate. We want and need young people to understand these interconnected systems and actually have that deep knowledge of how the world works and where we fit in it, and where other people fit in... farm programs are that opportunity for youth to actually see all of those connections.” (School Farm 1 & 2 Staff)*

*“We definitely talk a lot about some of the socioeconomic issues and environmental issues around food security, and I would say a lot of the environmental health issues around like things like COVID happening and the sensitivity of our distribution networks and just how fragile our whole food system is and bring into sort of the resiliency of having local food systems and food systems that can provide produce...” (School Farm 4 Staff)*

Topics related to the social aspects of food and the necessity to learn about food systemically came across in these participants’ discussion of food system issues, interconnected systems, and food security.

*Table 5. Food Literacy Concepts Taught on School Farms in British Columbia*

	<b>Nutrition</b>	<b>Cooking/ Processing</b>	<b>Food Production</b>	<b>Food Distribution</b>	<b>Environmental</b>	<b>Social</b>	<b>Cultural</b>	<b>Economic</b>
<b>School Farms 1 &amp; 2</b>	How food and body image are connected	Cooking for others, preserves, pickling	Planting, harvesting	School food programs, community access programs, CSA	Environmental issues, human impact, sustainability, urban food environments	Leadership, how to serve the community via food work, community building	Teaches how cultural or religious groups celebrates the spring and new life	How economics of an area influence what you grow and how you distribute food  Different socioeconomic classes experience the food system differently
<b>School Farm 3</b>	Nutritious healthy food from programs	Pickling, preserves, pasteurizing juice, dehydrating foods.	Planting, weeding, mulching, harvesting,	School food program, culinary course, veggie box program, farmers market	Uses food to change people's attitudes towards the environment and climate change	Intersectional lens of food systems and social justice  Guest teachers and workshops to share a diversity of perspectives	Works with One Planet Sanich to incorporate sustainability principles and food security topic	Not Included
<b>School Farm 4</b>	Healthy food choices	Food preparation with fresh produce	Planting, harvesting	Restaurants, food bank, CSA, culinary course	Building soil health  Composting  Regenerative agriculture  Building diverse and dynamic	Food sovereignty, food justice	Works with an organization that focuses on Indigenous land reclamation work in a local provincial park  Multicultural students share their language and what the name of foods are in their language	Socio-economics impact on distribution

					biological ecosystem		Teach pre-colonization Indigenous agriculture practices and histories. have.  Indigenous educators host drumming circles in the Medicine Wheel Garden.	
<b>School Farm 5</b>	Nourishing our bodies with fresh food  Promote healthy eating and nutrition	Cooking  Baking Knife skills  Making dressing Barbecuing	Planting  Harvesting Irrigation  Different methods of growing food (organic vs conventional, monoculture vs poly culture)  Seed Saving	Packing food  The journey of food  Grow for: CSA, plant sales, community food access programs, restaurants, grocery stores, school programs, food banks	Ecology, Ecosystems  Soil health, nutrient requirements and fertilizers, Plant ID, Ecosystems  Biotic Factors, Integrated pest management,  Land Stewardship, Climate Change, Water use	Self-sufficiency  Supporting your community  Choosing local food  Food Security  Promote sharing meals with family	Ethnobotany  Indigenous food-related topics: Medicine wheel, native plants, Elders share history of Indigenous gardening and food  Growing diverse foods to cook diverse meals  Encouraging students from different backgrounds to share their stories about food	Running a business
<b>School Farm 6</b>	Not Included	Canning  Preserving  Pickling Food Safety	Crop planning  Harvesting	Farm stand, CSA, food bank, community food access programs, restaurants, school food program	Seed saving  Sustainable food systems  Regenerative agriculture	Critical approach to food systems  Food access issues, Food deserts  School farms provide food for the community	Indigenous friendship circles to start class  Indigenous knowledge shared by students and elders	Marketing and business planning

## 6.2 Interdisciplinary Subject Integration

All of the school farms expressed how their programs either integrated interdisciplinary subjects in their curricula (Table 6) or they helped teachers teach an array of subjects based on what the BC curriculum required:

*“The BC curriculum calls for students to use technology, so we teach tools used for food production. Another topic is focused on food choices, so the farm brings in consumer choices and how we can consider sustainability issues on the farms.” (School District B Staff)*

*“I can make [a school farm] part of my curriculum. I can bend it that way, because it's to do with food and production, and I can interpret the curriculum in lots of ways, but the act of learning how to grow food isn't actually stated in our curriculum.” (School District B Staff)*

*“You could pick anything out of the curriculum and show where it's being learned in [the summer programming] ...Food and other types of plants are cross-curricular and are such a great way to teach students.” (School District A Staff)*

*“In high school you might take a foods class, science class, or social studies as separate subjects, but they're not. None of those things are disconnected from any other. One is not disconnected from the rest of us. [School farms] provide an amazing opportunity to have integrated real-world learning opportunities where you can't separate those subjects out.” (School Farm 1 & 2 Staff)*

Participants emphasized how school farms could be used to teach across disciplines, and that the interdisciplinary nature of agriculture and farming provide real-world learning opportunities across subjects.

Table 6. British Columbia school courses that utilize their school farm for interdisciplinary learning

	Potential Annual Credits	Science	Math	Culinary Arts/ Food Classes	Humanities	Other
<b>School Farms 1&amp;2</b>	1 summer	Environmental Systems 11 Biology	Math Courses	Culinary Arts	Art Courses Social Studies	Adaptive Courses Leadership Program*
<b>School Farm 3</b>	4 school-year 1 summer			Food Studies (9-12)		Flexible Studies Program* Independent Directed Study* Leadership* Teacher's Assistant* Work Experience Program*
<b>School Farm 4</b>	1 school year	Chemistry Biology Environmental Science 11		Applied Skills (culinary course) *	English Art	Yoga Physical Education Flexible Studies Program
<b>School Farm 5</b>	4 summer	Science 10* Environmental Science 11 & 12* Agriculture 12* Sustainable Vegetable Production 9-12*				Occupational Technology
<b>School Farm 6</b>	1 summer 4 school-year	Science 10-12		Home economics	English 10-12*	Entrepreneurship* Land & Food Systems*

*\*The course gives students the option to learn primarily on the school farm through harvesting, maintenance, and experiential education.*

If a specific school farm course was not offered, all of the programs allowed for interdisciplinary field trips where a teacher brought their class to the farm, and they had the opportunity to integrate their curriculum with farm experiences.

Participants also reported how school farms provided different avenues for students to graduate by creating opportunities to receive course credit in a different setting:

*“BC's grad program requires a grade 11 or 12 science to graduate, so, if they're selecting this as their grad required science then they use it to graduate.” (School Farm 5 Staff)*

### **6.3 Pedagogies**

Not only were the subjects and food literacy concepts taught on school farms major themes emerging from this study, but *how* these subjects were taught, or the pedagogies, were also important to understanding education on school farms. The three main pedagogies described were experiential learning, community-based learning, and place-based learning.

#### ***6.3.1 Experiential Learning***

The idea of learning by doing, hands-on learning, or kinesthetic learning were all discussed as modes of experiential learning while on the school farms.

Each of the school farms described their programming as experiential:



*Table 7. Experiential Learning on School Farms*

School Farm 1 & 2 Staff	"Give them opportunity to physically see food in the ground, before it's wrapped in plastic in the grocery store. Touch worms and bugs and see them in the soil...it's so different than watching a video. Experiencing how much work it takes to pull carrots out of the ground or weed a bed, it's not asking them to memorize things, it's asking them to engage with things in a very physical, real, hands-on, tangible way, where what you're doing has actual important meaning beyond just theoretical."
School Farm 1 Community Member	"I think teaching often is geared towards sort of like visual and auditory learners but with something like a school farm you can reach people who also need tactile and movement-based learning, other kinds of sensory components of learning...Being able to engage in the environments and in the doing components of experiential learning that doesn't necessarily require the verbal type of engagement that often happens in classrooms...Doing things with their hands and learning through doing... I think it empowers them too to create or come up with their own questions or create connections. That's a big difference than when you're just telling them information in other pedagogical settings."
School Farm 3 Staff	"The learning happens in actually doing the work...And having this experience to reflect upon and connecting. The food that we eat the fact that it has to grow somewhere and has to be tended and it has to be, it has to be managed and it doesn't just exist with a tremendous amount of effort so that's the main point, and I think the kids get it"
School Farm 4 Staff	"If they want to just have the students come out and have access to an experience of working with their hands and being outside, [teachers] might just leave [teaching] to me. "
School Farm 5 Community Member	"[The school farm program] is the practical part of the curriculum, or hands on, however you word it. If you want one sentence, that's it. Hands on agriculture curriculum. And we did a lot of theory, the students didn't even notice they were getting theory."
School Farm 5 Staff	"Coming together and doing things while learning is really important. So, getting out of that classroom and applying themselves and moving."
School District D Staff	"We're experiencing the curriculum, instead of just learning the curriculum-- the students in science 10 still had a science 10 textbook. We still went through all of the material they needed to go through. It was just that, when we could we would tie it to agriculture we would learn by going outside and doing it, or we learned by going to a farm and talking to a farmer, or we would learn by going down to the beach. So, the program was still entirely in line with the regular BC curriculum, it's just that we really played with the flexibility and how we deliver that."
School District D Staff	"Your learning should never be confined to four walls, you should never be stuck in a space where you have to learn in that space because, quite frankly, I think we learn more outside of the classroom than we do in it. The whole foundation for [School Farm 6], is that it would be an experiential program where students can learn about material and then actually go and do it, you know, like 10 meters away from them...and really trying to get as much hands-on learning as we can."

### 6.3.2 Community-Based Learning

Stakeholders indicated that another part of experiential learning on the school farms is by participating and interacting with the community. Community-based learning was a prominent pedagogical approach of the school farms as they relied on community input, teachers, resources, and experiences to teach students about the food system:

*“having the school farm setup provides all these different opportunities for different community members in addition to the kids... it's sort of like a bit of a hub to be connected to the community.” (School Farm 1 & 2 Community Member)*

*“It’s a scratch-my-back, I scratch-your-back relationship. Farmers need land to grow food, and teaching students about what goes into growing food, being outside, and working as a collective is a benefit to the community. (School Farm 4 Staff)*

*“Industry is very supportive of [the school farms], because that's where the next generation of farmers, workers, mid management, and upper management, are coming from. Right from those.” (School Farm 5 Community Member)*

Some stakeholders recognized the community-based learning as a way of breaking down cultural and social barriers:

*“I definitely like to focus on just this sort of community, sort of tribal experience of just like working together to accomplish something. And I think there's a real unifying breakdown of ideas around differences and race and those kinds of things in this context which I like. I like that I think people are just sort of a little bit more human with each other.” (School Farm 4 Staff)*

One stakeholder added that community-based learning meant students learned from their adult community, but that the students were also teachers to each other and their families:

*“We definitely got out into the community and we weren't just isolated in the schools when we were learning about things. Sometimes we would ask like oh has anyone ever run this thing before or does anyone know what this is? And we could kind of share. It's really good to have students learn like that and also, adults can learn from the program too, because if their kids go to the school and learn about things, and they come home, they're like whoa did you*

*know that cucumbers and zucchinis are related? That's really cool I didn't know that.” (School Farm 3 Community Member)*

*“Sometimes we would pair students with reluctant [student] farmers, and that peer teaching --more like peer guidance-- was in many ways more powerful than anything we could have done.” (School Farm 5 Community Member)*

*“there will sometimes be groups of students that are from six different nations and they speak six different languages and so they're actually interacting a lot of the time for the first time, and we'll get in their own conversations about what the name of this food is in their language and just like sharing little cross-cultural things... it's definitely been a piece, that we notice.” (School Farm 4 Staff)*

The most common expression of community-based learning in the schools was involvement of community members as teachers, supporters, and experts of subjects on the school farms:

*“ambassadors from the 4H program and community members came to teach things like grafting, pruning, [Integrated Pest Management] ... Donations from businesses, from lumberyards, to food processors etc., are tremendous... At first [the neighbors] complained about the racket the kids were making, and now they're working with the kids. It's just a win, win, win. It's a wholesome, holistic kind of thing going on” (School Farm 5 Community Member)*

*“There's been a dozen or more community members that I've leaned hard on. So, I will get in touch with someone I know who grows garlic and we'll work together and get advice from him and then some of them come to the farm and work with students... There's a farm nearby... We really like how they're set up and how they're growing food, and so we've taken students there and they see what they're doing on their farm and so then they can come back and they have a vision for what they're doing as a business as sustenance for themselves...the community has been totally vital in terms of making sure we can do things well and make fewer mistakes.” (School Farm 5 Staff)*

In the case of School Farm 6, the school district participant would contact the CEO of the local farmer institute to set-up students on field trips to local dairy farms and greenhouses, or the CEO would connect the school farm with opportunities happening in the community. School Farm 6 would often invite the community to come in and talk or teach students.

While many of the community-based learning events were expert-led, there are also examples of the school farms using their outdoor classroom as a gathering place for cross-generational learning and sharing:

*“To create sort of those community connections, we would try and hold different events. We did a tea one year where we had used things that we had harvested from the farm earlier in the year and invited in folks from a retirement home to come in. So, they all have their little bus and they came down and we had tea, and it was just really great for the kids to be able to chat with a different generation about farming and about agriculture, because they grew up in a very, very different setting in terms of where their food comes from and food production” (School District D staff).*

### **6.3.3 Place-Based Learning**

The third main pedagogy related to school farms was place-based learning which uses a place’s culture, geophysical features, and history to teach.

School Farm 1 Community Member described the school farm program as an opportunity to teach “*connection to the history of the land and place*”. And the administrator from school district A described:

*“school farm class is a strong example of really connected place-based learning. They're either in their own school, or at school in their district growing in the ground where they live, eating the food that comes from that ground, influencing their environment, building relationships in their community, and realizing the strength in the diversity of their group, relying on each other” (School District A Staff).*

All four districts mentioned the importance of Indigenous knowledge, culture and history to the education on school farms. One of the most common acknowledgements of place was through connecting learning to local Indigenous knowledges and histories.

*“We started off every meeting with a land acknowledgement...[School Farm 3 Staff] often talked about being good stewards of the land and how we can learn from the First Nation peoples in BC...always being aware of that relationship that the First Nations have with the land and like that we're*

*borrowing it to grow this food on and so to be respectful and like give back to the soil.” (School Farm 3 Community Member).*

*“The area has a lot of cultural significance with the First Nations. The site was a midden, and you can literally see shells all in the pathways around the dog park and sometimes we’ll find them, even in the beds in the farm, too, so, obviously, the historical connection with the First Nations people is really often a connection that kids can make. And the [NPO] staff really excels at their Indigenous education programs. [They] were broadcasting a weekly land acknowledgement every Monday out of the [NPO headquarters] to classrooms all around the district...It is so cool that [the school farm] could be a hub not only for farming and food system knowledge but also Indigenous knowledge and the interweaving of the two” (School District D Staff).*

Stakeholders also referenced place-based learning as an opportunity to connect the immediate lessons of the farm to larger contextual ideas of place and agriculture.

