

**The Socio-Environmental Aspects of Students' Food Literacy:
An Exploratory Case Study of Two Ontarian High Schools**

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Abstract

North American food environments have gone through dramatic shifts over the past six decades. During this period, we have witnessed the consolidation of a globalizing industrial agrifood regime, accompanied by new types of foods available and an excess of marketing. In recent years however, a growing number of scholars, environmentalists, rural organizations and consumers have highlighted the negative environmental and social impacts of this model of large scale, intensive monocultures. Another critique that has been more and more common is the lack of a comprehensive food literacy among youth populations. This thesis starts from the assumption that such knowledge is crucial to equip younger generations with the ability to understand the connections among these issues, to make conscious and informed choices and become engaged citizens, participating in transforming today's predominantly unsustainable agrifood systems. This is essential as younger generations are the future consumers, heads of households and decision-makers in Canadian society. As such, one of the primary objectives of this research was to (re)situate the concept of food literacy amidst the many literatures while also providing an original comprehensive framework of analysis, reaffirming both its health and well-being and agrifood systems components. Consequently, and based on such assessments, the thesis offers an original and exploratory analysis of high school students' food literacy levels. Using a mixed methods approach, it draws from qualitative and quantitative primary data resources and secondary literature to survey and compare eight groups of students in grades 9 and 10 in Ontario. Four of these groups took a food-related class and four were control groups, between two different types of food-related curricula. The research shows that a majority of the high school students who participated

in the study have a basic level of food literacy. This is especially notable when including socio-environmental considerations in order to assess their level of agrifood systems' literacy, which is the main focus and contribution that this research sought to evaluate.

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List of Abbreviations

BA – Bachelor of Arts

BSc – Bachelor of Science

CNT – Control Group

CO₂ – Carbon Dioxide

CS – City School

CSOs – Civil Society Organizations

EFS – Exploring Family Studies Class

FN – Food and Nutrition

FSC – Food Secure Canada

FS – Family Studies Curriculum

GHG – Greenhouse Gases

G9 – Grade 9

G10 – Grade 10

HT – Hospitality and Tourism Class

IPCC – Intergovernmental Panel on Climate Change

RS – Rural School

SSH – Social Sciences and Humanities Curriculum

TE – Technical Education Curriculum

UNHRC – United Nations Human Rights Council

Chapter 1: Introduction

On May 29th, 2017 consultations for the first ever national food policy in Canada were launched. The opening remarks on the governmental website state “The decisions we make as individuals and as a country about food have a direct impact on our health, environment, economy and communities” (Government of Canada, 2017). Hence, Canadians may have a very important opportunity to shape the future of agrifood systems, health and food security across this country. However, one of the main issues that Food Secure Canada (FSC) – a non-governmental organization that has been lobbying for a national food policy for years – has highlighted is the danger of policy incoherence (Food Secure Canada, 2017). This lack of “policy coherence” or of “systems thinking” is one of the main foci of this thesis, considering that governments, communities and individuals often lack this critical lens when making decisions about food issues.

As a result of these realizations and as a first objective, this thesis seeks to review and (re)situate food literacy within the growing literature on the subject. A second objective is to develop and suggest a new and more comprehensive set of food literacy levels for analyzing high school students’ food literacy. This will also contribute to design and propose an original framework of analysis that includes the multiple dimensions of food literacy and therefore provides other researchers with a model to proceed to research further on the subject. The third and final objective is to provide an empirical analysis of two Ontario high schools, investigating the existing level of food literacy among students through an exploratory and comparative analysis.

Additionally, for the purpose of this research, it is key to keep this “systems thinking” in mind which I attempt to do in using the term “agrifood systems”. Following Claire Lamine’s definition, this concept refers to:

socio-technical systems composed of the main social actors and institutions involved in food production, transformation, distribution and consumption (farmers, intermediaries, processors, CSOs, agricultural institutions, public policies, etc.) and of the rules and modes of coordination which link them. They can be considered on a local scale (such as in the case of alternative food systems) or on a larger scale (Lamine, 2015, p. 56).

Therefore, in keeping agrifood systems in mind, we are considering the *many* forces that play a role within said systems and the links connecting them, at both “local” and “larger” scales¹.

Research Questions

As a primary objective, this research seeks to discern and categorize the many disciplines that food literacy is bound to in order to highlight the diversity of approaches in discussing and studying the concept in addition to identifying its weaknesses and resituate it within the broader literature. Following analysis and discussion of elements of importance to the concept of food literacy, this study explores the food-related knowledge of high school students in order to begin to identify the key domain(s) and elements that they are familiar with, or not. It focuses on two main domains and related elements, which are health and well-being (health, cooking and nutrition, micro focus)

¹ I am aware of the growing literature and debates about “scale” and scale politics, especially among critical geographers, however, these debates are beyond the purpose of this thesis, and therefore I am using the concept of scale and level interchangeably.

and agrifood systems (environment, political ecology, macro focus). Another objective is to verify whether or not students who have completed a food-related elective course have a higher level of food literacy, and whether or not certain types of courses are more effective than others at improving food literacy. This study also allows a comparative analysis to see if there is a knowledge difference between students in rural and urban areas. Therefore, the central research questions are:

- *How is food literacy situated within the literature and what elements are currently being evaluated and considered as key to this concept?*
- *To what degree are Ontario High School Students' food literacy levels developed in general and enhanced by food-related education programs, particularly in regards to agrifood systems?*

Outline of the Thesis Chapters

In this thesis, I begin by discussing food regime analyses and regime shifts and present some examples of the many environmental issues that are apparent in modern agrifood systems. Only a limited number of environmental issues that are associated with agrifood systems will be discussed due to the limited space in this thesis, however, the concepts that are discussed pertain to agrifood systems sustainability, engaged citizenry, environmental issues in existence as a result of agrifood systems, and how procurement and consumption habits of institutions and individuals can have an impact. Further, I discuss the numerous elements of food literacy, to justify the importance of adopting a more comprehensive, systems-based framework of analysis. I then describe and justify the use of the political ecology lens to the study of food literacy as it offers a more comprehensive understanding and helps to expose existing flaws; and could in turn empower people to resist and act for agrifood systems change. Finally, I use this “more

comprehensive food literacy” framework as a baseline for assessing the levels of food literacy among the Ontario high school students included in this study. To my knowledge, this is therefore a first, exploratory attempt at evaluating students’ levels of food literacy through quantitative and qualitative data, which was collected through questionnaires and interviews with students, in addition to interviews with their teachers.

The thesis concludes by presenting that the original framework designed here to evaluate students’ food literacy through a more comprehensive and political ecology-informed lens, provides very useful tools which are worthy of further testing. This framework could also be updated using different benchmarks from different disciplines to reflect desired food literacy levels at different age categories. Nonetheless, it must be acknowledged that the data collection instruments need significant revision. Indeed, more in-depth research is also clearly needed to develop better tools aimed at assessing food literacy levels among Canadian youth through a comprehensive perspective that would integrate “agrifood systems thinking”. It further highlights the need to use such tools with a much broader sample of youth and food-related courses in order to provide crucial quantitative and qualitative empirical data for such important topics. These studies would indeed be extremely useful to orient governments and other key actors seeking to reinforce food literacy and food-related courses, but also to think critically about the broader questions and concerns about agrifood policies, agrifood systems and education more generally.

Chapter 2: Literature Review

This literature review synthesizes the different debates, understandings and perspectives on food literacy. It begins by introducing the concept of food regime to review the main characteristics of agrifood systems at different historical periods on a global scale, thus offering the readers a broader context in which this analysis is developed. This context is then discussed more specifically through giving examples of the nutrition, culinary and education transitions. Subsequently, some examples of environmental issues associated with dominant practices within agrifood systems are provided along with a discussion of sustainable food systems, to demonstrate how these issues can be perpetuated or reduced based on societal and individual choices. This is followed by a discussion of food literacy and its definition to explain the benefits of looking at it through a political ecology lens. Finally, food literacy is (re)situated within the existing literature and discussed through a political ecology lens to introduce and justify the theoretical and conceptual framework that informs this study.