*“One of the things that I think is really important is that they're just kind of making that connection back to being a part of this earth and that we're connected to it all and that our food comes from it, and it needs to be cared for, as well.” (School Farm 5 Staff)*

*“We’re in a well-connected place in terms of agriculture. We’ve got your sort of typical fruits and vegetables, but we’ve also got cattle farming for beef, we’ve got dairy farms, we’ve got chickens and eggs, like we’ve got so many different areas of agriculture...And it’s very easy for the students to then on their drive home be like ‘oh yeah there’s that’ and then it’s quite easy for them to see what’s actually happening and it’s not just an old white guy sitting on a tractor driving through field, like there’s so much more to agriculture than that.” (School District D Staff)*

*“I talked about the relationship we have with the land and how we should respect that, so I definitely think that working with the land and plants and stuff gives students a sense of like place and also helps to like teach students that other like living things are important, and they need your respect” (School Farm 3 Community Member).*

## Chapter 7: School Farm Demography and Impact on Students

Participants reported impacts of school farms on students specifically in the categories of student academic, professional, and personal development. Interviews with participants also revealed that the types of students attracted to school farm programming were diverse culturally, academically, socially, and neurologically.

### 7.1 Types of Students on School Farms

Participants described the types of students in their programs. Depending on the program, some school farms recruit students and have application processes for interested candidates, while others are recommended and assigned to school farm programs by school counselors, teachers, administrators, or parents. These program-specific details can be found in Chapter 5.

One of the main impacts of school farms on students common across interviews was the inclusivity of diversity. All stakeholders agreed that school farms serve a diverse group of students meaning classes included students with various cultural, academic, and personal backgrounds, as well as students with various mental and physical disabilities and neurodiversity (students with ADHD, Autism, Dyslexia, etc.) and students with different learning styles and personalities (Table 8). It is important to note that this study does not have the data nor do I have the expertise to relate these categories to each other. I recognize that while the table expresses diversity amongst the types of students involved on school farms, it may also unintentionally evoke negative stereotypes with described cultures or ethnicities through categorical association. This table should be interpreted as a display of the diversity of school farm participants and not used to correlate descriptions of students.

Table 8. Descriptions of BC school farm student participants

	<b>Descriptions</b>	<b>Types of Learners</b>	<b>Culture/ Ethnicity</b>	<b>Disabilities</b>	<b>Academic Proficiency</b>	<b>Home life/ Personal Life</b>
<b>School Farms 1 &amp; 2</b>	Quiet, shy, eager to ask questions	Enjoy learning while doing physical activity, neuro diverse learners	Immigrants, diverse culturally and socioeconomically	Attention issues, on the autism spectrum, ADHD	Struggle with math and writing, struggle academically, on the AP/IB track, kids in Life Skills course	Lacking parental support, sleep-deprived
<b>School Farm 3</b>	Overachievers, diverse gender identities and sexual orientations, transitioning,	Neuro diverse learning styles	Black Indigenous People of Color (BIPOC)	Anxiety, Mental health issues	Struggle academically	A range of food growing experience
<b>School Farm 4</b>	Not Specified	Not Specified	International students, students' ancestors were farmers	Autism	Not Specified	From an urban environment, parents or grandparents disapprove of farm labor
<b>School Farm 5</b>	Nerdy, fringe, "not your jocks," introverted, highly academic, less social skills	Kinesthetic learners	Mixed cultural and religious background	Behavioral Issues, mental disabilities, learning disabilities, wheelchair-bound, blind	Not Specified	Not Specified
<b>School Farm 6</b>	Outcasts, misfits, on the school farm against their will, rowdy	Not Specified	Tsawwassen First Nation students, Indian and South Asian students	Students on Individualized Education Programs (IEPs), social anxiety, learning disabilities, behaviour issues	Don't fit in, struggle academically	Students who struggle with drug-use, self-harming, children of farmers, really keen on agriculture/ food systems

Participants offered insight into some of the reasons for how student diversity on school farms, and the learning opportunity that is provides, create a direct positive impact on students:

*“there are students with all sorts of different abilities who might have attention issues, or students who are not great at math or writing and are always last in the classroom, who don’t get great grades. But then, when they come outside they have more of a sense of physical space or physical work and so they’ll be the one that figures out what needs to move where, or how to dig, or how to solve a problem and they’re the ones who are going to lead three, four students...suddenly they find a place to shine” (School Farm 1 & 2 Staff).*

*“students that were being given to us were not necessarily students who want to be at a farm. They were students who couldn’t fit into a regular classroom environment or a regular school environment. There was lots of drug use, lots of dealing with just all of the peripheral issues that go with being a teenager... there were self-harming kids, or the ones who’d been suspended every week, or we had a couple who simply weren’t allowed to go to any other school in the district because they had behaviours that weren’t conducive to large group environments.” (School Farm 5 Community Member)*

*“yeah and the farm is a really good way to keep students safe, because the ones who didn’t do well academically did tend to do very well out on the farm. They love the physicality of it.” (School Farm 5 Community Member)*

School farms were described as safe spaces for students who were struggling, whether they had personal health or behavioural issues, or special academic needs. While “highly academic” and “over achieving” students partook and enjoyed school farms, according to stakeholders, school farms generally attracted students who had a difficult time in a traditional classroom setting.

Participants also added how the inclusion of diverse students benefited the school farm programs:

*“Some of our most knowledgeable students were our South Asian students whose parents or grandparents had come from India and their knowledge of farming was just unbelievable.” (School Farm 5 Community Member)*

*“I think that [having First Nations students] was actually probably a silent or hidden value to the whole program. There was just this complete acceptance of culture and race. We had many languages students could speak, but you know we just spoke the language of farm.” (School Farm 5 Community Member)*



*“we truly had everyone under the umbrella. But it was interesting because when you put these different learners who have different learning styles and different challenges and different backgrounds into a similar program where they get to experience sharing that experience, they all have that in common. And it's not to say that everyone was super successful down here, like we're not saying that this is a magical solution to everything. But it was really interesting to see that students that really didn't thrive in their high school kind of get lifted up by everyone else in the program because everyone wanted the farm to succeed, so everyone wanted each other to succeed” (School District D Staff).*

Cultural and racial diversity on the school farm was perceived by participants as an asset to the experience and success of school farms, and was a source of positive impact.

## **7.2 Academic Impact**

School farms provided students with alternative ways to learn and receive course credit. The school farms provided an opportunity for students to step into positions as leaders and to succeed in academically in a non-traditional classroom setting.

School Farm 5 Community Member reported that the attrition rate [for school farm courses] was lower than the regular university courses. A School Farm 1 & 2 Staff added that:

*“students who are not going to do well in rigid straight-road classroom are seeing the benefit in participating and finding a place where they succeed. And then they have the ability to come back to it and make it into a path, into something bigger” (School Farm 1 & 2 Staff)*

Stakeholders shared their beliefs that school farms created new avenues for academic success and post-secondary opportunities for students that traditional classrooms did not provide.

## **7.3 Students' Professional Development**

A goal of school farms was to provide students with hard skills and knowledge of food systems and food production, and to show them that there were viable careers, livelihoods, and educational pursuits in food system work.

*“Developing hands-on skills would give them work experience. They have the opportunity to learn all levels of skills involved to work on a farm like working at a market, selling produce, and interacting with clients and community members. There is a leadership component built in, you know skills that can lend themselves to the workplace in general.” (School Farm 1 & 2 Staff)*

*“We created a bunch of different pathways for them to interact with the farm over multiple years and have this progression and growth and creating roles to kind of jumpstart their life and their careers.” (School Farm 1 & 2 Staff)*

*“I would say the goal of a school farm that you want your students to be able to leave with the knowledge that they learned in the school farm and apply it as they as they go into adulthood, either through post academic studies or going right directly on farms.” (School Farm 5 Community Member)*

According to two younger stakeholders—one of whom was an alumna of a school farm program and one who was recently employed by a school farm program— the professional development that students could obtain on a school farm was an important impact of this type of educational programming:

*“the school farm showed students the food and agriculture sector are somewhere they can work. It was huge for me personally, I never ever would have thought that, like Oh, I want to be a farmer. But having done the program and seeing like how important food is...and for students who are like right in the time when they're trying to decide what they want to do either in university or after school for a job, it's really good to have that. The agricultural sector is so important and like we need to always have food, so we need to always have people growing the food, or even like not farmers, but food adjacent environmentalists are really important, and so having students exposed to that and kind of showing them this is an option, you can do this for a job, is really good.” (School Farm 3 Community Member)*

*“I think secondary students being exposed to school farms is really important to expose them to the agricultural economy and potential employment and work experience, especially because there's such an exodus of people in agriculture, and in rural communities or not wanting to farm, wanting to move to the city. We need farmers so, even if, like, one kid in all of our program gets inspired to become a farmer, like that's a huge win.” (School Farm 6 Staff)*

The impact of the professional development opportunities on students from each school farm was evident by stakeholder’s accounts of students’ post-secondary journeys.

In School District A, students received both course credit and a stipend for participating in the summer programming. Graduated students who had participated in the school farm were often hired on as junior leaders through Canada Summer Jobs and then went on to work in agriculture or education. Stakeholders reported that community-involved activities like guest speakers and field trips, provided students with connections for job opportunities during the summer or post high school.

A few students in the School Farm 3 programming were also hired to work the summer program through Canada Summer Jobs, and some have started their own farms after secondary school. A “handful” of others have gone into the Horticulture or Land and Food Systems programs at Kwantlen Polytechnic University and the University of British Columbia.

On School Farm 4, students who showed an interest during their field trips could join the after-school garden club to work directly with the school farmers and the food studies teacher and learn more about agriculture and food production throughout the season. From this smaller cohort, those who were interested in pursuing a career in agriculture were invited to do a paid internship on the school farmer’s main farm site during the summer months

Finally, stakeholders from School Farm 5 reported students from the program used the dual credit courses with the university to continue into post-secondary education. Alumni have gone into industries like pest management, animal husbandry, horticulture, forestry, greenhouse growing they do research with insects, and have become conservation officers. School Farm 5 also hired students in the summer through Canada Summer Jobs to help with tasks on the farm and the greenhouse.

The myriad of professional opportunities was noted by participants:

*“I think the skills that we have for the high school students are more employment orientated [sic] and they also lead into higher level education in their employment sector or just even give them another skill that they can use in their life.” (School Farm 5 Staff)*

*“ I know not all of [the students] are going to be chefs and cooks, but [they] will have to eat for the rest of [their] life, so [they] might as well learn how to cook properly and for some, it might be the job getting [them] through university, for others it might just be a hobby, and this is how you end up feeding your family down the road, with these skills.” (School District C Staff)*

An alumnus in School District D who started their food education in the district in grade three, had participated in two years of summer programing, and then became a mentor their second year; this student was then hired back as a part-time junior staff member getting paid minimum wage. School Farm 6 Community Member and School District D Staff both reported that any students who wanted summer work on local farms felt comfortable applying for jobs because of their exposure and introductions during class, and they were more often than not offered the positions because the farms knew the skillsets of students after they completed the School Farm 6 summer programming. School Farm 6 Community Member estimated that one quarter of students who received the university credit as part of their school farm courses went into agricultural studies at the university. For students who did not pursue agricultural careers or post-secondary opportunities, some took their environmental science experience from the program and went into environmental sciences, rather than agriculture, for their post-secondary education.

#### **7.4 Personal Health & Emotional Development**

Participants also expressed the personal impact of school farms on students and how they facilitated personal development as a unique benefit of this education modality:

*“I don't think in high school we should be doing anything unless there's some sort of a lead into post-secondary life. I would hope that by us doing our business plans, and just the responsibilities of being in charge of something, that's a skill set that they will take with them, wherever they go, I would hope.” (School Farm 5 Community Member)*

Mental health was reported by participants as a chronic issue for high school students, and school farms were perceived as a means of alleviating some of the stress and anxiety that students were experiencing (Table 9).

Table 9. Illustrative quotes about mental health benefits of school farms for students

School Farm 1 & 2 Staff	"Being outside being in green spaces being around nature is so good for your mental health, it's so good for your emotional regulation, it's so good for like your ability to human and that's the thing that these kids are trying to do."
School Farm 1 Community Member	"Ideally, we would have more of these types of opportunities that are specifically geared towards like you know mental health and mental wellness...I definitely saw the therapeutic benefits for kids and young people just being outside and learning outside."
School District B Staff	"A lot of [students] say it's good for their mental health getting outside doing hands-on things, having a break from the classroom."
School District B Staff	"Well, one kid in particular struggled a bit with mental illness, and they found they felt better and it made them feel good like actually having something to do and being outside, and they found that during COVID they were so lonely and, in their room, so like being outside and doing something made them feel better."
School Farm 3 Community Member	"We did surveys for the students...and most people said that working outside in the garden was super beneficial for their mental health and they felt way more relaxed and less anxious and it just makes you feel better to be outside and work at something."
School Farm 3 Staff	"Feedback I've seen from our programs is just like the relief, having a break from being inside and staring at projector screens under fluorescent lights and now with masks all day. We hear like over and over again 'I felt more relaxed after, it helped me with my anxiety'."
School Farm 4 Staff	"I really want I really see [school farms] as a way to provide just an alternative option, to be doing a form of work that is like really beneficial for the community, but also really beneficial for like one's own quality of life and physical and mental health and nutrition."
School Farm 4 Staff	"so much of our school system and so much of what it's training people to do is to like sit and be inundated with like fluorescent light and we also are experiencing pretty significantly bloomed challenges around mental health and feelings of dissociation from purpose and each other. So yeah it feels really valuable that I just think that the context of bringing urban agriculture into an environment like [a school farm]."