Examining Food Literacy Through a Food Regime Analysis

Food regime analysis is a theoretical approach that came about as a result of a series of “food crises” and drastic changes in agrifood systems that began in industrializing periods, notably during the Green Revolution in the early 1970s (Friedmann, 2012). It undertakes a global and historical analysis of agrifood systems, including periods of stability and transition. In their well-known analysis of 1989, international political economy scholars Harriet Friedmann and Philip McMichael insisted on analyzing “food regimes as the link between ‘international relations of

production and consumption of food’ and ‘periods of capitalist accumulation,’ which are also periods whose rules are set by a hegemonic power” (as cited in Friedmann, 2012 p. 21). This definition shows that globalizing agrifood systems² are controlled by the hegemonic power of the time, with the possibility of being states as well as corporations (Friedmann, 2012). To date, scholars have identified three food regimes. The first two food regimes were between 1870-1914 tied to British hegemony and from 1947-1973 under the United States hegemony and the third regime is the corporate controlled food regime in which we are currently situated. The second, industrializing food regime in particular led us to the third one, variously named corporate or neoliberal food regime, which persists until today but is increasingly criticized, as the following analysis will indicate. The current regime shows an increasing influence of corporate private dictated standards in the agrifood sector, a rise of supermarkets as dominant players (in dictating the products offered – i.e., promotion of “own brands” and “ready-made foods”) and subsequent control of standards (“quality”, environmental and health) by said supermarkets (Magnan, 2016).

² I am using “globalizing” rather than globalized, following Peter André, Michael Bosia, Jeffrey Ayres, and Marie-Josée Massicotte (2014) to highlight the fact that even though we are witnessing the expansion of the dominant agroindustrial, or corporate food regime across the globe, a wide diversity of agrifood systems persist. In fact, in numerous regions, other forms of agrifood systems are thriving and proposing interesting alternatives to the dominant model. The latter is usually based on large-scale, low labour but energy- and capital-intensive practices, relying on long distance transportation and high levels of transformation, requiring the preservation of foods and often more inputs, all of which contribute to unhealthy and unsustainable practices. Hence, I am also using agrifood systems in the plural form to make visible this diversity of existing but too often devalued alternative models.

Environmental degradation and social malpractice³ are just a few of the issues that have arisen out of these industrializing and neoliberal food regimes, which have in turn led to some questioning of the power structures and their practices. As unsustainable practices have been uncovered, “alternative” markets and certification systems have simultaneously been developed to identify more sustainable products (i.e., organic, fair trade, etc.) (Magnan, 2016). Additionally, as a result of corporate control, Friedmann highlights that citizens and “social movements have shifted their advocacy from public policy to corporations” (2012, p. 24). This often includes tactics of making the public aware of wrong-doings by corporations and shaming them (Friedmann, 2012) to get them to change their methods, whether through local food networks, knowledge sharing, creating public pressure, advocating for institutional change (Blay-Palmer, Sonnino, & Custot, 2015) or citizens “voting with their dollars” (Bloomfield, 2014), also known as political consumerism⁴ (Micheletti, 2003).

Therefore, food regime analysis is an analytical tool that aids in “exposing flaws” within agrifood systems, especially when analyzing periods of transition creating opportunities for changes. Friedmann asks two key questions that need to be kept in mind regarding agrifood systems change: “What is changing?” and “How does change happen?” (2012, p. 25).

³ Referring to socially unsustainable practices in food systems, for example, unsafe working conditions, exceptionally long working days, and more.

⁴ Political consumerism is consumers making political decisions when choosing a product based on its many implications. According to Micheletti “Consumption can in certain instances be a venue for political action. It offers people an inroad – venue – into policy making that otherwise may be rather closed to grassroots citizen participation” (2003, p. 12)

Further, food regimes analysis contributes to a better understanding of how agrifood systems have become highly destructive in regards to the environment and the ways in which food moves from seed to table. For example, 1) a heavy reliance on fertilizers, pesticides and fossil-fuel powered machinery, which are often used on 2) large scale farms using mono-cropping practices resulting in biodiversity loss, pest infestation, poor soil health, etc. and 3) growing for surplus profit rather than subsistence (Weis, 2012)⁵. Therefore, the transformation of food regimes have led to the expansion of the corporate, agroindustrial food system, which builds on neoliberal policies⁶ and McMichael's concept of a globalizing food regime which contributes to environmental degradation at multiple, if not all levels of said system.

A good understanding of the hegemonic powers in place during food regimes and the transition periods can help us to appreciate how global agrifood systems changed and have become environmentally destructive, as well as how individuals have been “deskilled” with a degradation of food literacy⁷. This is particularly useful in examining the second and third (current) food regimes to be able to interpret the realities of today's agrifood systems. Thus, by becoming literate about agrifood systems, we are “training ourselves to see the links among many diverse initiatives and individuals and organizations” and “we can discover deep changes underway in the food system” (Friedmann, 2012, p. 27).

⁵ See the sections below on agrifood systems and environmental degradation for more examples

⁶ For a good explanation of neoliberal policies as they relate to food regime analyses, see (McMichael, 2009).

⁷ This is related to a lack of food education opportunities available in the home and less value given to taking food-related classes in schools, as well as the fact that the latter are optional courses.

Nutrition, Culinary and Food Education Transitions

Throughout the second and third food regimes noted above and over the past six decades, North American food environments have seen a rather dramatic shift in which the types of foods available have changed along with the fundamental way in which people shop for food, and eat. Large supermarket and fast food restaurant chains have popped up in conjunction with the industrialization of agrifood systems⁸ and expansion in globalizing product sourcing and exporting (Winson, 2013 as cited in Desjardins & Azevedo, 2013). Moreover, these fundamental shifts in our food environments have also led to a nutrition transition consisting of shifts in composition of diets (Popkin, 1994), consumption of more processed and ultra-processed foods, low nutrient and energy-dense foods and sugar-sweetened beverages (Desjardins & Azevedo, 2013; Popkin, 2001; Slater, 2013).

In addition to the nutrition transition, “fundamental shifts in the patterns and kind of skills required to get food onto tables and down throats” have occurred, which Lang & Caraher (2001, p. 2) refer to as the “culinary transition”. Tim Lang & Martin Caraher’s (2001) main argument is that our cooking skills are changing whilst Desjardins & Azevedo (2013) agree and state that we are being “deskilled”. Further, the surge in production and availability of processed, ready to eat or reheatable foods on the market

⁸ A “chain of activities that begins with the production of food and moves on to include the processing, distribution, wholesaling, retailing, and consumption of food and, eventually, to the disposal of waste” (Kaufman, 2004 in Sumner, 2012, p. 326)

by large corporations no longer requires individuals to cook, or learn and know how to cook “from scratch”⁹ (Desjardins & Azevedo, 2013).

Along with the shifts seen with the second and third food regimes, much of the reasoning for these transitions can also be related back to the shifts seen in social roles with women increasingly working outside of the home. As such, they were no longer consistently available to prepare meals for their families, as well as to teach their children about cooking and pass that information along to the next generation (Colatruglio & Slater, 2014; Desjardins & Azevedo, 2013). This shift in roles was also heavily capitalized on by corporations in their marketing and product development (Winson, 2012). Consequently, individuals are relying more on these foods out of “convenience” as “speed has been the obsession of the modern world” (p. 41) creating a sort of “time scarcity” and perception of the idea that we do not have the time to cook, nor teach children and youth (Colatruglio & Slater, 2014). The combination of the lack of a designated individual for meal preparation and lack of knowledge transfer has contributed to a heavy reliance on re-heating (Desjardins & Azevedo, 2013). Also, a “devaluing” of the need to take home economics courses has also occurred simultaneously (Slater, 2013).

Additionally, according to the participants involved in their study, Ellen Desjardins & Elsie Azevedo highlight the most likely places to develop one’s food literacy is through “direct experiential learning through family and relatives, including

⁹ Cooking or preparing food with unprocessed or minimally-processed ingredients (Wikipedia as cited in (Desjardins & Azevedo, 2013)

grandparents”, “school” and “community cooking programs” (2013, p. 7). Further, although home economics and food-related classes have always been offered in the school curricula (Desjardins & Azevedo, 2013) in Ontario, they have never been mandatory. This is paradoxical considering that there are fewer opportunities to learn about food in the home *and* at school through a devaluation of these programs and sets of skills (Slater, 2013). This further maintains what I call a “food education transition” that indicates the growing need for food education in schools, where young Canadians can develop such essential life skills (Slater, 2013).