Another participant mentioned how the school farms provided students a way to deal with climate anxiety:

*"I've done some informal polling of who's concerned about the state of the planet, you know it's like everyone, often, or like 20 of 25 kids. So they're living in this reality, where like we're faced with biodiversity collapse and like this rhetoric of climate change, and they're experiencing the reality of what's happening on the planet in a way that I think previous generations didn't...I think that having access to school farms gives tangible solutions. We're not just going to teach you about all of the horrible things that are happening. There is a lot of opportunity for different kinds of solutions and engagement and hopefulness through this kind of experience and this kind of learning, even if they don't become farmers...it's not all just gloom and there are tangible things we can do to at least make small improvements in the Community." (School Farm 3 Staff)*

Another impact of the school farms was students' ability to make decisions and have autonomy on the farm increased their sense of self-worth and contribution to society:

*"there's also a sense of accomplishment, there's a sense of being able to have tangible progress" (School Farm 3 Staff)*

*"They get to see things growing, they get to see the products of their efforts, they get to see this harvest box and feel good about getting it out to staff and families and providing them with healthy foods. They get a lot of positive reinforcement from the people who get the harvest box, because they love it." (School District B Staff)*

*Some of the kids who find success out here or find a sense of satisfaction, I think they like it because you can see your work as it's completed, you know. Some of these kids haven't really done physical labor before and there's a satisfaction that comes with that, like that tiredness, and looking back and being like wow we built this today" (School District B Staff)*

*Our Indigenous students brought a lot of their elders' wisdom with them, and it was really almost like a platform for them to talk about things that they might have hidden in a regular school situation, and they really, really took ownership." (School Farm 5 Community Member)*

School farms were also reported to develop socio-emotional skills, social connections and other positive behaviours:

*“...Cultivate different levels of responsibility through the farm experience, like teamwork, working collectively and collaboratively and problem solving...they get all these [skills] from being involved at different levels of the production and sale of the farm produce” (School Farm 1 & 2 Community Member).*

*“I’ve heard a lot of students say that in our school farm programs they have the opportunity to connect with peers that they’ve never talked to before ...so I think the social connection is the sort of like mental health benefit.” (School Farm 3 Staff)*

*“There is like a lot of social skills that they’re learning that they wouldn’t necessarily learn in a regular classroom because they’re having to interact, they’re having to problem solve, they’re having to work in groups to do something ...so there was a lot of sort of like cooperative work that was happening, and a lot of socialization amongst groups that wouldn’t necessarily have socialized had they all been at the same school. I think there was a lot of social cooperative, social emotional learning that was going on.” (School District D Staff)*

*“I think there’s some real benefits from a social standpoint, or from a communication standpoint, students have to like actually listen to instructions and then perform a task together as a team.” (School Farm 5 Staff)*

*“[students] just need to focus on social emotional learning, how to be a human, and how to engage in the world with the world around them. A farm is a really great way for all that to happen and isn’t asking them just to sit in a classroom and read a book and answer a test question” (School Farm 1 & 2 Staff).*

Another key personal development skill mentioned in discussing the impact of school farms was leadership:

*“We put a lot more responsibility on the students than they might necessarily have been given in any other environment and natural leaders rose to the top.” (School Farm 5 Community Member)*

*“Some kids can take on like a leadership role in this context where they haven’t been able to before, where maybe in the previous school experience they haven’t really felt like they couldn’t be in leadership roles.” (School District B Staff)*

Finally, school farms were also said to influence students’ food behaviours and knowledge as another benefit to students’ personal health:



*“student gain like an awareness and appreciation of the energy that goes into growing food. I would say just that, and they've even you know sort of expressed in talking with them how they even understand like how important the quality of dirt is and things like that, and how much labor goes into it, and energy that they have to put out, so I feel like they appreciate their food better, so there's less food waste because they know and value the actual food itself.”*  
(School District C Staff)

*“We were learning about food and about like where it comes from and how it's grown and what goes into [growing food] and so then people are more aware when they're eating of like what goes into that and also the availability of fresh healthy food at school. It's really good because, like, I had a lot of people in my classes, say, or like in my class that went [to the farm] say they were making healthier decisions for eating.”* (School Farm 3 Community Member)

*“It starts to create a culture in the school where fresh local harvest is part of the norm. Everybody loves our Caesar salads from the salad bar that include kale from our own farm garden. Even the soccer school boys raved about our Caesar salads and raced to fill their plates on salad bar days!”* (School District B Staff)

## Chapter 8: Defining a School Farm

One of the main research questions for this project was: How are stakeholders in BC defining a ‘school farm’? As a concluding question, I asked participants how they would define a school farm as a unique food education program. In their replies, participants gave answers to both define school farms (Table 10) and also differentiate them from other school food interventions or programs.

Table 10. Summary of respondents' definitions of a 'school farm.'

Position	School Farm 1 & 2	School Farm 3	School Farm 4	School Farm 5	School Farm 6
<b>School Farm Staff</b>	<p>"A school farm has a community partner that is able to support and care for the space, making it a true production space, so you can see what it takes to grow food and understand more about the food system" (School Farm 1 &amp; 2 Staff)."</p>	<p>"The product for sale aspect to it, so the salad bar connected to it, where you are harvesting for sale, that's what's been unique when we started calling us a farm. Its production level I guess you're producing for consumption by the school community whether that's students, staff, or parents." (School Farm 3 Staff)</p>	<p>"It's managed year-round by us...it's a functioning farm that its existence is both to educate, but also to produce food and make a serious dent in the sort of local food security of the neighborhood. It also provides like quality produce for residents of the immediate region around the school." (School Farm 4 Staff)</p>	<p>"multi-faceted learning facility" (School Farm 5 Staff)</p> <p>"I think the differences between having plots on a school yard and having actual designated area that can used with tractors and equipment and stuff like that-- So the tools are different, the water delivery is different, the nutrient cycling is different, the volume of production and the size is different...with that space I think you enter into some of the problems that farmers enter into in production on a on a larger scale (School Farm 5 Staff).</p> <p>"a farm to me is functional for the purpose of sales and to you know, have a business almost." (School Farm 5 Staff)</p> <p>"the reason I would say it's called a farm not just school garden is that we sell the produce to the public. And it's actually growing food, not just for own consumption but to sell to others is it's has that sales component and that sort of marketing and all that kind of stuff that goes with it,</p>	

				it goes with farming” (School Farm 5 Staff)	
<b>School District Staff</b>	“A school farm is an educational farm or a demonstration farm but not procurement or production enterprise” (School District A Staff).		“this is a productive space like this, this food feeds lots of community members...it's the size and scope. Yeah, like this isn't just a few plots that a few classes nibble on. This feeds families, from really high-end plates to really low income, at-risk people, they're all eating this food” (School District B Staff)	“yeah so I feel like it has to have some components to it, where there's you know you're growing you're picking, you're irrigating, your using pesticides and there's so many sort of science components and agriculture components to the farm, so I feel like all of that learning in some ways, needs to be incorporated to it.” (School District C Staff)	“a school farm somewhere that you're producing food and learning about that food production by getting your hands dirty and getting in the dirt and you know really digging in. a school farm is like a classroom somewhere that you are Out there tending to it, 8-10 months of the year” (School District D Staff)
<b>Community Member</b>	“Larger scale and built for production, there is a farmer who is focused on farming” (School Farm 1 Community Member).	“a school farm it just like produces more and has more attention given to it...and also probably has more space available...We grew a lot and we harvested it all and did something with the produce like sold it or use it for a salad bar or take it home.... So, I think probably the focus would be like on production of food and also education about that, like all the aspects of that process” (School Farm 3 Community Member)			“By its definition a farm should be producing...we are in fact farming and we are creating farmers...a school farm to me, is a working farm that has students who attend and can walk away with some academic credits relevant to what it is that they do on the farm.” (School Farm 5 Community Member)

## 8.1 Differentiating Characteristics of a School Farm

Stakeholders differentiated between school farms and other school food programming by providing differences between the programs. This information helped further define school farms as unique educational programs by describing what they are not.

### 8.1.1 School Farm vs. School Garden

School farms and school gardens are similar, but their differences helped to define the scale and scope of school farms. Participants described school farms as being larger, more productive, and requiring more resources and time to maintain than a school garden.

*“We had really dense production, like we produced a ton from that [school farm] site, way more than you would in like a little garden...I think, just because of the way it's managed and the like attention put on [the school farm] it's way more productive and like grew a ton more than a regular school garden would like...and also probably has more space available” (School Farm 3 Community Member)*

*“It's large. It's a lot bigger than a school garden would be. it's partnered with an organization that distributes the food and funds the whole operation through the sale and distribution of food. We don't do any granting and don't get any funds from outside of food sales” (School Farm 4 Staff)*

*“A school farm is a space at a school that is for food growing on a scale that's like bigger or more productive or more food than just like a little garden...because a farm takes a lot of resources to run, so it has to have more than just like a teacher growing his tomatoes in the garden or something.” (School Farm 3 Community Member)*

*“I think a school garden is a little bit more of a decorative thing where ‘we'll get to it to at some point’, but you know it's just sort of there to learn a little bit, you set it and forget it, and where you sort of plant things and that's that.” (School District D Staff)*

One participant expressed that the school farm they worked on was more similar to a market garden:

*“I think of most like production farms that are under two acres as being a market garden and a defining feature of that to me is that you don't have to use the tractor, and at that scale of under two acres you can still be highly profitable without the use for tractor based on having a super diverse amount of crops and less overhead and less inputs since you're not having to own and maintain and operate a tractor. And also, then doing that all like direct to consumer sales. That's kind of like the principles of a market garden and profitability to me.” (School Farm 6 Staff)*

School Farm 6 Staff was the only person in this study to say the school farm was more like a garden than a farm.

### **8.1.2 School Farm vs Home Economics or Food Studies**

Though school farms taught many of the same concepts as food studies or home economics courses relating to food choices and food behaviours, and school farms were often used as outdoor classrooms for the culinary arts, participants made distinctions between models these educational formats:

*“I think, with most food studies classes there's no core connection to where food comes from, it's strictly about sort of nutrition and food preparation skills.” (School District B Staff)*

*“I feel like that whole from-the-dirt-forward is not anything that you know other people experience a in a home ec class or culinary class.” (School District C Staff)*

*“Home ec -great stuff. Food preparation, cook program-great stuff. what these [school farm] teachers are doing is everything. And that's the thing. Where does the food come from? How is it getting harvested and processed? And where does it go in the end until we receive it as the end consumer by eating it...” (School Farm 5 Community Member)*

*“On School Farms, students from those schools can be involved...and both see and be involved with like the growing process and the harvesting and whatnot and not just sort of seeing food at its end stage at the cooking part and the prep and cooking stage. I think it adds a lot to the experience and also like increases interest when you know when kids can like can see things literally in the ground that they will maybe later eat or there'll be able to you know...which is unique with school farms compared to like yeah like other types of food programs that I've seen.” (School Farms 1 & 2 Community Member)*

*“My background is in PE and home ec and food and, like, I know how valuable it is to get the kids out of the culinary classroom and into a setting like this, where they get to actually see the food and where it comes from, because a lot of the time, like we just sort of deliver the food to the classroom and then they cook it and that's that.” (School District D Staff)*

Based on participants’ replies, these school farms were different than other interventions because they built on the culinary concepts of food literacy by providing a more holistic view of the food system to understand where food comes from, how to grow it, and how it gets distributed. These elements were clearly missing from traditional food education courses.

## **8.2 School Farm Challenges**

The complex structures of school farms—the interdepartmental and interorganizational partnerships and geographic locations of the schools—caused obstacles and challenges for the operations of the programs, as shown in Table 11.

Table 11. Challenges of Operating a School Farm in British Columbia

	School District A	School District B		School District C	School District D
	School Farm 1 & 2	School Farm 3	School Farm 4	School Farm 5	School Farm 6
<b>Funding</b>	The school farm pays for the majority of its programming and maintenance and isn't well supported financially by the school district.	Difficult to get permitting and build new infrastructure		Always need more money  Constantly fundraising and begging and looking to have community support	There is a need for more sustainable funding that does not rely on NPO labor and services.
<b>Bureaucracy</b>	Difficult to get permitting and build new infrastructure	The school farm has to do all repairs (even simple ones) through the unions, which takes time and is expensive.  Unions make the bureaucracy more difficult.	Challenging working with the school system		Selling food to the school cafeteria requires new contracts.
<b>Staffing Farms</b>	Difficult to find teachers for the summer courses	Teachers volunteer a lot of time beyond their employment contracts  A champion teacher does all the heavy-lifting for fundraising, organizing, and operating the program and often leave or burn out.		Full teaching load + running the farm and developing programming.  Steady funding would support more full-time school farm teachers  If the two champion teachers left, it would be difficult to replace them with someone with the knowledges or experience to continue running the farm	High burnout rate.



<b>Turnover in Leadership</b>	Difficult to have to restart relationships with changing administrators	A principal is only out of school for 3-5 years and then they get moved. Then, school farms have to start over building relationships and solidifying administrative support.			
<b>Lack of Support</b>	Past poor experiences with abandoned school garden projects started by parent groups or teachers made school district members resistant to the school farm. They needed assurance of long-term management.	The principal at the school and the facilities were really resistant because the groundskeepers were going to lose land they maintained, which hurt their bottom line.  Teachers uncomfortable teaching on the farms		It is difficult to get teachers, maintenance, School District, and unions to understand the vision and the goal of school farms.	Teachers are uncomfortable teaching out of a classroom or teaching food system concepts.
<b>Other</b>	Theft from farms after hours.  Growing season and the school year don't coincide.	Trying to work at multiple schools makes the scheduling challenging. Teachers want to change things at the last minute and the school farm can't plan in advance for programming.	The urban environment means there is always trash and debris in the soil.  Rodents in the compost.  Seismic upgrades require moving the farm and students will be away from the original farm site.	Time blocks are short and walking or bussing to the farm off campus means there is less than an hour for teaching and activities	Transportation to get kids to the school farm is costly.  Retention among Grade 12 students.  It's hard to get classes to come on field trips consistently to get a more well-rounded experience on the farm.

While there were many challenges reported by participants, tensions between school districts and school farms were present across all districts and touched on all of the categories, such as funding (Bakr & Abd Gawad, 2021), leadership, bureaucracy, staffing, and support (Ashlee & Fuller, 2021) (Table 12). It is important to note that there was only one school district administrator in the school district stakeholder group. All other school district staff were teachers.

*Table 12. Illustrative quotes showing tensions between school farm staff and the school district in British Columbia*

Quotes from School Farm Staff	Quotes from School District Staff
<p>"We pretty much get nothing from this school, we pay for all of it" (School Farm 1 &amp; 2 Staff).</p> <p>"It's a long process of back and forth, there are lots of things they aren't allowed to do, and there is more questioning of why and being really cautious about safety, even in cases where it just comes from a place of not understanding" (School Farm 1 &amp; 2 Staff)</p> <p>"You know it's not 'oh my God you're doing this amazing work we're going to support you and help you.' There are individuals that see that, but most of the organization and the way that our licensing agreements and things are set, it's like 'you should say thank you that we allow you to do this,' when we're putting thousands and hundreds of thousands of dollars of value into their spaces. To be honest that's one of the bigger challenges" (School Farm 1 &amp; 2 Staff)</p> <p>"I was like so keen on selling to the cafeterias. It just made so much sense, but apparently it's like a bureaucratic mess of like contracts with like big food distributors and not like a lot of like willingness from upper levels of management to like change the status quo" (School Farm 6 Staff)</p> <p>"It's not an easy system to work within, especially when these programs are sort of external to the system, and I think that's fundamentally one of the like Big downfalls of school food programs are like schoolyard farms um. yeah is that they're not really institutionalized into the education system" (School Farm 3 Staff)</p> <p>"That's something that the district has been very supportive of obviously the program like I said it's a fairly costly program but the district's been behind it" (School Farm 6 Staff)</p> <p>"we mow the lawns, we set up and take down everything, and we fund a porta potty for the farm so we're paying for that out of her own fundraising, like we're pretty independent, probably more than we should be, I think...we're trying to gently suggest that maybe we could be supported in some of these ways, but there's not a lot of funding out there in general and I don't want to appear ungrateful either because we have got a lot of help from the district and from the grounds crew." (School Farm 5 Staff)</p>	<p>"The school farm wants to do this radical thing and the district says that's not going to fly. There's a lot of complexities here that we're dealing with. We're not just trying to be sticks in the mud. We're actually trying to operate a pretty complex system" (School District A Staff)</p> <p>"There should be advances in what the educational environment looks like and the opportunities for education and the priorities for education, and I think there's a lot of growth to happen on our end, but that kind of thing takes time. Having to continuously rebuild relationships with changing administrators. Hope that sustainability is more embedded in the learning environment of students." (School District A Staff)</p> <p>"There has been tension and conflict...it's fairly radical to have a farm on a school yard. It's not what the ground department had done and it's outside of the norm for a school district" (School District A Staff)</p> <p>"There's a Venn diagram: the community organization's objectives and the school district's mandate, and where they overlap is where they can play. Hopefully, over time, the overlap grows, but that growth happens together over time, not by force" (School District A Staff)</p> <p>"People who run school don't necessarily care about growing food. It's a school. It's not where food comes from... Our mandate is to educate people to prepare them to enter the world, and that's a big job already. There are other people who grow food, other land that grows food." (School District A Staff)</p>

### 8.3 School Farm Goals

Although not a focus of this research, another theme that emerged from my interviews was an understanding of the future goals of the programs. This indirectly helped in giving clarity on how school farms hoped to structure, identify, and function as they continued to grow.