All of the above transitions are especially concerning to scholars (Langlois et al., 2009; Canadian Population Health Institute, 2005 as cited in Desjardins & Azevedo, 2013), primarily from a health perspective considering that frequently eating highly processed foods can be linked to diet-related chronic diseases, notably obesity, heart disease and type II diabetes. Other researchers also contend that food literacy can contribute to enhancing well-being (Block et al., 2011; Colatruglio & Slater, 2014; Palumbo, 2016). Overall, food literacy in regards to preparing and eating healthy and tasty foods, should be of critical concern for the health and well-being of Canadians presently and in the future. A lack of such systems thinking would most likely lead to policy development that does not address multiple systemic issues (“policy incoherence”), for example, how current agrifood systems are affecting health and dietary outcomes (Hawkes et al., 2013).

Moreover, these transitions have also contributed to perpetuating social inequities and environmental degradation in agrifood systems. Tim Lang, (2005) highlighted that dietitians’ recommendations are often based solely on the nutritional value of food intake,

and disregard the environmental implications of said recommendations on agrifood systems. As a result of this, many nutritional recommendations are environmentally unsustainable and unattainable in some food supply chains (i.e., recommendations to eat fish even though many fish stocks are depleting) (Lang, 2005, p. 733). This health focus and lack of ecological or agrifood systems thinking lens is especially problematic and concerning regarding environmental health and food production systems. Therefore, in concluding this section, the transitions highlighted above (nutrition, culinary and education) or shifts in food literacy have been problematic for the health and well-being of individuals and populations more generally. However, as highlighted by Lang (2005) and Hawkes and colleagues (2013), we also need to be thinking about the implications of these shifts on the environment and agrifood systems. In the following sections, some environmental issues pertaining to agrifood systems will be addressed.

Environmental Degradation and Agrifood Systems

Since the “dawn of agriculture” and “fixed settlements”, we have seen that humans have the capacity to alter and threaten the “geopolitical security” and “global ecological stability of biophysical systems and processes” (Rees & Wackernagel, 1996, p. 224). Also, while the planet’s population is growing, there is more and more stress put on the earth’s ability to support human beings’ demands for food and water (Hartikainen, Roininen, Katajajuuri, & Pulkkinen, 2014; Vanderheiden, 2008; Wapner, 2014), especially in regards to our food consumption habits and our current agrifood systems (Kissinger, 2013; Riebel, 2011; Tan, Tan, & Khoo, 2014).

Accordingly, a July 2015 report by the United Nations Department of Economic and Social Affairs indicated that the world's population has reached 7.3 billion and continues to grow (United Nations, Department of Economic and Social Affairs (UNDESA), 2015). The rate at which the population continues to grow is 1.18 percent per year, which projects the world's population to reach 9.7 billion by 2050 (with degrees of uncertainty taken into consideration) (UNDESA, 2015)). This persistent and rather large growth is therefore concerning for food production and consumption needs, in addition to waste management.

Many researchers are therefore concerned about the environmental implications that occur as a result of our food production systems (Bartl, Verones, & Hellweg, 2012; Riebel, 2011; Stavi & Lal, 2013; Stehfest et al., 2009; Vermeulen, Campbell, & Ingram, 2012), the carbon footprint of our food (Gössling, 2011; Hartikainen et al., 2014; Tan et al., 2014) ecological footprint of food (Kissinger, 2013), or our “foodprint” (Dooren & Bosschaert, 2013; Riebel, 2011) as well as life cycle analyses¹⁰ of food (Bartl et al., 2012; Stoessel, Juraske, Pfister, & Hellweg, 2012)

Sonja Vermeulen et al. (2012) highlight that even if there is more greenhouse gas (GHG) efficiency in food production, emissions from consumption will continue to grow, especially if patterns (related to types of foods consumed and discarded) do not change (p. 214). However, it would be apolitical to only mention environmental degradation as a result of growing populations and growing consumption needs (“eco-scarcities”) without

¹⁰ Life cycle analysis in this case refers to the various agricultural phases, which go from seed (re)production and improvement, to food waste and recycling and the repetitive aspect of such phases.

also mentioning the specific consumption patterns (i.e., meat consumption, see below) of some wealthier populations, notably in Western countries (Robbins, 2004).

There is a wide variety of food production methods today, all of which have their own advantages and disadvantages, whether social, economic or environmental. Nonetheless, certain production methods can be seen as more sustainable than others. For example, many people believe that purchasing local food is better than purchasing imported products. However, this is not always true since local production can promote unjust social practices with migrant workers and/or less environmentally sustainable methods for example (Yamashita & Robinson, 2016). On the other hand, purchasing local food can be seen as “better” due to the fact that it supports local economies (Topley, 2013) and requires less transportation (Kissinger, 2013). These contradictions and additional decision-making heuristics can be very confusing for consumers to grapple with when purchasing food, or unknown altogether.

Defining Sustainable Agrifood Systems¹¹

Considering that agrifood systems are rather complex, and due to their interconnectedness, it is essential to define them in a way that reflects their intricacies, which can be seen and reflected in the agrifood system definition by Lamine (2015). As defined in the introduction, agrifood systems refer to:

socio-technical systems composed of the main social actors and institutions involved in food production, transformation, distribution and consumption

¹¹ In this section “food systems” are being used interchangeably with “agrifood systems” as in the introduction, whilst allowing to define food systems as they are discussed in common discourse.

(farmers, intermediaries, processors, CSOs, agricultural institutions, public policies, etc.) and of the rules and modes of coordination which link them. They can be considered on a local scale (such as in the case of alternative food systems) or on a larger scale (Lamine, 2015, p. 56).

The increasingly global and complex agrifood systems¹², as well as corporate control, have brought many issues related to the sustainability of food systems into question (Sumner, 2012).

It is therefore beneficial to re-examine the concept of sustainability, what it refers to and sustainability in regards to agrifood systems. Sustainability is often defined based on the inclusion of three pillars – social, economic and ecological (Gibson, 2006). However, the three pillars are not always well integrated and they are often addressed separately, which is related to the fact that “professionals and experts” are not educated in an interdisciplinary fashion including promotion of knowledge acquisition of all three (Gibson, 2006). Consequently, when researchers highlight that practices could be “more sustainable”, they (Sumner, 2012; Yamashita & Robinson, 2016, etc) *often* refer to the fact that one or more of the three pillars could be better integrated. For example, to return to the practice of procuring and purchasing local foods, we may be supporting local farmers and economies, but the practices being used during production (environmental implications) and the treatment and remuneration of workers may be sub-par. Hence, in this thesis, my conception of integrated or comprehensive sustainability encompasses all

¹² Complex in this instance refers to the globalization of agrifood systems which has often involved distancing of consumers from food physically and mentally, and also used many environmentally (i.e., often involving fossil fuels, intensive farming practices, etc.), socially (i.e., unsafe working conditions) and economically (i.e., money in the hands of corporations rather than farmers) unsustainable practices (Sumner, 2012).

three pillars. In regards to sustainability through a pedagogical lens, sustainability described by David Orr (2002) is “a series of public choices that require effective institutions of governance and a well-informed, democratically engaged citizenry” (as cited in Carleton-Hug & Hug, 2010, p. 163). Thus, most importantly, there is a need for an informed and consequently “democratically engaged citizenry” to ensure collective efforts for sustainability in managing consumption and waste. This way of thinking can then be applied to the need to inform citizens through education and an enhanced level of comprehensive food literacy in the case of this thesis.

Returning to the idea of sustainable food, Jennifer Black and colleagues (2015) define environmentally sustainable food as the availability of foods “that are minimally processed, grown or sourced locally, seasonally and organically, include vegetarian options and create less waste from packaging” (p. 2380). Therefore, sustainable food, through this explanation, requires less inputs from production, processing, and packaging and reflects mostly the environmental pillar of sustainability.