Participants identified that school farms needed to have support from the community in order to be successful:

*“Partnerships with local industry would stabilize the funding for the school farm” (School Farm 6 Staff)*

*“It can't rely on teacher champions. That might be the way it starts, but if you really want to reap the benefits of this for more students in more locations [school farms] definitely needs to figure out a community partnership that's more consistent and solid over time.” (School District B Staff)*

Participants hoped that school farms would be more sustainably integrated into the education system, reaching more students, involving more teachers, and creating post-secondary pathways.

Participants hoped for...

*“...more teachers and students getting to use the farms.” (School District A Staff)*

*“...some kind of applied environmental science class that grows into something that's not off the side of someone's desk but actually a person's job to facilitate... That would be that would be a dream, a bigger project, like a pipeline to some kind of agriculture post-secondary or connection at a college or somewhere.” (School District B Staff)*

*“...more work with colleges and universities and building programs to prepare students for post-secondary school or work.” (School Farm 5 Community Member)*

and

*“...a more enhanced and rich kind of program for students.” (School Farm 5 Staff)*

Participants hopes were also to strengthen school farm relations within the school district:

*“There needs to be someone who sees the benefit in getting to every kid and getting to kids who are falling between the cracks. They help make the programs successful and will move quickly and change things to support what we do- it's been teachers, principals, a director on the school board, etc.”*  
(School Farms 1 & 2 Staff)

*“For a school-year farm course to run, it needs a champion from the educational side from within the district like a principal or director of instruction. It can't just be an external group; [an NPO].”* (School District A Staff)

*“If the teachers don't have the wherewith all to run with it and put the extra time in, if they don't have a supportive principal, it's all for not.”* (School Farm 5 Community Member)

Based on these remarks, school farms believed having a leader in the school district administration to act as a champion and advocate for the school farms' success was a necessity in stabilizing programmatic structure.

## Chapter 9: Discussion

In the discussion of this study on school farms, I will summarize the main findings and key conclusions as well as the methodological considerations of this research. The main findings and themes of this study include a working definition of school farms as defined by stakeholders; how school farms are teaching food literacy concepts to adolescents; the well-being impacts of school farms; and the major funding barriers that threaten the sustainability of the programs.

### **9.1 Main Findings and Key Conclusions**

This study sought to define school farms and their capacity to build adolescent food literacy based on stakeholders' experiences with their school farms in British Columbia, Canada. The study is the first of its kind as to-date there are no studies defining self-identifying 'school farms', nor are there studies discussing school farms' capacity to teach food literacy concepts to adolescents. The findings of this study advance research in the fields of food education and food literacy as well as experiential, community-, and place-based learning and confirms the potential of school farms in BC as educational interventions that could improve students' health, learning, and well-being through participation in the food system.

#### ***9.1.1 Defining School Farms***

##### *9.1.1.1 Overview*

Existing literature did not inform the definition of a school farm in this study since programs described used names other than 'school farm', or they used education models that do not apply to the BC school farm movement. For example, the American-centric agricultural education model is comprised of classroom instruction; supervised agricultural experience (SAE), which typically occurs off school property; and student participation in the National FFA Organization (Gilbert, 2013; Phipps et al., 2008). The burgeoning school farm movement in BC is different

from the United States. BC's school farms do not have a relationship with land grant institutions, they do not use this tripartite model, do not include a national youth organization like FFA, and do not prioritize many of the vocational agricultural focuses of US secondary school agricultural programs like livestock enterprise, welding, construction, landscaping, etc.

When asked 'what is a school farm?' stakeholders consistently referenced how a school farm differed from other food education interventions like a food studies course, home economics course, or a small school garden. Defining by comparison created a framework for describing school farms. Participants agreed school farms produce more food than a garden, and require more attention, resources, and maintenance, and more cultivation space. The farms are maintained year-round. There is a business structure at a school farm where the production and sale of food funds operations and requires business planning, marketing, and the exchange of currency for produce. The sale and donation of school farms' food is feeding the school and broader community, and was reported to aid in relieving local food insecurity (Enokela, 2021). The increase in scale of food production (compared to a garden) creates a setting where students are exposed to some of the larger ecological and economic challenges of farming that are more easily mitigated or bypassed altogether in a small or hobby garden. School farms are different from home economics or food studies courses because the teaching subjects extend beyond nutrition and food preparation and focus on outdoor experiential education on where food comes from; how it is grown before purchasing or preparing it; and the effect it has on the community and environment through the distribution phase. The holistic view of the food system is a unique component of school farms compared to other food education models.

All but one participant agreed that their school farms were larger and more productive than school gardens. One school farmer said the farm was more similar to a market garden because

they don't have to use large scale machinery like a tractor and because they mostly do direct-to-consumer sales. However, other school farms did use a tractor and/or did sell to markets and restaurants or to school meal programs, which means the presence or absence of machinery and the specificity of distribution channels is not necessary in defining a school farm. While stakeholders saw apparent differences between school farms and gardens, some participants also acknowledged many similarities between school farms and other outdoor experiential food education models like school gardens or other programs. These similarities include: growing food through experiential education; tasting fresh produce; and learning about the environment, sciences, and food system. These similarities may be the reasons school farms show similar positive impacts to student's health and well-being as other green space, garden, or nature-oriented educational approaches (Bakr & Abd Gawad, 2021; Bell & Dymment, 2008; Chawla, 2014; Farag & El Gemae, 2021; Lam et al., 2019; Matsuoka, 2010; Roeser, 2001; Schmutz et al., 2014; Van Den Berg & Custers, 2010; van Lier et al., 2017; Waliczek et al., 2000; Weare & Nind, 2011; N. M. Wells, 2000). As a result of stakeholders' comparative assessments of school farms relative to other programs, school farms can broadly be defined as experiential food system education models that teach food production and distribution at a scale that exposes students to the ecological, business, social, and production challenges of agriculture.

#### *9.1.1.2 Structure*

No district structured or ran their school farm the same way. Thus, while there are many commonalities from this study that contribute to a consistent definition of school farm, the functionality of programs needed to be specific to the context of their geography, environment, the demographics of their area, and their personnel. Therefore, an important component of school farms is their ability to adapt to their place and the people they involve and



serve. Ronto et al. (2017) emphasize that food literacy is to be taught within a context-specific environment to address the actual food system within which people are learning, eating, working, thriving, or struggling (Lalli et al., 2021). This contextualization necessitates place-based and community-based learning to ensure the local social, cultural, and environmental frameworks of food are being addressed. With place-based and community-based education as two of the main pedagogical approaches of a school farm, a vital component of the school farm definition is that they are adaptable to their locales. They must rely on community and a sense of place to teach relevant and meaningful experiential education to contextually orient students within their food system. School farms need to take into account their local capacity, knowledges, wisdoms, and food practices in order to promote food sovereignty and self-determination in the community (A. Smith, 2020).

#### *9.1.1.3 Pedagogies*

The trifecta of community-based, place-based, and experiential learning of school farms, creates an educational synergy and can be summarized under the umbrella of Critical Food System Education (CFSE). Though Critical Theory was arguably canonized by a non- Indigenous person from Brazil, Paulo Freire, there is relevance of this approach to the Indigenous people of BC. My study revealed that critical approaches were consistently mentioned in the available definitions of food literacy in the literature ([see Chapter 2](#)) and in the curricula of the school farms studied ([see Chapter 6](#)). This critical perspective reflects the concept of ‘land as pedagogy’ (Simpson, 2014) since school farms include many of the necessary elements that are considered essential for a generation of land-based, community-based intellectuals and cultural producers who seek to regenerate land, food, and living systems, according to Leanne Simpson, a renowned Michi Saagiig Nishnaabeg scholar (2014). Notably, my interview data revealed the majority of place-

based approaches on school farms were grounded in lessons on Indigenous food systems and culture. Thus, the importance of place- and community-based pedagogical themes in my data could help to bring Indigenous knowledges into the Western institutions of education (Simpson, 2014). Further, this trifecta of pedagogical themes is directly relevant to the CFSE model of learning (Meek & Tarlau, 2015). The model encourages community engagement through actions such as: participatory research; experiential learning focused on traditional food systems; and breaking down the false dichotomy between school and community learning spaces (Meek & Tarlau, 2016). The continued overlap of CFSE and Indigenous food system education may indicate CFSE could serve as a beneficial model for integrating Indigenous knowledge and the provincial (Western) food education system. School farms, as community-centric food education models, require knowing and teaching about the land they grow on for the farm to function as a hub for learning, food production, and community. Rather than prioritize science-based nutrition data linked to colonial research paradigms to formulate curricula, school farms appear to highlight students' personal stories and agricultural relations and to motivate student ownership and action through self-reflection (Bagelman, 2018). This type of learning benefits students in two important ways: first, it gives them experiential education in agriculture; and second, it gives them the intellectual framework to understand and redefine their concepts of food systems through their relations and experience with the land, people, and concepts on the school farm (Coca, 2021; Harmon & Maretzki, 2006b). The integration of community- and place- (or land-) based learning within school farms blends ecological and social justice issues (Gruenewald & Smith, 2008), and also encourages both the rehabilitation of the environment and the decolonization of ecological literacy through critical and transdisciplinary learning (Mier y Terán Giménez Cacho et al., 2018). The social and intergenerational exposure of school farms

involving students, farmers, community members, and teachers breaks down societal barriers such as age segregation and fosters students' appreciation for diversity, which is an essential principle of learning about the environment (Mayer et al., 2009).

#### *9.1.1.4 Funding Barriers Related to School Farm Structure*

The study found there were four main challenges faced by school farms. These were: a lack of sustainable funding; the barriers of bureaucracy; inconsistency of leadership; and a lack of support from the school district. There were common tensions between school farms and school districts regarding funding and administrative support across my interview data, however the three school farms that expressed the greatest challenges were all operated by NPOs on school district property. This finding coincides with previous research that found sporadic or insufficient funding often is the inhibitor to the growth and success of most community-based food programs (Slater et al., 2018; A. Smith, 2020). My data also revealed a diametrically opposed view between school farm staff and an administrator in terms of the purpose of a school farm. On the one hand, a school farm is for learning and not production, and on the other hand, a school farms' success is related to its scale of production. From one administrator's perspective, schools do not have a role to play in growing food and do not need to be self-sufficient regarding food production (Rojas et al., 2011). Rather, food production should happen on an educational or demonstration farm, not as a social enterprise; this might explain why some school farms appeared to be struggling more financially and reported feeling undervalued. Though there was an evident clashing of sentiment regarding the purpose of school farms, administrative resistance to novel educational programs that involve educational and social reform and relationships with outside entities is not unusual (Baum, 2002).

However, despite a perceived ideological difference between the school farms and school districts, my findings indicate that the goals of school farms and of school district are more similar than they appear to be among stakeholders. As Rojas et. al. (2011) explains, the goal of food system education is to expose students and staff at every level to opportunities where they can reconnect with the sources of their food and see how food is connected to all aspects of human life. The Ministry of Education states that the purpose of the BC school system is to enable students to “develop their individual potential and to acquire the knowledge, skills and abilities needed to contribute to a healthy society and a prosperous and sustainable economy” (*Ministry of Education and Child Care*, 2022). School farms have the capacity to develop diverse student learners’ potential by building their knowledge, skills, and abilities across disciplines’ curricula. While the Ministry does not explicitly say schools should grow food, there is acknowledgement that schools should be teaching students how to be both healthy and also participate in a prosperous and sustainable economy which includes food, nutrition and agriculture. This study demonstrated that the combination of inter-disciplinary flexibility and effective delivery of food literacy education of school farms resulted in positive effects on student well-being, which included teaching them applicable life skills to be self-sufficient, employed, and community-oriented adults, so as to participate in a prosperous and sustainable economy.

Notably, the lack of support from school districts to expand and increase the productivity of the farms as enterprises means the school farm’s threshold for how much income they can generate is restricted, and therefore its sustainability. Considering the many great challenges—lack of funding, lack of school district support, and staff turnover and burnout on school farms (potentially due to lack of funding)—my data suggests that growing and sustaining steady income is a necessity for the longevity of school farm programs. Without autonomy to grow

production and sales or a substantial increase in district funding, the school farm's ability to improve their financial sustainability relies on community support. If the purpose of school farms is solely to educate on a regular continuous basis, it will require school districts to increase funding for school farm programs so NPOs can employ year-round staff; maintain growing spaces; and offer educational programming without the burden of trying to self-fund with restricted resources and agency over their business model. One school farm was a clear example of how to structure the program so as to be sustainable regarding funding and staff structure. The farm was developed to be the perfect size to ensure that it could produce enough saleable food to fund staff to maintain the space and offer educational programs.

One of the trade-offs to addressing known financial barriers through a school farm structure of sustainable funding is the more limited educational offerings and therefore impact of the program. The sustainably funded school farm was only able to provide students with one day a week of food education, and this took the form of fieldtrips (as opposed to more immersive consistent programming). Since that school farm's program was not accredited either in the summer or during the school year, the school farm experience was not integrated into students' regular academic experience and therefore students' level of food literacy education and the impact on their well-being impacts was limited to the discretion of the teacher. That is, in the sustainably funded school farm program, each teacher determined the amount of time they chose to visit the farm (a maximum of one period a week); how often they wanted to travel to the farm; and most importantly, how comfortable they felt in bringing classes to an outdoor setting. As this study corroborates, teacher knowledge and training is a main obstacle to wanting to participate in food system and outdoor education (Sadegholvad et al., 2017), and thus presents an unintended limitation to scaling up a school farm program structured to be sustainable.