In regards to sustainable food systems, Gail Feenstra (2002) highlights that they must “resonate with the civil commons: democratic participation, two-way communication, livable wages, food sovereignty, and... a community food system” (as cited in Sumner, 2012, p. 330). Furthermore, Feenstra (2002) describes the characteristics of a sustainable food system as follows:

They tend to be more decentralized, and invite the democratic participation of community residents in their food systems. They encourage more direct and authentic connections between all parties in the food system, particularly between farmers and those who enjoy the fruits of their labor – consumers or eaters. They attempt to recognize, respect, and more adequately compensate the laborer we often take for granted – farmworkers, food service workers, and laborers in food processing facilities, for example. And they tend to be place-based, drawing on

the unique attributes of particular bio-region and its population to define and support themselves (as cited in Sumner, 2012, p. 330).

A sustainable food system then “involves an interdependent web of activities that build the civil commons¹³ with respect to the production, processing, distribution, consumption and disposal of food” (Sumner, 2012, p. 330). Sumner also states that “to qualify as sustainable, the activities within a food system would have to contribute to co-operative human constructs that protect and/or enable universal access to the life-good of food” (2012, p. 330). There are many parallels that can be drawn from these definitions and the ideas within them regarding sustainability definitions as highlighted above by Orr, 2002 as cited in Carleton-Hug & Hug, 2010 (p. 163). In the definitions above, it is also evident that the three pillars of sustainability are taken into consideration in defining sustainable agrifood systems, without also forgetting the importance of the social aspect through democratic engagement of citizens in building strong decentralized food systems for the civil commons.

Agrifood Systems, the Environment and Sustainable Consumption Habits

As previously stated, food production (Tukker et al., 2006; 2011 as cited in Nemecek, Jungbluth, Canals, & Schenck, 2016) and agrifood systems in particular (Nemecek et al., 2016) have a rather significant impact on the environment. A current

¹³ The civil commons, defined as “society’s organized and community-funded capacity of universally accessible resources to provide for the life preservation and growth of society’s members and their environmental life-host. The civil commons is, in other words, what people ensure together as a society to protect and further life, as distinct from money aggregates (McMurtry, 1998 as cited in Sumner, 2012, p. 329)

primary example of concern is greenhouse gas (GHG) production (through land use change and production methods), which contributes to anthropogenic climate change (Vermeulen et al., 2012). In turn, anthropogenic climate change is also expected to have negative impacts on agricultural production (Altieri, Nicholls, Henao, & Lana, 2015; IPCC, 2014; Vermeulen et al., 2012). According to the Intergovernmental Panel on Climate Change (IPCC, 2014) climate change is expected to affect “all aspects of food security...including food production, access, use and price stability (*high confidence*)” (p. 69) with some impacts being positive (i.e., some areas will experience increases in crop yields with warming temperatures) and some negative (IPCC, 2014). This statement was made in “high confidence”, meaning that all of these issues are highly likely to be realized and are of serious concern. Moreover, even though impacts on crop yields in the beginning of the 21st century are expected to be small, it is expected that they will be increasingly and continuously worse after that (Adams et al., 1998 as cited in Altieri et al., 2015).

Therefore, seeing as “Climate change influences and is influenced by agricultural systems” (International Assessment of Agricultural Knowledge, Science and Technology for Development, IAASTD, 2009, p. 24) we can begin to address the methods of agricultural production that are seen as “less sustainable”. We can also address methods of best practice to limit emissions contributing to climate change and the residual impacts that will come full-circle to harm agricultural production in the long run. This is also relevant for any environmental impacts that are incurred as a result of agrifood systems. Maintaining a healthier environment with shorter value chains will ensure a healthier

environment for agrifood systems, societies and for further production (Frison & IPES-Food, 2016).

Furthermore, as climate change is of growing global concern, more and more researchers are focused on GHG emissions related to agrifood systems (Dooren & Bosschaert, 2013; Gössling, 2011; Hartikainen et al., 2014; Harvey & Pilgrim, 2011; Kissinger, 2013; Tan et al., 2014; etc.). Also, the ecological or carbon footprints related to food commodities can be rather large, based on a variety of different factors and elements. For example, although, transportation of food is negative for the carbon footprint of food (Riebel, 2011), some products are being shipped long distances for consumption, rather than eating products that are available locally (Kissinger, 2013). Kissinger highlighted that over the last decade, more than 80 percent of fruits and about 45 percent of vegetables were imported for Canadian consumption due to the fact that we no longer eat seasonally, but also because we import commodities that can also be acquired domestically (e.g., potatoes and apples) (2013, p. 366).

Moreover, heavy pesticide usage¹⁴ coupled with water runoff can lead to eutrophication¹⁵ of bodies of water (DeAngelo et al., in Stavi & Lal, 2013, p. 277) and

¹⁴ The United Nations Human Rights Council (UNHRC) recently called attention to the harmful effects of pesticides for not only environmental health and sustainability reasons, but also human health and human rights (2017, p. 4). This report also denounced the idea that pesticides are necessary in food production to support the world's rapidly growing population (p. 3) (UNHRC, 2017). Weis (2012) also denounces the idea of pesticide usage, which he calls *biophysical overrides*, that did not exist in the former *closed loop* system that would return outputs back to the land (through mixed crop-livestock farming and composting, etc.). Moreover, after years of pressure from the Global North and large transnational corporations, many peasant farmers in the Global South either conformed to the idea of "development" (through the industrialization of agriculture) or resisted and joined the international food sovereignty movement, La Vía Campesina (Desmarais, 2007). Much of this resistance arose out of strong beliefs against the use of genetically engineered crops and the intensive practices associated with them (Desmarais, 2007).

intensified production or mono-cropping can contribute to biodiversity loss of seed varieties and the acidification of soils (Bartl et al., 2012; Gössling, 2011). Meanwhile, water used in large amounts for crop irrigation can contribute to water stress issues depending on the place of production (Stoessel et al., 2012, p. 3256).

The above arguments show that certain practices in agrifood systems can be more harmful for the environment than others¹⁶. The scale wherein products are produced is another important factor to consider in regards to environmental impact. For example, industrialized farming requires a lot more energy (between 50-100 times more) than traditional agricultural systems (Lucas et al., 2007 as cited in Harvey & Pilgrim, 2011, p. 42) and often involves mono-cropping.

Consequently, more recently, sustainable alternatives in regards to GHG emissions have been promoted at the consumer level through carbon labelling. It has been said that carbon labels can help consumers to make more informed and sustainable choices (Gössling, 2011) as seen with carbon labelling beef versus vegetarian burgers in Sweden (see Van Gilder Cooke, 2012 as cited in Tan et al., 2014). Although carbon

¹⁵ Eutrophication refers to the excess of nutrients in a body of water which can be disruptive to ecosystems, often occurring as a result of runoff from land. An example in this case in particular could include pesticide runoff from agricultural production practices.

¹⁶ Beef production for human consumption, for example, is a rather intensive process that involves growing feed for animals, transporting the feed, enteric methane fermentation¹⁶, waste produced by animals, slaughter and transportation of meat products (Beauchemin, Henry Janzen, Little, McAllister, & McGinn, 2010). These processes can change depending on the location of production and be more or less intensive in regards to GHG production due to deforestation for pasture lands (Bryngelsson, Wirsenius, Hedenus, & Sonesson, 2016, p. 162). Also, it is worth noting that methane has a greenhouse effect that is 20 times more powerful than carbon dioxide (CO₂) (IPCC, 2007 in Harvey & Pilgrim, 2011), especially considering the methane emissions resulting from beef production. Interestingly enough, Bryngelsson et al. (2016) argue that if the European Union wishes to meet their climate targets, it will be essential for Europeans to change their dietary habits and to reduce consumption of meat and dairy products.

labelling has its drawbacks – since it focuses only on one GHG and neglects many other adverse ones (like methane) – the principle behind the concept of consumer awareness through labelling is of growing interest (Tan et al., 2014). This is especially interesting in regards to point of purchase food literacy (in both grocery stores and restaurants).

Franziska Stoessel and colleagues (2012) state that to be more sustainable, consumption habits should seek to avoid eating out of season either through imported fruits and vegetables, or foods that are grown in (fossil fuel heated) greenhouses using a significant amount of fossil fuels in production and/or transport. Contrarily, if greenhouses are heated with non-fossil energy or “waste heat” (i.e., from waste incineration or geothermal heat) they may be a more viable option for local production of non-seasonal products (Stoessel et al., 2012). Storage of seasonal products over the off-production seasons helps to avoid both of the aforementioned challenges associated with non-seasonal procurement and consumption (at the personal and institutional levels). Food processing¹⁷ has also been identified as intensive with each step often requiring the use of energy or gasoline in particular, as well as packaging, which then becomes waste (Riebel, 2011).