Overall, findings indicated that a school farm requires consistent and reliable funding from either their school district or unencumbered production profits to be able to deliver consistent, accredited, interdisciplinary food system education. This funding not only ensures sustainability of food system education but importantly maximizes the shared goal of the school farm and the school district of creating healthy and prosperous students.

### ***9.1.2 School Farms' Capacity to Teach Food Literacy***

The second research question for this project asked, in what ways do stakeholders believe school farms promote food literacy for adolescents? While it was a possibility that this study might find school farms did not teach food literacy at all, my feasibility interviews and community-based work prior to the study indicated that the participating school farms did teach food literacy in some capacity. In fact, this study found that almost all of the competencies necessary to be considered 'food literate' are taught on school farms in BC. School farms are teaching food literacy competencies for individual actions related to the selection, preparation, preservation, cooking, and consumption of food, and also for community actions related to the entire food production cycle from planning, to growing, maintaining, harvesting, processing, and distributing food (Desjardins, 2013; Perry et al., 2017; Rosas et al., 2020; Vidgen & Gallegos, 2014). Students are taught how to market and sell their food in a micro food economy. They are taught about their role as food producers, consumers, and relational beings in an ecosystem and social structure who can affect the social and environmental systems around them with their personal choices and how they engage with their community (Begley et al., 2019; Cullen et al., 2015; Lalli et al., 2021; Perry et al., 2017; Rosas et al., 2020; Slater et al., 2018; Thompson et al., 2021). More specifically, this study presented results expressing school farms' curricular

alignment with food literacy frameworks developed especially for young adults (Sadegholvad et al., 2017; Slater et al., 2018; Vidgen & Gallegos, 2014).

The expansion and evolution of the term food literacy to include more critical thinking and active participation in the food system puts more responsibility on individuals to be ‘food literate’ (Fingland et al., 2021). However, this responsibility generates a level of agency and autonomy that is necessary for teens entering adulthood. There is more onus on an adolescent leaving secondary school to participate in society than a primary school student. This may be in the form of continued education, as a young professional, or as a contributor and/or provider to a family. My findings support the concept that it is a necessity for adolescents to see both their individual responsibility and their agency within their food system, which is a major reported impact that school farms have on students. School farms prepare students for the power and choice they can have when it comes to their personal health and the health of their community. There is a need for students to know and engage with food systems and food production to understand the factors that activate and influence them, and how they impact our ecosystems, environments, and our social systems (Lang, 2009; Palumbo, 2016; Slater et al., 2018; Slater & Yeudall, 2015; A. Smith, 2020; Sumner, 2015; Widener & Karides, 2014).

An important component of the research is the specificity of teaching food literacy for adolescents rather than primary school students or post-secondary students. Age was a central element of school farms because of the gaps in secondary school food education; the recommendation for more food education for young adults; and the continuity of all of BC’s school farms being developed on high school property or for high school students. My findings showed the most common reasons school farms catered to adolescents were because high schools generally have more space; the students are older and stronger and are therefore

generally more physically capable of effectively doing large-scale farm work; and they have the capacity to critically think about the complexities of our food system at the scale necessary to understand both individual and collective participation. Although data indicated a common view that teens need to prepare for adulthood, it was also clear that school farms should teach younger students so that they are more prepared, engaged, and informed when they reach high school.

It was interesting to note that, while food literacy competencies were not directly correlated to the adolescent age group, school farms' teachings align with food literacy frameworks developed specifically for young adults (Brooks & Begley, 2014; Sadegholvad et al., 2017; Slater et al., 2018). This finding suggests that while school farms may not intentionally be designed as food literacy interventions for adolescents, school farms have the capacity to build adolescent food literacy.

#### *9.1.2.1 Nutrition*

Despite the prevailing discourse around nutrition in food literacy discussions (Renwick & Smith, 2020; Slater et al., 2018), nutrition was mentioned less frequently than most other competencies or topics on the school farms. Instead, healthy eating and nourishing bodies in relation to fresh produce were general themes related to nutrition that emerged from interviews with school farm stakeholders from two districts. While nutrition may not have been the main theme on the farms, three out of the four districts' culinary arts, food studies, or home economics courses utilized the school farms as an outdoor classroom, meaning there are continued opportunities to expand nutrition education through interdisciplinary learning.



#### *9.1.2.2 Food Preparation & Consumption*

Preparing food on school farms goes beyond cooking and baking to include food safety, pickling, preserving, canning, and dehydrating foods for storage. Students often worked in collaboration with interdisciplinary courses (e.g. Leadership, Culinary Arts, and Food Studies) with chefs, or an NPO, to prepare large meals to share and/or sell through school meal programs; give as donations; or enjoy as part of the school farm program. Students were also asked to bring farm produce home to prepare with their families as homework or extra credit.

#### *9.1.2.3 Food Production*

Though it may be implied in the title, a major focus of school farms is food production. Each farm discussed the involvement of students in the planning, planting, weeding, irrigating, mulching, maintaining, and finally, harvesting of the food on school farms. These skills and experiences were based on interdisciplinary conversations, lessons, and considerations of the ecology, climate, and final destination or sales goals for the food. Learning how to grow food was rooted in environmental science and conservation teachings including how to build soil health; build and protect ecosystems; manage pests; steward the land; manage water use; save seeds; and compost and build diverse and dynamic biological ecosystems. Students were asked to engage in different types of farming (organic, conventional, and regenerative) and to draw their own conclusions about the impact on the environment. They also learned the implications of climate change for agriculture and how different food production practices interplay with contributing to or combating climate change.

#### *9.1.2.4 Food System Literacy*

The social factors of food literacy were mentioned in depth on school farms. This was partially because the nature of the program promoted community-based learning from all types of people,

including a diverse student body. Both the scoping review and the interview data revealed how providing food for the community was a major objective of school farms. This theme related to food system topics of food literacy including food security; food access; food justice; and how growing and buying local food supports the community. Perhaps the largest links between food literacy competencies and the discussions with interviewees were stakeholders' anecdotes about school farms framing food as part of a holistic system; using critical approaches to think about food; and teaching social, cultural, and economic subjects through food (Crosley, 2013; Harris & Barter, 2015; Rose & Lourival, 2019; Widener & Karides, 2014). Some school farm staff spoke directly of growing food and learning about the whole system, rather than just how to cook, eat, or sell it, as a way to promote a critical approach to food education. A common theme of school farms was the integration of students' cultural traditions and knowledges of food into their curricula. Students from many different religious, cultural, and socio-economic backgrounds shared their personal knowledges and experiences around growing and eating food. The farms also taught ethnobotany and how to grow diverse foods to cook meals from different cultures.

Beyond teaching food production, school farms provided food system literacy through teaching subjects about Indigenous food knowledge and culture. While Indigenous food systems are not explicitly mentioned in the majority of food literacy literature, the prevalence of Indigenous culture taught on school farms speaks to their critical approach to food systems and consideration of broader social and environmental impacts that newer definitions of food literacy prioritize. If the broader intentions of food literacy are to promote the next generation of critical thinkers and participants in society and within the food system, then the incorporation of Indigenous foodways into school farm curricula is a vital part of teaching food literacy in a BC-specific context (and likely within the context of most colonized nations).

Schools and educational institutions in Canada were and are still today powerful contributors to the colonizing and systematic oppression of Indigenous people (*National Centre for Truth and Reconciliation Reports*, 2022). Western education sought to eradicate the language and traditions of First Peoples, affecting the well-being, foodways, and health of First Nations, Métis and Inuit people and their communities (Gillies et al., 2020; Grey & Patel, 2015; Settee & Shukla, 2020; A. Smith, 2020). As part of the federal and provincial commitment to Truth & Reconciliation, The BC Ministry of Education has a goal of “decolonizing” school curricula (*Aboriginal Worldviews and Perspectives in the Classroom*, 2015); the BC government has also signed the Human Rights Treaty on the Rights of Indigenous People. Thus it is both purposeful and necessary for BC’s food system education to include Indigenous Ways of Knowing given the concerning destruction of food system knowledge, Indigenous food security and sovereignty, and sustainable food practices in the wake of colonization (Settee & Shukla, 2020; A. Smith, 2020). In doing so, school farms teach food system literacy from a much broader social and critical perspective. School farms are prioritizing subjects like sustainability principles; land reclamation; pre-colonial agricultural practices; food as medicine; native plants; social gathering and sharing over food; and multi-generational sharing of knowledge.

School farms’ focus on the production of food as a product of and for the community. The emphasis of Indigenous food knowledges, place-based, and community-based learning nods towards what Widener and Karides (2014) describe as food *system* literacy. Food system literacy allows people to practice their agency as food citizens, whose food-related behaviours support the development of democratic, environmentally sustainable, and socially and economically just food systems (Farag & El Gemae, 2021; Wilkins, 2005).

Students' proficiency in food and food system literacy competencies taught on school farms was displayed through reported improvements in confidence and empowerment with food, or functional competency similar to previous research (Slater et al., 2018). Findings on student self-empowerment and confidence through food work as a positive impact will be discussed in more detail the following section (9.2.2). Students' relational food literacy competencies included students learning to share food; socialise in a food setting; and connect to traditions and culture (Slater et al., 2018). My results suggested that students feel an increased sense of belonging, and that students enjoyed their work and had a sense of purpose through a safe social dynamic that was created by them sharing their differences—languages, struggles, cultures, etc.—and by their act of growing and sharing food together. As others have noted, a key component of food system literacy is students' competency and learning about equity and sustainability in food systems (Slater et al., 2018), which came through in my data. In BC, food system literacy was derived from student participation in community food access programs; land restoration and conservation practices on the farms; and in critical food system work around food insecurity; Indigenous food sovereignty; and community engagement.

### ***9.1.3 School Farms' Impact on Student Well-being***

This study found numerous positive health impacts of school farms on a diverse demographic of students despite the fact that it was not designed to evaluate or assess school farms as a health intervention. The prominence of improved mental, emotional, and social health themes in the findings aligns with other research on outdoor/greenspace/garden/food education and their positive health impacts (Bakr & Abd Gawad, 2021), which will be discussed later in this section.

#### *9.1.3.1 Types of Students Impacted by School Farms*

Based on the results, school farms attract students of all kinds, including students who excel in academics; who are outgoing youth; and students from stable and supportive homes. However, most of the descriptions of students spoke to a portion of the student body who might otherwise struggle academically and/or socially in formal school settings (Ashlee & Fuller, 2021). Students were described as introverted and quiet with less social skills, as misfits. Some are neurodivergent, with mental health issues like anxiety. Some students struggle with ADHD and behavioral issues. Others are transitioning youth or have diverse gender identities and sexual orientations. Some students come from different cultural or socioeconomic backgrounds. Students who are different; who have not found their place or success in an indoor classroom or large school setting; and/or who have different knowledges and learning preferences seem to be drawn to school farms (Frag & El Gemae, 2021). This finding coincides with qualitative research on school gardens which reported children with lower abilities who had become disengaged from learning had social wellbeing benefits after engaging in programming (Lalli et al., 2021). This may be because children under hardship and who suffer from stress take refuge in nature to heal and rest (Chawla, 2014). But often, school farm students are referred to the programs by their guidance counselors, teachers, or parents. Even for students who do not anticipate finding refuge on school farms, my findings support the concept that school farms may lower students' stress levels; improve their mental health; increase their academic success (Enokela, 2021); and improve their resiliency by giving them a sense of autonomy and self-confidence as indicated by previous research (Bell & Dymont, 2008; Chawla et al., 2014; Frag & El Gemae, 2021; Lam et al., 2019; Roeser, 2001; Waliczek et al., 2000; Weare & Nind, 2011).

### *9.1.3.2 School Farms' Impact on Students' Mental Health*

Secondary school students who are exposed to views of trees and natural landscapes rather than parking lots or empty lawns have significantly higher graduation rates, merit awards, post-secondary education plans, and fewer criminal behaviours (Matsuoka, 2010). They are shown to have better mental performance when they have access to green spaces (Schmutz et al., 2014; N. M. Wells, 2000), and there are reports to suggest young people's symptoms of attention deficit hyperactivity disorder (ADHD) (Kuo & Faber Taylor, 2004) and depression can be relieved by experiencing activity in green spaces (Maas et al., 2009). Natural areas, like school farms, have shown to improve young people's mental health by reducing stress and helping youth to develop supportive relationships, self-confidence, autonomy, a positive outlook, and resiliency (Bell & Dymont, 2008; Chawla et al., 2014; Farag & El Gemae, 2021; Lam et al., 2019; Roeser, 2001; Waliczek et al., 2000; Weare & Nind, 2011). Growing food, specifically, is thought to be good for mental health and well-being (Schmutz et al., 2014; van Lier et al., 2017). Several studies of high school students growing food on school grounds have demonstrated that students who grew food at school show improved mental health and focus, and lower stress and cortisol levels (Chawla et al., 2014; Van Den Berg & Custers, 2010; van Lier et al., 2017). These students also expressed peace, calm, and relaxation, improved attention, centering and self-reflection (Chawla et al., 2014). These mental health benefits have also been tied to successful food literacy interventions (Lam et al., 2019).

Based on this existing research, it is not surprising that because school farms were reported to decrease stress and improve student mental health, they also were shown to improve student's general well-being, contributing to feelings of achievement, belonging, and success (Enokela, 2021). Gardening is known to lead to feelings of success and achievement, and the physical

completion of a task can lead to contentment and relaxation (Schmutz et al., 2014). This idea of purpose and achievement came up repeatedly in my study with many descriptions given of students being confident leaders, and taking ownership (Ashlee & Fuller, 2021) and responsibility for their crops from seed to sale.

#### *9.1.3.3 School Farms' Impact on Students' Social Behaviours*

Aside from the personal benefits of improved mental health, students on school farms were reported to have improved social behaviour. With an emphasis on teamwork, problem-solving, and creativity within diverse groups of students, school farms use food as a means to develop students' social health and competency (Farag & El Gemae, 2021). Growing food has been shown to better social relationships and emotional well-being (Ashlee & Fuller, 2021) compared to students who do not grow food (van Lier et al., 2017). Cooperative and creative environments created by natural areas have been shown to enhance social health (Bell & Dymont, 2008; Chawla et al., 2014). By bridging traditions, cultures, and promoting socialization through food, students can build emotional and cultural competencies, which emphasizes positive relationships with food (Slater et al., 2018). These relationships contribute to positive food choices and related decisions, and ultimately a person's achievement of well-being (A. McMahon et al., 2010). The community aspect of school farms and growing food necessitated collaboration and teamwork that involved students' physical, mental, and emotional capacities. This social component, in combination with the effects of being outside with nature, creates a setting for young adults to develop not only their education, but also their personalities, strengths, and identities.

#### *9.1.3.4 School Farms Promote Resiliency*

I found the word *resilient* was used frequently to describe the role of school farms and communities' resilience regarding food security and food access. Additionally, findings on

students' improved well-being relates to research that may suggest students themselves become more resilient through outdoor learning programs like school farms (Ashlee & Fuller, 2021; D. R. Williams & Dixon, 2013). Resilience is influenced by a person's protective factors, which include social competence; initiative; a sense of positive meaning; purpose; self-efficacy; and problem-solving abilities (Chawla et al., 2014). All of these factors were described as the positive impacts of students' participation with school farms. While resilience research predominantly features individuals or social systems historically, there is a recent acknowledgement of socioecological models to promote resiliency (Chawla et al., 2014; Masten & Obradovic, 2008). These models show that the well-being of people and their communities are part of larger processes of ecosystem resilience. The idea is that social models should emulate, reflect, and embed themselves in their natural systems so as to learn and offer adaptive capacity to maintain life-sustaining functions despite risk and change (Chawla et al., 2014; Masten & Obradovic, 2008). In the case of the school farms, students interact with natural processes, and in working to conserve and experience productive biodiversity and abundance, they too derive the social, psychological, and physical benefits of these interactions (Chawla et al., 2014; Tidball & Krasny, 2010). These correlations suggest students may possibly leave the programming as more resilient people.

#### *9.1.3.5 School Farms' Impact on Students' Academic and Professional Opportunities*

School farms also help build student's community and potential for extracurricular and/or post-secondary-school opportunities. All of the school farms either offer programs that pay students stipends to participate, or they offer paid positions to stay involved with farms outside of programming. Students are given alternative outlets to acquire graduation credits in a learning setting that may be more conducive to their strengths and skills, and they are then able to



transform the knowledge they gain in programs into occupational skills. Students who were previously struggling in their academic performance were reported to not only find academic success on school farms, but also become leaders. It is known that hands-on study of nature can improve academic achievement across the curriculum (Chawla et al., 2014; G. A. Smith & Sobel, 2014; D. R. Williams & Dixon, 2013). Considering the interdisciplinary nature of food systems, it is not surprising students found academic success outside the classroom through school farm learning. Often the community members who come in to teach on the school farms or whom the students visit on fieldtrips provide students jobs during the summer or after graduation, with the key reason being community members value the experience level of students coming out of the school farm programs.

## **9.2 Methodological Considerations**

### ***9.2.1 Bias of Western Knowledge***

In the name of reflexivity, it is important to disclose that I am a white, middle-class, American, Jewish, European-descendant woman, who has a history of involvement with community and school food access programs. All of these identities have formed my perspective, experience, and understanding of the world, and therefore influenced the design, approach, and analysis of this work as the identity of any researcher (subconsciously or consciously) influences their work regardless of qualitative or quantitative approaches (Spencer et al., 2014). My work as a former garden- and food educator in primary and middle schools catalyzed my interest in school farm programming and also the idea that school farms had potential as food literacy interventions. My social position and identity especially as a visitor to BC mean I do not share the lived experience of my stakeholders or the students they describe, and so I was careful to not draw parallels between my own experiences and those I witnessed from my participants. My optimistic

disposition, privilege, and previous work with school food education may have contributed subconsciously to a biased representation of the potential of school farms to *serve* the community and the environment and also the magnitude of school farms' potential impact on students' well-being. Participants' willingness to share openly and candidly may have been due to perceived likeness and shared values, or their perception of me as a person wanting to hear certain ideas about the success and impact of their programs (though those questions were not asked.) My background in journalism and as an educator bias my skills towards qualitative work (methods and analysis) as I prefer to engage with the human experience and narrative rather than a numerical representation of people.

Despite the potential for my relatively favourable bias in the formation of this project, the results were derived from thorough community review, reflexivity, and existing research that combine to mitigate this bias and validate this study. The involvement of community-based food education non-profits in the creation and execution of this study lends itself to the mission and motives of provincial school food groups and their hopes to proliferate school farms and school food programs. That being said, research done for a community should be consented and requested by the community, so implicit bias is inherently part of the community-built process. Application of these findings in policy and future research will mirror a similar bias of the politicians, institutions, and organizations who seek to make change in food education. While the recruitment method for this study was not implicitly biased, the self-selection of participants implies that the people who partook in the study had a vested interest in school farms and wanted to support building knowledge around these programs. However, participants were not aware of the research questions linking school farms to food literacy, and questions were designed so I was not overt in making those connections ([Appendix C](#)).

Theoretically, prioritizing food literacy as a framework to discuss school farm education is an inherently Western and colonial lens to discuss the capacity for food education. Literacy as we know it has historically omitted Indigenous language and knowledge as measures of competency (Rappaport & Cummins, 2020). In the vein of A.P Smith's work (2015) with the Gitxaala people, food literacy in this study encompassed the environmental and social context of BC school farms which are inextricable from the history, culture, and place of Indigenous peoples (Cullen et al., 2015; Settee & Shukla, 2020). This study in no way captures the extent of Canada's violence and colonization of Indigenous people in BC. Nor does this study capture how those atrocities are tied to the public health, education, and socio-economic issues in our society (Settee & Shukla, 2020), all of which are motivating factors to increase food literacy and ultimately food sovereignty. Entire careers and lifetimes could be devoted to understanding the importance of Indigenous relations to land and food as premier markers of being 'food literate.' I recognize that this study perpetuates Western paradigms of knowledge, research, and education by the nature of the thesis process through a Western institution, the University of British Columbia, and also by the incorporation of stakeholders who all work with or within provincial educational institutions. The ethnicity of participants was not revealed in this study, but in that decision, marginalized voices were also not highlighted or sought out. Despite these limitations, this study used a critical framework of analysis to help link to Indigenous food knowledges and hopefully help with the decolonization and Indigenisation of conventional food and education systems.

### ***9.2.2 Study Method Limitations***

Due to COVID-19, I built safety measures into the research proposal to conduct all of the interviews via Zoom so as not to travel across the province and interact with different people in

different communities. This reduced the potential for spreading and contracting the virus. One major disadvantage to the virtual interviews was not being able to be on the school farm sites for visible contextualization or notes on the physical structure of the farms. All of the school farm staff asked if the interviews would be on the farms, which indicated that they wished the interviews had some experiential component. Being in person would have allowed for more personal observations of the farms and of the personnel interacting with other stakeholders and community members. However, given the circumstances, virtual interviews were not only safer, but may have provided more accurate answers from participants. Most stakeholders did their interviews from their homes, cars, or private office spaces, meaning they likely were able to speak candidly of their experiences without worrying who else could hear or see the interview. Confidentiality of participants was enhanced as the interviews were not done in public, so presumably interviewees were able to discuss more politically or socially sensitive topics like inter-school relationships, student behaviours, etc.

While the participants represented a diverse range of school farm stakeholders across the three groups (school district staff; school farm staff; and community members), the specific roles of the stakeholders contributed to their perspectives on school farms. There were school farm staff from different tiers of management who were funded by different entities. There was less diversity in the school district stakeholder group. All but one person in this group were teachers funded by the district who either work with the farms or on the farms in an organizational capacity. There was only one school district administrator amongst members, and their birds-eye view of the school system from an administrative perspective offered healthy contrast and context for some of the struggles voiced by school farm members. Having more school district administrators across the different districts would have created a more balanced narrative.

However, this study was community-based, and administrators (principals, vice principals, superintendents, and school board members) of each district were asked to participate. Many did not reply, did not have time, or were not familiar enough with the school farm programs to participate. This in itself could be a finding, and may suggest more involved participation from the higher levels of the school district could help address grievances and challenges voiced by school farm members. The willingness of teachers to participate emphasized the role of teacher champions in the current program models, and offered an in-depth perspective of how teachers of different subjects could integrate their courses with school farms.

Moreover, the findings are based on the voices of 18 participants in this study and may not reflect the complexity and individuality of each school districts' nuanced geographies, hierarchies of power, bureaucracies, or needs. This does not negate the validity of the results, as each participant was an integral part in the functioning of their school farm and their lived experiences are vital in gathering the programs' knowledge. However, should more knowledge and interviews be collected to describe the school farms, it is likely the complexity and the depth of each program would continue to inform our understanding of the specific school farm.

Another recruitment consideration was that children and participants of school farm programs were not included in the stakeholder groups. This was due to COVID concerns and logistics for meeting with students in person. However, alumni students, some of whom were only a year or two out of the program, were asked to participate. This allowed for reflection on their experience and also reflection on how the school farm program influenced where they are now and their ideas of food literacy and food systems.

### **9.2.3 Validation**

The primary goal of this study was to determine *what* a school farm is, and create a generalized definition intentionally constructed to adapt to different programs' unique contexts. In this way, the definition is a representational generalization based on 6 school farms to define broader school farms (Lewis et al., 2003). The capacity of a school farm to teach food literacy to adolescents is likely generalizable to other school farms in Canada with arable land and on secondary school properties or that are catered to secondary school students. This is because the programmatic and physical structure of school farms in the study were diverse and situated in both urban and rural contexts, therefore accounting for a certain degree of diversity across most school farms. While the results of the research questions regarding definition and food literacy capacity are representationally generalizable, findings regarding impact and challenges may not be. Communities in high alpine environments and in the Northern Territories experience shorter growing seasons than the Lower Mainland and host unique social contexts due to their isolation from larger metropolises. This means that while the definition and ability of a school farm to teach food literacy will likely fit most school farm models, additional studies in unique geographical locations may reveal different program needs and structures not captured in this study.

The results of this study were internally validated. The dual analyses within the Framework Analysis method used both description and abstraction of the data, and thus made it possible to identify key patterns and to interpret them across the themes of food literacy and school farms' key characteristics (Goldsmith, 2021). Having an iterative process of inductive and deductive coding and refinement of themes created a built-in validation process to make sure themes were

not missed in either a singular framework overlay or in a general open coding. The combination of the framework and open coding added rigor to the analysis process.

Externally, results of this study were also sent to all participating members to ensure ideas and findings were accurately represented as a form of triangulation, or member validation (Lewis et al., 2003). And, despite the lack of specific school farm literature in BC and a lack of a definition for these self-defining farms in pre-existing sources, the results of this study also aligned with numerous other studies on outdoor and experiential food education discussed in Chapters 1, 2, 6, 7 and 8. These congruences offer a level of external validation of this study and the potential for school farms as food literacy interventions for adolescents.

## Chapter 10: Recommendations, Future Directions, and Conclusion

Based on the findings and discussion and the definition of school farms and their capacity to teach food literacy, the following chapter will outline recommendations for future school farms, food education policy and practice, and implications for future school farm research.

### **10.1 A Blended School Farm Structure**

A potential solution to the consistent challenges faced by school farm programs, is a blended structure. In comparing the different school farm structures, a recommendation from my work is that a non-school district entity, like an NPO, or private business should lease school district or municipal land to run a school farm. It appears that some level of enterprise is necessary to ensure school farms are sustained long-term programs (Ashlee & Fuller, 2021). This will allow the partner to be able to manage the farm and grow production to whatever scale necessary to generate a profit while maintaining a safe and productive educational space.

At the same time, the school district can fund school farm courses either as Board Accredited courses specific to food system education, or as core curriculum courses using interdisciplinary approaches to teach the curriculum. The school district would fund the school farm staff as is done for all the school-year courses. Based on one case in my study, the interdisciplinary courses would be the most cost-effective since schools would not need to hire additional teachers to teach on the school farms. Instead, current teachers (i.e. science, math, English, culinary, or history teachers) would utilize the school farm for interdisciplinary lessons.

An important lesson from School Farm 5 in my study is that even when current full-time staff are teaching on a school farm, they should not be expected to run the farm. Instead farm management needs to be a part of a job description where dedicated funds and time is allocated



to whoever manages the farm. If a school district does not wish for an outside partner (NPO or business) to manage the farm, the most expensive, but fully internal option, is for the school district to hire separate full-time farm staff to be in charge of farm management and production. In either case, the non-school district entity or a specific school district funded farmer position would be in charge of farm management and production and the school district teaching staff would educate students and work in tandem with the farmer and their land to utilize the school farm as a learning space. Another related lesson from my work is that the school farm should be available for full-credit courses, unlike one of the school farms in the study. Dual accreditation programs with local universities, afterschool or summer programming, or post-grad opportunities can be designed to help recruit students into new job opportunities and continued learning.

Maximizing empty school district or municipal land for school farms would alleviate land access and cost issues young and new farmers face today, especially in the Lower Mainland of BC (Gichungwa, 2015; Valley & Wittman, 2019). As owners, the school district could allow the farms to lease water and land usage, while allowing the NPO or business to build, own, and operate required infrastructure. Agreements could be made that provide an opportunity for the school district to purchase the infrastructure should the school district decide to not only fund the educational components but fully manage and operate school farm. These suggestions are based on the voiced concerns and frustrations of the specific participants in this study and may require refining based on the complexity and individuality of each districts' nuanced geographies, bureaucracies, hierarchies of power, or needs.

#### ***10.1.1 A Canadian School Food/Meal Program***

In the US, the school food programs are supported by the U.S. Department of Agriculture (USDA) in collaboration with schools and state agencies. In Italy and Brazil, their whole

governments are involved. In France and Japan, the Ministry of Education operates the programs and uses private funds from families to subsidize costs (Harper et al., 2008). Canada, however, does not have a national school food program and instead each school district is left to devise their own school food meal programs (or not). School food systems are part of complex institutional frameworks that impact student health and the environment and therefore school-based interventions and educational policy can drive food system sustainability, food security, and food sovereignty goals (Rojas et al., 2011, 2017).

Every school farm in BC in this study grew food and contributed to a meal program or food served in the school. As Canada moves towards a national school food program (Fawcett-Atkinson, 2022), there is great potential for school farms to grow and help prepare food for such programming (Enokela, 2021). Based on the key characteristics for a national school food program in Canada as laid out by Hernandez et al. (2018), school farms can contribute to the school food programs by offering the following:

- ‘health promoting’ food (fruits and vegetables);
- ‘respectful food,’ that is locally adapted and culturally appropriate;
- ‘connected food,’ since school farm food is as local as school food gets and school farms are supported by the community;
- ‘multicomponent food,’ which integrates food literacy, nutrition education and food skills into the curricula; and,
- ‘sustainable food,’ so long as school farms can address their funding sustainability as was discussed previously.

School farms should develop and grow at a capacity that can or could support a school food meal program in their school so as to create a resilient local food system and ensure school farms remain funded and supported through this anticipated new school food policy (Lalli et al., 2021).

### ***10.1.2 School Farm Accredited Courses***

A key recommendation from my work is that nutrition education on school farms should expand and can take advantage of interdisciplinary learning opportunities, especially with existing food studies courses that have syllabi and teachers. While creating new Board Accredited courses is an option, school districts do not need to build their own courses and hire new staff to offer accredited school farm courses. Not only would it be cost-effective, but using existing courses for school farm curricula could also limit the burden on students who cannot access extra-curricular programming or have full course loads. Six secondary school courses in BC's curriculum mention nutrition as core content, with Food Studies 10 and 12 looking specifically at "food trends, including nutrition, marketing, and food systems" and "nutrition and health claims and how they change over time," respectively. Seeing as two of the participants were involved in teaching food studies courses and spoke of their success integrating their curriculum and classes with the school farm, there may be natural pairing between the two. Other BC accredited courses that specifically mention "nutrition" are PE & Health 9, Active Living 11, and Outdoor Education 11 and 12 (British Columbia Government, 2022a).