To continue on the note of waste, wasting food has rather large implications for the environment due to the squandering of resources, especially in regards to energy used for the production of said wasted products. Energy is required for 1) production, processing and distribution of food products to get food to consumers; 2) transportation

¹⁷ Food processing is “the work of cooking and assembling the food; adding coloring, additives and preservatives; putting it into boxes, bottles or cans; and shipping it from one plant to another” (Riebel, 2011, p. 55).

to haul food waste to a waste management facility; and 3) conversion of food waste into another product (Abdulla, Martin, Gooch, & Jovel, 2013, p. 145). Thus, wasting food involves wasting quite a bit of energy. Food waste in Canada has been reported as considerably high, as noted by Statistics Canada (2010), where an estimate of approximately 40% of food that is produced, processed and distributed in Canada is wasted annually (as cited in Gooch, Felfel, & Marenick, 2010, p. 2). Furthermore, approximately 51% of the overall food waste generated in Canada is at the consumer level (as cited in Gooch et al., 2010, p. 5). These developments have led to food waste at the household level being an issue of high importance in the 2013 Conference Board of Canada's report on food literacy (Brichta & Howard, 2013), considering that mitigation of this waste could greatly help to reduce food waste and the energy that is required to deal with it (Abdulla et al., 2013).

All of the above arguments highlight that agrifood systems practices and subsequent dietary choices and food procurement, consumption and waste can have significant environmental implications. Edgar Hertwich (2005) argues that "food represents an exceptional opportunity for consumers to reduce their personal impacts, as well as the possibility to make 'day-to-day' choices and exercise a high degree of personal choice" (as cited in Hartikainen et al., 2014, p. 285). Even the International

Panel of Experts on Sustainable Food Systems, highlights sustainable diets as one of the key benchmarks for sustainable food systems in the future (Frison & IPES-Food, 2016).¹⁸

That being said, it would be unfair and apolitical to put all of the onus on individuals for food choices, as these decisions are often made in a particular socio-historical and cultural context, and in relation to the systems available to them (Kimura, 2011). Individuals may not always have the capacity to make “responsible” food choices as a result of socio-economic constraints, for example (Caraher, 2016). They may have access to limited, contradictory, incomplete, and biased information, as in the case of some food advertising targeting specific audiences and seeking to “sell” them the delight of sweet beverages or fast food or other products. Consequently, the power of institutional procurement – that is, for example, the provisioning of food for large institutions such as hospitals and universities – through public demand as a driver for agrifood systems amelioration and change has been highlighted by Kevin Morgan & Roberta Sonnino (2008) and others. The above arguments also raise to the forefront the idea that food literacy, at an advanced level¹⁹, can play a significant role in regards to

¹⁸ Sustainable diets are “characterized by “low environmental impacts which contribute to food and nutrition security and to healthy life for present and future generations”, and must be “protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy; while optimizing natural and human resources” (FAO, 2010 as cited in Frison & IPES-Food, 2016, p. 13)

¹⁹ An advanced level of food literacy can include critical interactions with an *understanding of* the social (Renwick, 2013 as cited in Fordyce-Voorham, 2015) and more broadly the external environment, or wider context, shaping agrifood systems (food production, transformation, etc.) and nutritional health. When attaining this advanced level, people would generally recognize the need, or call for some personal, familial, and community changes to enhance *the sustainability of agrifood systems locally and globally, food security and* nutritional health (Slater, 2013). In other words, they would also be able to “examine one’s own values with respect to food systems,” “grapple with multiple values and perspectives that underlie food systems,” “understand the larger socio-political contexts and factors that shape food

institutional and individual food choices and their environmental, social, economic and political implications. In the following sections I will examine the concept of food literacy as well its potential to empower citizens for agrifood systems change at both the individual and institutional levels, through exposing history and flaws, hidden power structures and prevailing discourses.

Food Literacy in the Literature

Food literacy has become a hot topic in recent years with many researchers exploring what this incredibly complex concept entails, and a common definition of it continues to be contested (Block et al., 2011; Brichta & Howard, 2013; Brooks & Begley, 2013; Colatruglio & Slater, 2014; Cullen, Hatch, Martin, Higgins, & Sheppard, 2015; Cullerton, Vidgen, & Gallegos, 2012; Desjardins & Azevedo, 2013; Fordyce-Voorham, 2015; Kimura, 2011; Palumbo, 2016; Ronto, Ball, Pendergast, & Harris, 2016; Sandell et al., 2016; Slater, 2013; Sumner, 2013; Thomas & Irwin, 2011; Topley, 2013; Vaitkeviciute, 2015; Vidgen & Gallegos, 2012; Vidgen & Gallegos, 2014; Vidgen, 2016; Yamashita & Robinson, 2016). That being said, however, Sarah Colatruglio & Joyce Slater (2016) highlight that “the concept of food literacy has emerged as a framework to connect food related knowledge, skills and capacity” (as cited in Ronto et al., 2016, p. 550).

systems,” and “take action toward social justice in food systems and sustainability more broadly” (Yamashita & Robinson, 2016) (p. 5) *in the future*. Also including an ability and the confidence to cook tasty, complex and nutritional meals for themselves and their family (Desjardins & Azevedo, 2013) whilst having a positive relationship with food. *We will expand on these issues in Chapter 3, p.54.*

According to Rocco Palumbo (2016), the concept was probably first introduced in the early 1990s by Jeanne Jones (1994) to indicate the ability to follow a healthy diet (p. 101). The term was later connected to the concept of health literacy²⁰ by Kathryn Kolasa et al. (2001) indicating the ability of an individual to act on acquired knowledge to promote good health (as cited in Palumbo, 2016). The connection between these two concepts, and the development of food literacy from health literacy, has since been made by several other scholars (Block et al., 2011; Brichta & Howard, 2013; Cullen et al., 2015; Desjardins & Azevedo, 2013; Kimura, 2011; Topley, 2013; Vidgen, 2016). Hence the influence of the health literacy perspective on shaping the definition and use of food literacy as consisting of the “functional skills (including literacy and numeracy) as well as social and critical abilities which are needed to select and prepare food” (Palumbo, 2016, p. 101). Building on that, Lina Yamashita & Diana Robinson (2016) refer to food literacy as “the ability of individuals to understand the origins of production of food, apply nutritional knowledge to food choices and to grow and prepare food” (a combination of definitions by Cullen et al., 2015; Goldstein, 2014; Vidgen & Gallegos, 2014 as cited in Yamashita & Robinson, 2016, p. 272).

Other scholars have more recently put an emphasis on discussing critical food literacy (Yamashita & Robinson, 2016; Winslow, 2012), which has more of an agrifood systems than a health emphasis. Nonetheless, these debates seem to be happening in silos

²⁰ “Health literacy represents the cognitive and social skills which determine the motivation and ability of individuals to gain access to, understand and use information in ways which promote and maintain good health.” (Nutbeam, 1998, p. 357)

(not in an interdisciplinary fashion), as if these concepts are different, rather than integrating them both at all levels of food literacy.

In regards to the studies that have been conducted to date on the topic, there have been many systematic reviews examining definitions (Cullen et al., 2015) and the concept itself (Colatruglio & Slater, 2014; Palumbo, 2016). Other studies examine interventions (i.e., food education programs) (Brooks & Begley, 2013; Cullerton et al., 2012; Korzun & Webb, 2014) and some explore the idea of measuring food literacy (Fordyce-Voorham, 2015; Ronto et al., 2016). Two very notable studies known for their initial empirical research and public consultation in exploring the concept of food literacy and defining it were completed by Helen Vidgen & Danielle Gallegos (2012) and Desjardins & Azevedo (2013). Colatruglio & Slater (2014) examined food literacy through a systematic review and analyzed how food literacy, food and nutrition have an impact on well-being, while Palumbo (2016) also explored food literacy through a systematic review in regards to a more comprehensive well-being. Also, several studies have analyzed fruit and vegetable consumption among children and youth for health promotion purposes (Horne et al., 2004; Thomas & Irwin, 2011; Whiteley & Matwiejczyk, 2015, etc.). Other studies have created intervention programs and attempted to measure food literacy levels of adolescents in schools (Fordyce-Voorham, 2015) although these types of studies are still very limited.

Studies pertaining to the evaluation of food-related courses and intervention programs available in schools as well as teacher and administrative support and perceptions of said programs have also been completed. Noteworthy examples have been in Manitoba, Canada (Slater, 2013; Slater & Hinds, 2014) and beyond (Australia) (Ronto

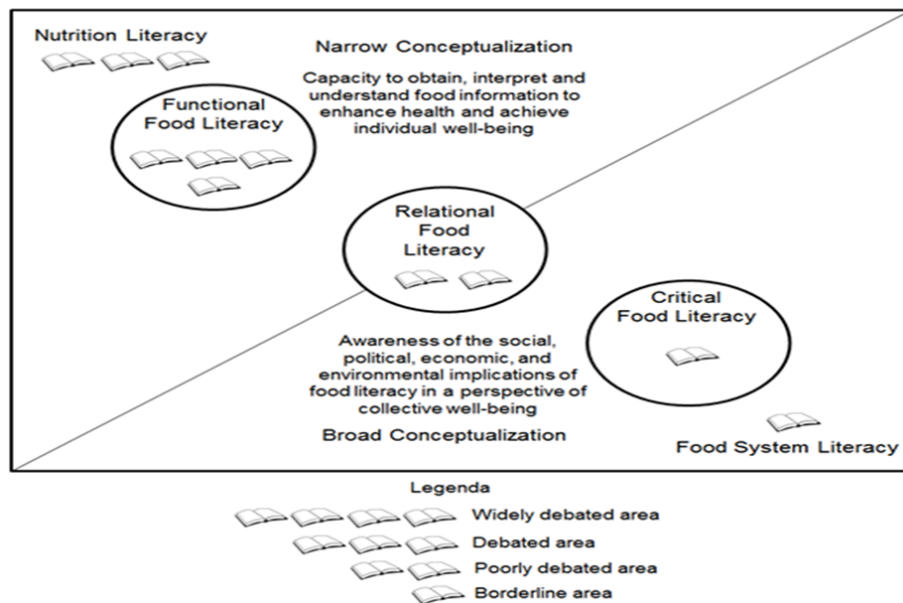
et al., 2016). Moreover, as concerns about population health and dietary intake are rising, school food and nutrition policies have been recently introduced across the country. Few provinces or territories have evaluated the impacts of these policies, however, when evaluations are completed they are primarily in regards to dietary intake and their impact on health (Fung, McIssac, Kuhle, Kirk, & Veugelers, 2013; McKenna, 2010; Mullally et al., 2010). Also worth noting, to date, most academic studies researching food-related knowledge of children in schools (Allen & Guthman, 2006; Izumi, Rostant, Moss, & Hamm, 2006; Nowak, Kolouch, Schneyer, & Roberts, 2012; Vallianatos, Gottlieb, & Haase, 2004) or of the general public (Brichta & Howard, 2013; Desjardins & Azevedo, 2013; Nesbitt et al., 2008) focus on health and well-being issues.

One of the main issues of the aforementioned studies is that they tend to lack a holistic agrifood systems lens and they are often only or very health focused, neglecting the ecological aspects which are crucial to agrifood systems thinking (Palumbo, 2016). A summary of the main focuses of the different studies examining the conceptualization of food literacy (narrow or broad; see next section for further explanation) can be seen as is illustrated in Figure 1, created by Palumbo (2016) in his systematic review of the literature on the subject.

As Figure 1 demonstrates, the study of *critical* food literacy has been emerging following “other food literacies” (i.e., relational food literacy and food system literacy) to demonstrate if or how individuals can be critical of the agrifood systems around them and in their food choices (Winslow, 2012; Yamashita & Robinson, 2016). Critical food literacy starts from the assumption that people may be able to question and challenge societal norms and “read the world” through their eating habits (Sumner, 2013). That

being said, however, it seems as though critical food literacy is looked at as an auxiliary concept to food literacy, rather than an integral part of the overall concept and that consequently scholars are working in silos. This highlights the critique raised by Lang (2005) again, that agrifood systems are often forgotten when analyzing nutritional recommendations and in the work done by health professionals.

Figure 1: Debated Area in the Field of “Food Literacy” (Palumbo, 2016, p. 104)



Widener & Karides (2014) have highlighted a lack of “food system literacy²¹”, which they noted from their study in South Florida, while the Conference Board of Canada (Brichta & Howard, 2013) highlighted that Canadian’s food literacy is lacking from this perspective. Echoed further by Palumbo (2016) “a narrow interpretation of food

²¹ Although Widener & Karides (2014) use food system literacy in the non-plural format, I am using it in the plural format of agrifood systems literacy, to add emphasis to the multiplicity and complexities of said systems

literacy is still prevailing” (p. 104) while Vaitkeviciute, Ball and Harris (2015) also highlight that studies that have investigated “all aspects” of food literacy (nutrition and health and agrifood systems elements) are lacking. This lack of a comprehensive conceptualization of food literacy is problematic when analyzing the various problems related to the globalizing agrifood system and the urgency for innovation and changes that many scholars, activists, other researchers and experts have identified (Palumbo, 2016). I will now provide a definition of food literacy, as presented by other scholars to be able to understand what I mean by a comprehensive understanding of this concept.

Defining Food Literacy

Over the past fifteen years, countless definitions of food literacy have been debated, with a plethora coming from academics who are attempting to grapple with, develop and operationalize the concept. Researchers’ backgrounds and areas of expertise generally influence the definitions they are proposing, which tends to favour certain elements over others. That being said and in considering that “food literacy is depicted as a crucial determinant of health improvement, environmental sustainability and social equity” (Palumbo, 2016, p. 104), it is crucial to think carefully and critically about how we define and explain it. For the sake of space, this thesis will only present one definition here, however other prominently used definitions in the field can be found in a summary table in the Appendix B (Table 13).

Tracy Cullen and colleagues have highlighted that most food literacy definitions have not incorporated social, ecological and agrifood systems aspects (2015, p. 141 & 163), which can be an issue if one considers—as this thesis is seeking to argue—that food literacy itself must also be agrifood systems oriented. This is important in order to see

more of the connections between health and well-being *and* agrifood systems issues. It is also essential to achieve policy coherence (Hawkes et al., 2013). These authors have noticed much inconsistency in certain uses of the concept of food literacy (Cullen et al., 2015, p. 141), which can also be problematic for nurturing a good understanding among the general public. The definition below incorporates elements of community food security²², the importance of achieving food literacy for personal health, and for the common good, by promoting the implementation and maintenance of sustainable agrifood systems. I will adopt this definition for the purpose of this thesis as it highlights the significance of both food skills and practices, and engagement in a “complex food system”. However, I have rephrased it slightly, as to remove the emphasis from the individual and situate it more among the collective, in line with the work of Cullen and colleagues:

Food literacy [consists of the knowledge that gives us] the ability... to understand food in a way that [we may] develop a positive relationship with it, including food skills and practices across the lifespan in order to navigate, engage, and participate within... complex food system[s]. It's the ability to make decisions to support the achievement of personal health and... sustainable food system[s] considering environmental, social, economic, cultural and political components (2015, p. 143).

Another key element of this definition is the consideration that food literacy is something that continues to develop over an individual's lifespan. This highlights that knowledge is constantly in flux and can be enhanced.

²² Community food security, as defined by Hamm and Bellows (2003) is “a situation in which all community residents obtain a safe, culturally acceptable, nutritionally adequate diet through a sustainable food system that maximizes community self-reliance and social justice” (as cited in Cullen, Hatch, Martin, Higgins, & Sheppard, 2015, p. 140).

From my perspective then, food literacy should be defined and looked at comprehensively to encourage the development of an advanced, comprehensive and critical level of food literacy amongst citizens, as described by Yamashita & Robinson (2016). This is important so that citizens can “engage” in and contribute to building the food system that they desire, based on informed reflection, with an appropriate level of knowledge and tools to be able to select among a variety of options in “complex food system[s]”. At this point in time, it is of value to show how this concept can be considered through a political ecology lens, regarding the ideas of being aware of issues within systems and showing resistance against them.