Perspectives in Indigenous food sovereignty in Food Studies 12 focuses on the Right of Indigenous Peoples to determine food and land use policies with respect to growing, gathering, hunting, and harvesting food (British Columbia Government, 2022a, 2022b). This course not only aligns with food literacy concepts already taught on the school farms, but also matches school farms' existing Indigenous Garden spaces, community partners, and developed

curriculum on Indigenous foodways. In BC's Declaration on the Rights of Indigenous People's Act Draft Action Plan (2021), there is a proposed new Indigenous-focused course requirement as a graduation requirement. School farms offer a space for existing and new courses alike to deepen students' understanding of Indigenous knowledges, history, cultures, and experiences.

From the findings of a diversity of disciplines taught, school farms could submit BA courses to offer students specific school farm programming or to teach graduate requirement courses. These courses could expand beyond the sciences and include subjects in the humanities, special education (Farag & El Gemae, 2021), trades, and more. The key to interdisciplinary course success on school farms will be making sure teachers are qualified, trained, and comfortable teaching in experiential environments. It may be relevant for school districts to hire future teaching staff with education and experience in both agriculture and their core subject, which this study found helped teachers move fluidly from their formal classrooms to the farm, and bridge information between. For school farms with teachers not familiar with these subjects, my work would suggest that the managing entity develop an experiential module and communication system to support professional development and training teachers in their own learning and their delivery of education in an outdoor setting.

## **10.2 Implications for Future School Farm Research**

This study, particularly the literature review, revealed a large and ongoing gap in knowledge on a number of areas such as food literacy; school farm definition; school farms impact on student well-being; and food education. Generally, the development of a definition of food literacy with international consensus on indicators endorsed by an international agency would help advance the field of food literacy (Thompson et al., 2021), and would allow for more consistent evaluative measures of the effectiveness of food literacy interventions such as school farms in

BC. Locally, the Conference Board of Canada identified food literacy as an important area of exploration to address concerns about the population's "food de-skilling" and to improve health and disease prevention (Howard & Brichta, 2013). Therefore, continued research on food literacy as a framework and its application to support both human health and environmental health should be prioritized in the fields of education, environmental sciences, and public health. In particular, the role of a multifaceted food literacy intervention for preventing or mitigating food insecurity shows promise but should be investigated using qualitative research in addition to quantitative assessments of effectiveness (West et al., 2020). Specifically, mixed-methods implementation sciences should be applied to the study of school farms to see how their various structures and program delivery can be most effective in their individually variable contexts (Lalli et al., 2021), and if there is singular structure that could be replicated as a general framework across school districts.

Future research should also seek to verify if the localized community-derived definition of school farms from this study changes at a larger scale or context/province. A process of definition and consensus-building would be the next steps in both Canada and on the global level to have a unified understanding of the structure, programs, and goals of school farms in primary and secondary school settings. Also, future evaluative research is needed to assess the effectiveness of school farms in teaching food literacy as this study's scope concerned school farms' capacity to teach food literacy concepts and the perceived impacts. Systematic assessment of students' psychological, behavioural, functional, emotional, and intellectual growth as a result of food literacy education on school farms could support the potential benefits suggested by this study. Additionally, school farms can support growing research on the health benefits of being in nature on teens (Bell & Dymont, 2008; Chawla et al., 2014; Lam et al., 2019; Matsuoka, 2010;

Roeser, 2001; Schmutz et al., 2014; Van Den Berg & Custers, 2010; van Lier et al., 2017; Waliczek et al., 2000; Weare & Nind, 2011; N. M. Wells, 2000), including participation in growing food and the food system.

It is important to continue developing health promotion strategies that lead to a flourishing life through improved nutrition and food relationships beyond the reductionist lenses of obesity prevention or lifestyle education (Slater et al., 2018). This study's findings on how marginalized and atypical learner students find success in community-based, place-based, and experiential education could inform future research on alternative learning environments for students who struggle in traditional formal classroom settings.

Longitudinal studies over the course of a child's participation in school farms from elementary school through high school may offer more insight into how students' resilience is improved, and how students can make positive adaptations to stressors in the long term (Chawla et al., 2014). This work would demand continued interdisciplinary and interdepartmental support between school farms, guidance counselors, school district teachers and administrators, and academic experts to bridge the fields of agriculture, landscape architecture, psychology, pedagogy, and behavioral sciences (Lalli et al., 2021).

Since 2010, BC provincial legislation requires all public institutions, including schools, to be carbon neutral (Rojas et al., 2011). Since schools' food systems have significant carbon footprints, school food and school farm program and policy could possibly aid in decreasing schools' carbon emissions. Tracking local food procurement from school farms and the effects on schools' carbon emissions is another potential area of research study of school farms.

### 10.3 Conclusion

This qualitative study, using semi-structured interviews and Framework Analysis, is the first to examine school farms in British Columbia and to create a working definition to describe self-identifying ‘school farms’. It is also the first to discuss the capacity of school farms to teach food literacy specifically to adolescents. School farms can broadly be defined as experiential, place-based, and community-centric food education models that teach about food systems holistically at a scale that exposes students to the ecological, social, business, and production challenges of agriculture. For school farms to deliver consistent, accredited, interdisciplinary food system education, school farms require consistent and reliable funding. The results of this study suggest dedicated staff time and funding should be allocated to school farm staff positions. This could mean a robust school farm-dedicated role within the school district, or it may mean the involvement of a community or separate entity partner (i.e. NPO, local business, local farmer) in collaboration with the school district to form the most resilient and sustainable structure for programming.

Based on this study, school farms have the potential to positively impact students’ well-being regarding their health, social connectedness, and their academic and professional pursuits.

School farms address the gaps in secondary school food education and the recommendation for more food education for young adults described in the broader literature. These programs cater to adolescents because high schools generally have more space; the students are older and stronger and are therefore generally more physically capable of effectively doing large-scale farm work; and they have the capacity to critically think about the complexities of our food system at the scale necessary to understand both individual and collective participation.

This thesis showed that, while school farms may not intentionally be designed as food literacy interventions for adolescents, school farms have the capacity to successfully teach food literacy

to teenagers in a more inclusion way. By continuing the expansion of food literacy education, especially to secondary school students, the growing school farm movement has the potential to educate and empower young adults from diverse backgrounds as agents of change who can advocate for healthier, more just, and more sustainable food systems, and to work towards improving community food security and food sovereignty for current and future generations.



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## Appendices

### Appendix A. Summary of included sources in scoping review of school farm literature

Author/s	Title	Year of Publication	Article Type	Country/Region	Age/Grade Demographics	Sample Size	Gender	Geographic Size
NR	New school farm for Boise.	1916	Editorial	US	Secondary school students	NR	NR	40 Acres
NR	Boise's progress.	1917	Editorial	USA	NR	NR	Boys	40 Acres Divided Into 8 5-Acre Tracts
Day	The place of the school farm in a secondary vocational agricultural instruction.	1921	Editorial	USA	NR	NR	Boys	NR
NR	School farmers make neat profit	1934	Editorial	USA	NR	262 students	NR	NR
NR	School farms in India	1938	Editorial	India	Primary and secondary school students	NR	Boys	NR
Cross	Why a school farm?	1939	Editorial	USA	School-aged* FFA members	NR	Boys	10–50-Acre Plots
Dickson	Use of a school farm as a laboratory for vocational agriculture.	1939	Editorial	USA	NR	About 300 students	Boys	100 Acres
Balloun	Using a school farm in teaching.	1939	Editorial	USA	School-aged* FFA members	NR	Boys	15 Acres
Vazquez-Torres	Directed practice in the school farms of Puerto Rico.	1939	Editorial	Puerto Rico	School-aged students*	NR	Boys	5 Acres or Larger
NR	School farm in the Transvaal: Lord Milner School Farm.	1943	Editorial	South Africa	Primary school students	NR	Boys & Girls	NR
Pack	Students in Hawaii produce food on the school farm.	1943	Editorial	USA	Secondary school students	NR	Boys	1 Acre
NR	School farms.	1944	Editorial	UK	School-aged students*	NR	Boys	N/A
Ako	Relation of the school farm to the instructional program in Hawaii.	1945	Editorial	USA	School-aged students*	NR	Boys	2-Acre Vegetable Plot
Johnson	School farm and plots in the Pacific region.	1947	Editorial	USA	NR	NR	Boys	32.9 Acres-Owned And 57.8- Leased (Averages)
Bressler	We moved our classes to the farm.	1948	Editorial	USA	Secondary school students & veterans	NR	Boys	750 Acres Divided In 3 Sections.
Mcmahon & McMahan	Conservation at the Battle Creek Public School Farm	1949	Editorial	USA	School-aged students*	150 students	Boys & Girls	NR
Brown	School farm becomes much used resource.	1949	Editorial	USA	NR	NR	Boys	51 Acres

Eckelberry	School farm offers educational opportunity.	1949	Editorial	USA	Secondary school students	50% of students in the school	Boys	121 Acres
Spearin	Cooperative school farm.	1950	Editorial	USA	NR	NR	Boys	15 Acres
Ahalt	School farms in the North Atlantic region.	1951	Editorial	USA	Secondary school students	NR	Boys	3-750-Acre Plots
Clark	Observations on use of school farms in Michigan.	1951	Editorial	USA	Mostly secondary school students	NR	Boys	120 -160 Acres
Hutton	West Virginia's school Farm.	1951	Editorial	USA	Secondary school students	NR	Boys	NR
Mcdonald	School farms In Maryland.	1951	Editorial	USA	School-aged students*	NR	Boys	3-40 Acres.
Cazaly	High school farm operated as a commercial unit.	1951	Editorial	USA	Secondary school students	NR	Boys	80 Acres
Jensen	Establishment and organization of the Visalia school farm.	1951	Editorial	USA	Secondary school students & junior college** students	175 secondary school students, More than 100 junior college students	Boys	40 Acres
Hagenbuch & Brannaka	Quakertown High School Farm.	1952	Editorial	USA	Secondary school students	NR	Boys	100 Acres
Spilsbury	School farm laboratory supplements classroom teaching.	1952	Editorial	USA	Secondary school students	NR	Boys	95 Acres
	Harrow school farm.	1953	Editorial	UK	School-aged Students*	NR	Boys	155 Acres
Welch	School farm as a training center.	1953	Editorial	USA	Secondary school students	NR	Boys	65 Acres
Crandall	Favorable learning opportunity on a school farm.	1953	Editorial	USA	Secondary school students	NR	Boys	50 Acres
Juergenson	Community is your school farm.	1953	Editorial	USA	Secondary school students	NR	Boys	3-300 Acres
Kabler	School farms can be valuable.	1954	Editorial	USA	Secondary school students	50-80 students	Boys	40-45 Acres
Sherman	Share agreement as a means of stocking school farms	1955	Editorial	USA	Junior college** school farm	NR	Boys	300 Acres
Snell	School farms and group farming enterprises.	1955	Editorial	USA	Secondary school students	NR	Boys	NR
Sherman	School farm has public relations value.	1956	Editorial	USA	Post-secondary students	NR	NR	400 Acres
Smith	Place of a school farm.	1956	Editorial	USA	School-aged Students*	NR	Boys	93 Acres
Garvie	School farm	1957	Editorial	USA	Primary students (Grades 5 & 6)	90 students	NR	12 Acres
Booska	School farm in adjusting local program.	1960	Editorial	USA	NR	NR	NR	NR
Ballard	School farm.	1960	Editorial	USA	School-aged Students*	NR	Boys	NR

Nicklas	How the school farm operates at the U. Of Nebraska School of Agriculture.	1960	Editorial	USA	Secondary school students	NR	Boys	450 Acres
Bryant	Developing A school farm.	1960	Editorial	USA	NR	NR	NR	140 Acres
Hohman	Doing to learn, on the school farm.	1961	Editorial	USA	NR	NR	Boys	60 Acres
Haight	Using the school farm effectively.	1961	Editorial	USA	NR	NR	Boys	235 Acres
Duff	Do you need a school farm?	1970	Editorial	USA	Secondary school students	NR	Boys	3-300 Acres
Bearden	Morris FFA School Farm provides challenge.	1971	Editorial	USA	NR	29 students	Boys	10 Acres
Orhwall	School farms and country parks.	1972	Editorial	USA	Secondary school students	NR	Boys	245 Acres
Hammer	Using a school farm.	1974	Editorial	USA	Secondary school students	NR	NR	70 Acres
Mabee	Report to the government of Malaysia, on programme of the Agricultural Institutes of the Ministry of Agriculture and Fisheries, West Malaysia	1974	Government Report	Malaysia	NR	NR	NR	NR
Mcmillion	School farm In 1975.	1975	Editorial	NR	Secondary school students	NR	NR	NR
Stump	Conservation studies down on the school farm.	1976	Editorial	USA	Secondary school students	NR	NR	230 Acres
Puckett	School farm.	1977	Editorial	USA	NR	NR	NR	108 Acres
Alcock	Mdukatshani – experiment in agricultural development.	1977	Original study	South Africa	Any farmers or students interested	NR	Boys & Girls	61.78 Acres
Udo	Land laboratory use in teaching agriculture in the southern United States with implications for agricultural education in Nigeria.	1979	Dissertation	Nigeria And USA	Secondary school teachers and students	US: 69 vocational agriculture teachers from 69 public high schools; Nigeria: 26 agricultural science teachers from 26 high schools	Boys & Girls	620 Acres
Adams	Challenge of establishing a school farm.	1980	Editorial	USA	Secondary school students (Grades 11 and 12)	20 students	NR	190 Acres
Farrell	The school farm: educating through laboratory experience.	1983	Editorial	USA	Secondary school students & alumni	NR	NR	160 Acres
Stump	Prairie Heights School Farm: SOEP in conservation.	1984	Editorial	USA	NR	NR	NR	230 Acres