Exposing the Flaws of Dominant Agrifood Systems Through a Political Ecology Lens

The field of political ecology aims to “expose flaws” related to the environmental practices of capitalism and neoliberalism from the perspective of local and vulnerable peoples, while also analyzing the way that people deal with change and utilize local and traditional knowledges relating to ecological processes (Robbins, 2004, p. 12-13). Paul Robbins explains that political ecology is “something that people *do*” because it is a “research effort to expose the forces at work in ecological struggle and document livelihood alternatives in the face of change” (2004, p. 13). According to Michael Watts (2000), political ecology advocates also have the goals of emphasizing broadening ones “knowledge” in turn giving them “power” which can then be put into “practice” to address issues related to “politics, justice and governance” (as cited in Robbins, 2004). Further, Watts (2000) defines political ecology as a way “to understand the complex relations between nature and society through a careful analysis of what one might call the forms of access and control over resources and their implications for environmental

health and sustainable livelihoods” (as cited in Robbins, 2004). Thus, these ideas of “knowledge, power and practice” are of particular interest in my thesis to examine how knowledge can empower individuals and communities to promote certain sociopolitical changes. This particular study will therefore evaluate the level of food literacy among high school students as it may represent a key avenue for acquiring knowledge, that could in turn be mobilized to inform Canadian agrifood policies, and more specifically, food-related curriculum for high school students, towards healthier and more sustainable food practices.

In his book *Political Ecology: A Critical Introduction*, Robbins (2004) discusses these connections to different theorists and their work, such as Karl Marx’s work on capitalism, Antonio Gramsci on hegemony, James Scott on “everyday forms of resistance”, and Michel Foucault on discipline and the power of discourses. In tying these concepts together, Robbins (2004) demonstrates that one can expose the flaws or hierarchies of the dominant practices within society and act upon them for sustainable change. Indeed, a political ecology lens allows us to see knowledge as power, which can translate into practices in everyday lives. I will now explain these concepts, as described by Robbins (2004), to later connect them to the definition of food literacy used in this thesis.

As seen with Food Regime analysis, capitalism is based on the exploitation of labour and nature for surplus and financial gain, which has contributed to environmental degradation. For example, mega grain companies that are vertically integrated in the economy are the main beneficiaries, whilst encouraging grain farmers to produce on a large-scale that requires external inputs (chemical fertilizers, machinery) (Weis, 2012),

which are often also under the control of a few transnational grain companies (Clapp, 2017). This exploitation and dependence, according to Robbins, leads to questioning relations of power or hegemony, and the loss of autonomy for agricultural producers.

Although capitalism helps to understand the exploitation of nature and labour, by itself it does not explain the “role of the daily life of producers” (Robbins, 2004, p. 52). Resistance to powerful corporations with unsustainable practices, as well as the tactics for said resistance are of interest to many (see for example Andrée, Bosia, Ayres, & Massicotte, 2014; Friedmann, 2012).

Focusing on the role of everyday resistance rather than large-scale uprisings, James Scott insists on the importance of quotidian actions that have political implications and influence change (Robbins, 2004). In his book *Weapons of the Weak*, Scott highlights that everyday resistance includes not only physical resistance, but also the ways in which individuals think and talk about their situation, implying solidarity and organization. By making visible and analyzing these discussions, thoughts and “secret histories”, we can not only better understand the ways in which political and environmental changes happened, but also the ways to enable other people in other places to analyze their own struggles, labour and relationship to power (Robbins, 2004).

In the case of food literacy, everyday resistance can be enabled through understanding power structures in the food system, talking about them, and acting on them (through purchasing behaviour and other advocacy). That being said, the knowledge that arises from dominant discourse is very important, and the truths that are formed then play a vital role in how society will act on them.

Consequently, Robbins also introduces the work of Foucault, arguing that his perspective “is one in which forms of knowledge can be explained by virtue of their relationship to establishing or subverting systems of power” (2004, p. 65). According to Foucault, “truth is an effect of power”; “truths” are shaped through discourses consisting of language, stories, images and terminology (Robbins, 2004, p. 65-66). These discourses are further shaped and supported by social systems or institutions such as medicine, prisons or schools which give them credibility or “truth” (Robbins, 2004).

Taking this further, we could argue that hegemonic powers – specific to a food regime, or in a time of transition – play a role in shaping the “truths” of each country’s, community’s or individual’s food literacy. If this is accurate, we could then assume that individuals (or communities, etc.) who have a basic level of food literacy are unable to unearth or “excavate” the hegemonic discourses. Poststructural and postcolonial studies examine how “deconstruction” is possible through questioning dominant truth claims. However, to deconstruct these truths, an individual must be able to perform Foucault’s “archaeology” of underlying power structures. This “archaeology” involves investigating the history of “truths” and analyzing their connection to hegemonic powers. Foucault stated that “Truth is a thing of this world: it is produced only by virtue of multiple forms of constraint. And it induces regular effects of power. Each society has its regime of truth, its general politics of truth, that is, the types of discourse that it accepts and makes function as true” (Foucault 1980 as cited in Robbins, 2004, p. 66).

Food Literacy and Political Ecology

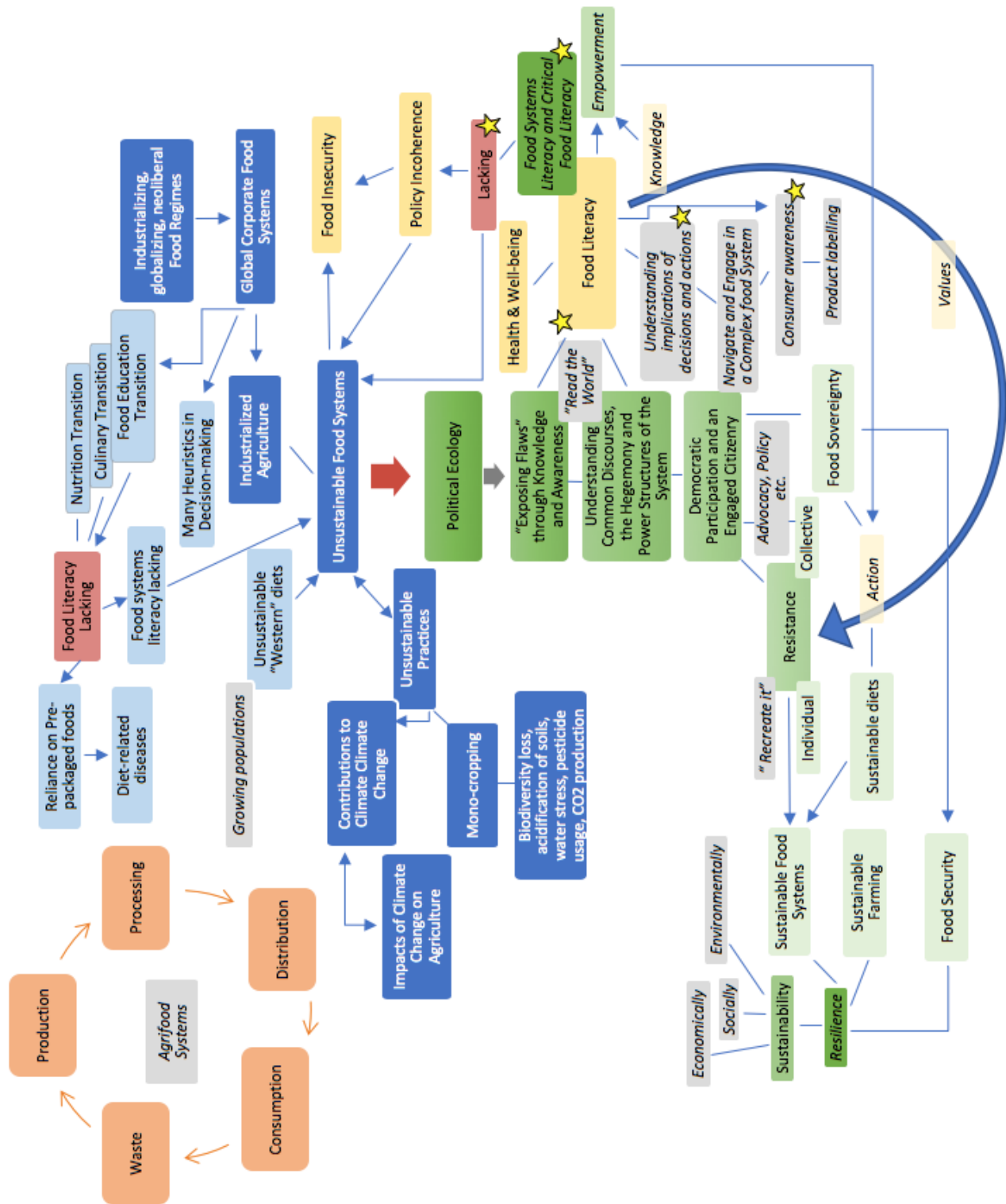
From a political ecology approach, and starting from the idea that a comprehensive level of food literacy includes agrifood systems awareness and acting on