Olaitan	Agricultural education in the tropics. Methodology for teaching agriculture.	1984	Textbook	International	NR	NR	Boys & Girls	NR
Williams & McCarthy	Student benefits from school farm activities as perceived by administrators and instructors.	1985	Original study	USA (4 states)	Vocational agriculture departments for school-aged students*	68 departments	Boys & Girls	10 Acres or Less
Martin & Dormody	Zuni School Farm: A bridge between vocational and academic education.	1992	Editorial	USA (Zuni Pueblo)	Secondary school students	NR	Boys	25 Acres
Martin & Dormody	Dreams becoming realities: The Zuni School Farm Project.	1994	Editorial	USA (Zuni Pueblo)	Secondary school students	NR	Boys	25 Acres
McGavin	Extra milk.	1995	Editorial	UK	School-aged students*	40 students	Boys & Girls	NR
Konoshima	Participation of school children in agricultural activities at school farms in Shiga prefecture.	1995	Original study	Japan	Kindergarten and primary school students	NR	Boys & Girls	NR
Thomas	Barn storming.	1996	Editorial	UK	Secondary school students	NR	Boys & Girls	2.5 Acres
Haigh	Dig in to pastures new.	1997	Editorial	UK	NR	NR	Boys	NR
Newnham	Cows on the curriculum.	2000	Editorial	UK	School farms for school-aged students*	111 school farms	Boys & Girls	44.94 Acres
Brown	Cows the classroom: A school farm for inclusive education, general farm maintenance, construction, gardening, landcare projects on farm and in the community	2001	Editorial	Australia (Tasmania)	Primary school students	NR	NR	8 Hectares
McGavin	Learning 'til the cows come home.	2002	Editorial	UK	Secondary school students	220 students	NR	140 Acres
B. Swan	Solving problems through action research: Engaging the teacher and student through exploratory learning.	2004	Editorial	US	NR	NR	NR	20 Acres
Parkin	The daily rind.	2005	Editorial	UK	Community college students	1,400 students	NR	4.94-49.42 Acres
Foeken et al.	School farming and school feeding in Nakuru Town, Kenya: Practice and potential	2007	Other (Working paper)	Kenya	Primary & secondary schools	116 schools	NR	0.1-5 Acres
Morrison	Best baa none.	2008	Editorial	UK	Primary schools	NR	NR	NR
Marley	Farm school keeps lads on the right track.	2009	Editorial	UK	13–15-Year-Olds	175 students	Boys	NR
Foeken et al..	Coping with increasing food prices in Nakuru, Kenya: Urban school farming as a way to	2009	News	Kenya	NR	750 Students	NR	0.1 -5 Acres



	make school lunches affordable.							
Foeken et al.	Urban school farming to improve school feeding: The case of Nakuru Town, Kenya.	2010	Original study	Kenya	Primary & secondary schools	116 schools	NR	0.1 -5 Acres
Sayre & Clark	Fields of learning: The student farm movement in North America	2011	Textbook	North America	Post-secondary students	NR	Boys & Girls	NR
Warsh	Cultivating citizens: The Children's School Farm in New York City, 1902-1931	2011	Original study	USA	Secondary school students	NR	Boys & Girls	7 Acres
Wydler	The state of the art of school farming in Switzerland - The case Of Schub.	2012	Original study	Switzerland	Primary school students (grades 1 to 9)	28,000 students	NR	NR
Tearle	Where there's muck...	2013	Editorial	UK	3 - 16-year-olds with moderate to severe learning/emotional/social/behavioral difficulties	NR	NR	5.5 Acres
Summers	Tomatoes, cucumbers, and salad tag: A farmer goes to school.	2013	Editorial	USA	primary and secondary schools	5 schools	Boys	.5 Acre
Jenkins	Crops to classrooms: How school farm are growing student engagement	2014	Editorial	UK	NR	100+ school farms	NR	3 Acres
Walters	At the Table.	2014	Editorial	USA	NR		NR	NR
Carten	Farming school grounds.	2014	Editorial	Canada	Primary and secondary students in Toronto and Vancouver	Toronto, 14 students Vancouver, 30-4- students	NR	NR
NA	Lancing Farm Project, 30 Years On.	2014	Editorial	USA	NR	NR	NR	NR
Green Schools National Network	Denver Public Schools Farm to School Program: School farms feed district students.	2015	News	USA	NR	NR	NR	NR
Paffarini et al.	Bridging the Gap - Education and in specialized kindergarten programs	2015	Original study	Europe	Children from 2 kindergarten schools	Italy, 4 students Germany, 20 students	NR	Italy: 123.55 Acres Germany: 61.78 Acres
Ambroise et al.	Perfea: Ongoing counselling towards strategic planning processes to implement the agro-ecological transition	2016	Other (Conference Paper)	France	Secondary schools	190 School Farms, 33 Technical Processing Plants	Boys & Girls	NR
Grambril	School farm safety: Avoiding or being the headlines.	2016	Editorial	USA	Secondary schools	NR	NR	NR

Aniebiat Okon	Strategies for school farmland conflict resolution and effective teaching and research in agricultural education	2017	Original study	Nigeria	NR	70 Agricultural teachers, 20 School management staff, 60 community leaders in school communities	NR	NR
Twenter & Edwards	Facilities in school-based, agricultural education (SBAE): A historical inquiry	2017	Original study	USA	Primary & secondary school students	NR	Boys	5-300 Acres
Corbett et al.	What we're about out here: The resilience and relevance of school farm in rural Tasmania.	2017	Original study	Australia (Tasmania)	Primary and secondary schools	22 School Farm Educators	Boys	49.42 Acres
Fifolt et al.	Promoting school connectedness among minority youth through experience-based urban farming	2018	Original study	USA	Kindergarten, primary, and secondary school students	33 students, 25 parents	Boys	2-40 Acres
Yopp et al.	Flipped programs: Traditional agricultural education in non-traditional programs.	2018	Original study	USA	Secondary school agricultural programs	3 agricultural programs, 3 teachers	Boys	NR
Lambert et al.	Understanding characteristics, uses, perceptions, and barriers related to school farms in Oregon.	2018	Original study	USA	Oregon secondary school agricultural education teachers	64 teachers	Boys	1-60 Acres
Fifolt & Morgan	Engaging K-8 students through inquiry-based learning and school farms.	2019	Original study	USA	Primary school staff	15 Teachers, 5 Principals	NR	NR

Abbreviations: TES, Times Education Supplement; AEM, Agricultural Education Magazine; NR, Not Reported. \* School-aged students were undefined, so students could be in any grade from kindergarten to high school. \*\* Junior colleges are 2-year post-secondary schools common in the United States

Appendix B. School farm peer-reviewed articles themes and summary

Source	Study Location	Study Design	Objective	Population	Reported Results
Williams & McCarthy <sup>36</sup>	United States	Case Study	Determine characteristics and benefits of school farms operated by vocational departments in Iowa, Kansas, Missouri, and Nebraska and the characteristics and perceptions of their teachers and school administrators	68 vocational agriculture departments across Iowa, Kansas, Missouri, and Nebraska	A majority of school farms were located one mile or less from the classroom, and more than half of them were 10 acres or less in size. The main purposes of the school farms were to supplement vocational agricultural classrooms, make money for FFA, and give supervised occupational experience to non-farm students,
Konoshima <sup>43</sup>	Japan	Case Study	Investigate the agricultural and horticultural activities at school farms supported by the Shiga Prefecture's local self-governing bodies.	Kindergarten and primary school children	Most primary schools in Shiga prefecture have participated in agricultural activities at school farms. Procuring arable land was the greatest obstacle and most schools borrowed land from neighboring farms. School farm activities are conducted as domestic science curriculum for first and second graders and then as its own subject for older grades.
Alcock <sup>38</sup> .	South Africa	Case Study	Assessing the 'land school' and school farm and their effect on the community	Any farmers that were interested in becoming students	The school farm has established new farmers, improved students' farming, and the program saw an increase in student enrollment in farm courses.
Foeken et al. <sup>34</sup>	Kenya	Case Study	Examine school feeding and school farming in Nakuru Town, Kenya and the extent to which school farming contributes to	116 schools (both primary and secondary)	There are school farms in Nakuru who have achieved a degree of self-sufficiency in their feeding programs through school farming. Obstacles to successful programs include land and water access, and lack of support and leadership.

			school feeding programs, and its potential benefits for children.		
Warsh <sup>40</sup>	United States	Historical	Provide a historical report of the Children's School Farm in New York City from 1902-1931	School-Aged students (Not specified)	The school farm and integration into a public park exemplified Progressive Era reform and the role of nature in urban life and how educators could reexamine the relationship between children, education, and nature.
Wydler <sup>35</sup>	Switzerland	Case Study	Analyse which groups of pupils involved with school farms in Switzerland were interested in different subjects in the eco-educational programming.	28,000 students (1st to 9th grade)	Most pupils visited the school farm. Younger students were more interested in farm topics, and the more times a student visited, the more likely they were to show interest in the farm. The school farm showed merit in the field of environmental education. Girls generally showed more enthusiasm than boys in farm topics.
Paffarini et al. <sup>37</sup>	Italy & Germany	Case Study Comparison	Identify the main business strategy and principal characteristics of kindergarten farms and examine the value of combining agriculture and education.	2 kindergarten schools (one in Italy and one in Germany) Italy: 14 kids; Germany: 20 kids	The Main characteristics of a kindergarten school farm are: (1) customers are young families unfamiliar with farms (2) school farms offer educational service and farm products (3) school farm infrastructure is built on educational and productivity functions carried out by teachers and farm staff and (4) school farm viability is an outcome of revenue streams and costs
Twenter & Edwards <sup>42</sup>	United States	Historical	Examine the historical evolution of learning spaces and	Not Specified	Historical sources recognized the need for specialized facilities and equipment to educate students in SBAE. Early learning spaces were used for agricultural instruction

			related resources for teaching school-based agricultural education (SBAE) in the United States.		and production while today's spaces integrate academic content with agricultural concepts. Federal legislative mandates solidified occupational training as a part of SBAE.
Aniebiat Okon <sup>50</sup>	Nigeria	Comparative	Investigate strategies for school farm land conflict resolution in Akwa Ibom State and understand how to facilitate effective teaching and research in agriculture education to prevent conflict.	150 subjects in study (70 ag teachers, 20 school management staff, 60 community leaders in school communities)	Agricultural education requires land for effective implantation of program. School and community conflict hinder implementation of programs. Government intervention is the best tool for school land conflict resolutions. School managements and community leaders should communicate to prevent conflict.
Corbett et al. <sup>29</sup>	Australia	Qualitative	Analyze interviews undertaken in 2016 with 22 school farm educators about the state of Tasmania's school farms.	22 school farm educators from primary and secondary schools)	School farms reflect the materiality of a place, social practice, and potential of education that connects local identity and authentic rural experience. School farms respond to workforce needs of the agricultural industry and provide a community-valued environment. They also provide experiential links between food, sustainability, and ecology.
Fifolt et al. <sup>39</sup>	United States	Case Study	Explore student and parent experiences school-based urban farming with Jones Valley Teaching Farm.	33 students: 29 from grades K-8 and four high school students, and 25 parents	The three main themes that emerged from parent and student focus groups regarding their experiences on the school farm were: responsibility/accountability, relationships, and self-efficacy. Students on the school farms learned about their own

					personal and professional interests, developed life skills to make healthier food choices, and agents of change in their community.
Yopp et al. <sup>41</sup>	United States	Case Study	Observed and interviewed teachers in different in classrooms and laboratories at secondary schools, in livestock barns, greenhouses, and vineyards on school farms and explored the relationship between personal, behavioral, and environmental determinants of social cognitive theory within the total agricultural education program model.	3 secondary school agricultural programs with between 2-5 teachers and 1,700-3,100 students.	School farms are made up of three-component agricultural education program model: classroom and laboratory instruction, supervised agricultural experiences (SAE) and a Future Farmers of America (FFA) club. Even in urban settings, school farms were able to use this model and deliver traditional agricultural content. According to teachers was a captivating topic for students and the school farms provided new experience for student who were not familiar with production agriculture.
Lambert et al. <sup>31</sup>	United States	Descriptive	Explore the characteristics, utilization, perceptions, and potential barriers to using school farms for instructional activities as an experiential learning tool.	64 Oregon agricultural education teachers who identified having a school farm.	School farms provide relevant experiential learning opportunities for students. The primary facilities available on Oregon school farms were for equipment and tool storage and animal projects. Students used school farms for SAE and laboratory instruction. Barriers of successful school farms include the condition of the school farm, facilities, finances, and teachers' ability to manage

					and engage all students on the farm.
Fifolt & Morgan <sup>32</sup>	United States	Case Study	Explore principal and teacher experiences with Jones Valley Teaching Farm and how their school farm uses a hands-on food education model to teach academic standards-based lessons	4600 K-8 students, 20 staff members (15 teachers, 5 principals)	The school farm was seen as a catalyst for student engagement and contributed to the retention of students at risk of dropping out of school. The school farms also created leadership opportunities for students who were not as academically inclined as their peers. The school farm promotes collaboration, communication, and problem-solving skills in their content.

## Appendix C

### School Farm Interview Guide

Good morning/Afternoon. Thank you for taking the time to meet with me and share your experience and knowledge of (insert name of program). You are part of a food education program that is growing in popularity and is filling a critical gap in food education for adolescents. We are excited to learn from you, your reflections, and perceptions, as you help us learn more about school farms.

The information you share today will add to a community-based narrative around food systems and food education in British Columbia, and will strengthen public and academic understanding of school farms and food education in secondary school. The results of my research will provide insight into how school farms can continue to grow, improve, and serve the community.

As discussed in the consent form, I will record this discussion in order to transcribe and fully understand your comments. Everything you say will be kept in confidence and your identity will be anonymized using a study number in any publications or presentations. If at any point you wish to say something off of the recording or you no longer want to be part of this study, you may say so, and we can pause the recording or end the interview.

#### **1. Tell me about your experience and knowledge of (insert name) school farm?**

##### *Probes*

- a) *What is your role?*
- b) *How long have you worked/collaborated with the program?*
- c) *What is the staff structure of the program?*
- d) *What do you do over the course of a day/week/month/year?*
- e) *What subjects/themes/topics are taught in the program?*
- f) *Can you explain the teaching style of the school farm? What kind of methods are used to teach or engage students?*
- g) *What would you say the goal(s) of the program are?*
- h) *What are the strengths and challenges of the program?*
- i) *Which (if any) types of community members are involved in the program? What are their roles?*

#### **2. In your experience or to your knowledge, how is (program name) different from other school food initiatives (school garden, home economics courses, cooking classes, nutrition courses, etc.)**

##### *Probe:*

- a) *Differences can be in terms of the program schedule, its content, location, leadership, etc.*



**3. Does your program integrate topics of race, culture, or economics into the curriculum?**

*If yes, how?*

**4. Can you describe what is growing at the school farm? And what happens to the produce/plants after they are ready to be harvested?**

*Probes:*

- a) What kinds of produce is the farm growing?*
- b) Where does the food go? Or what is it used for?(food banks, cafeteria, tastings, courses at the school, etc.)*

**5. Which skills, knowledge, or behaviours taught at the school farm do you think are most important for adolescents to learn? Why?**

*Probe:*

*Do you feel adolescents would learn these skills elsewhere if they were not participating in the school farm? Explain*

**6. Have you witnessed students or alumni of the program using their skills or knowledge outside of school or after leaving the program? Explain.**

*Probe:*

*Have students gone on to work, volunteer, or continue their learning about food or food systems?*

**We are near the end of the interview, so I just wanted to ask:**

**7. Do you have any other thoughts, experiences, or comments on your program or food education generally in British Columbia?**

**8. Is there anything else we did not cover that you want to address?**

Thank you so much for your participation in this interview for my Master's research. I am looking forward to using this information to [help the local school farm community in BC / add as relevant]. Your part in helping me reach this objective is very much appreciated. Have a good day.