this knowledge, then individuals with an advanced level of food literacy should be able to “expose flaws”, gain power through their knowledge, and act with this knowledge as power in their everyday practices. This becomes in itself a mode of resistance, through selecting and buying food, and eating habits, if and when they have the capacity to choose. Food literacy, especially advanced/critical food literacy, like political ecology, can therefore be a tool for understanding latent global environmental issues and their connectedness to agrifood systems in this case in particular. Furthermore, if knowledge and understanding are tools for action empowering individuals and groups, then an advanced level of food literacy is a step towards everyday forms of resistance, promoting greater environmental justice and sustainability.

(Re)situating Food Literacy in the Literature

For the purpose of this thesis therefore, and considering existing definitions and gaps in the food literacy literature, I am proposing a more comprehensive definition of the concept, which I have illustrated in Figure 2, to help visualize its potential to acknowledge and assess the multiple dimensions of agrifood systems literacy. This innovative way of envisioning this concept incorporates the main elements previously identified. Furthermore, it has the advantage of pointing towards ways of enacting changes that are informed by a political ecology perspective. This entails regarding issues more systematically, from a broader or macro perspective, which allows us to expose the root causes of the problems associated with the unsustainable corporate/neoliberal agrifood regime that are being experienced on a daily basis at a more micro level.

Figure 2: Mapping the Multiple Components of Food Literacy and their Relationships



To review, from the beginning, the neoliberal or agroindustrial food regime is expanding across the world under the leadership of corporate powers and is sustained by powerful state forces. This food regime has transformed the diets of numerous households and participated in what have been identified as the “nutrition” (Desjardins & Azevedo, 2013), “culinary” (Lang & Caraher, 2001) and “education” transitions. This globalizing agrifood regime is tied to large scale, export-oriented, industrialized agriculture and the many unsustainable practices related to this model of production. Furthermore, as outlined in Figure 2 below, the unsustainable environmental, social and economic nature of these practices and agrifood systems is now giving rise to a growing awareness among citizens of the problems they create, and in turn, growing resistance and desire to organize and promote alternatives, based on sustainable agrifood practices. This schematic model proposes a political ecology framework for the study of food literacy, based on an understanding of knowledge as an empowering tool. This tool can lead to sustainable agrifood systems, especially if and when they are valued and sought by populations, governments and other state actors.

Hence, beyond empowerment for personal health and well-being, I argue that food literacy can also enable democratic participation by engaged citizens who demand more sustainable agrifood systems. It is therefore another key reason to carefully study food literacy. Returning to the research objectives of the literature review in this thesis, I have aimed to highlight the potential for an advanced level of food literacy among citizens as a way to enact change within agrifood systems and to subsequently resituate it within the literature (see Figure 2 below). However, considering the scope of the fieldwork of this master’s thesis, only the elements marked with yellow stars in Figure 2

have been explored in order to get a better sense of the actual level of food literacy—especially as it relates to environmental issues and a more comprehensive agrifood systems awareness – among high school students in Ontario.

Key Questions and Context of the Study

The “What’s to eat?: Improving food literacy in Canada” report released by the Conference Board of Canada in 2013 highlights that Canadians’ food literacy is generally good but lacking in terms of agrifood systems thinking. This key finding from the Conference Board of Canada report has led to me questioning how food literacy is discussed or situated within the literature, its scope, and the elements that are considered in studying this concept. Another concern highlighted in the report is that the percentage (not specified) of children and adolescents involved in family meal preparation is low (Brichta & Howard, 2013). Additionally, Slater (2013) argued that food skills are not being transferred in the household as much as they were in the past. This is especially concerning since the home is one of the main places for children and youth to learn about food and food preparation (Desjardins & Azevedo, 2013). One of the next best or most common places for enhancing food literacy levels is in the formal education system (Desjardins & Azevedo, 2013), thus making it a valid location to evaluate food-related education programs, especially when there is a lack of evaluations of said programs (Korzun & Webb, 2014). Moreover, high school students are the subjects of interest for this study since high school education can provide an opportunity to enhance adolescents’ food literacy levels, with the potential to influence dietary choices, long-term health outcomes (Ronto et al., 2016) and the overall sustainability of agrifood systems in a society. Adolescents are also soon-to-be independent citizens who will work, consume and make food-related choices on a daily basis, and engage in Canadian society, hopefully in a responsible and meaningful way.

These concerns are also echoed by the Ontario Ministry of Education in their “Policy Framework for Environmental Education in Schools” released in 2009 and citing from their own 2007 report:

Schools have a vital role to play in preparing our young people to take their place as informed, engaged, and empowered citizens who will be pivotal in shaping the future of our communities, our province, our country, and our global environment (as cited in Ontario Ministry of Education, 2009a, p. 2).

Ontario’s education system will prepare students with the knowledge, skills, perspectives, and practices that they need to be environmentally responsible citizens. Students will understand our fundamental connections to each other and the world around us through our relationship to food, water, energy, air, and land, and our interaction with all living things. The education system will provide opportunities within the classroom and the community for students to engage in actions that deepen this understanding (as cited in Ontario Ministry of Education, 2009a, p. 6).

Although these statements do not call directly for improved food literacy, they recognize the importance of training responsible and engaged citizens, as well as fostering “connections to... the world around us through our relationship to food”, and that “The future of environmental solutions ultimately rests with students” (Ontario Ministry of Education, 2009a, p. 7). Thus, they explicitly refer to food as a domain of interest to build relationships between citizens and the world around them.

Furthermore, in 2013, the Ontario Provincial Government addressed the lack of food literacy more explicitly when it released the Local Food Act (Bill 36). This document focused on improving food literacy as well as emphasized a need to build more resilience in local food systems. One of the stated “goals and targets” of the Act was “improving food literacy in respect of local food” (Government of Ontario, 2013, p. 3). Therefore, the Ontario government is beginning to explicitly address the need and calls for more food-related education and food literacy. Considering this growing interest

among academics and in governmental institutions for supporting food literacy and engaged citizens, this is a timely moment justifying the key concerns and objectives of this research.

As introduced earlier (p. 3), the research questions of this thesis are:

- *How is food literacy situated within the literature and what elements are currently being evaluated and considered as key to this concept?*
- *To what degree are Ontario High School Students' food literacy levels developed in general and enhanced by food-related education programs, particularly in regards to agrifood systems?*

Further, some secondary questions that will aid in answering the above questions are the following:

- *To what extent do current food-related courses provide Ontario high school students with the required knowledge and capacities to make informed choices in regards to both health and well-being and sustainable agrifood systems?*
- *How are Ontario High School Students' levels of food literacy impacted by food-related courses?*
- *Is there a differentiated impact between those who have taken a course based in the Family Studies (FS) curriculum in comparison with those who took a course from the Technological Education (TE) curriculum?*
- *How does the community location (rural vs urban) impact students' agrifood systems literacy levels?*

Consistent with the study released by the Conference Board of Canada (Brichta & Howard, 2013) my first hypothesis is that Ontario high school students who have taken a food-related class are more likely to have a higher level of food literacy than those who have not. However, their agrifood systems literacy levels may remain low. The second hypothesis assumes that students from the courses based on the TE curriculum, which is more practically based than theoretical, will have obtained more hands-on skills than students from FS curriculum based courses. By contrast, it is uncertain whether or not there is a difference in program outcome in regards to agrifood systems knowledge.

Finally, high school students from a rural community are more likely to be agrifood systems literate than students from an urban environment considering the proximity of farming and food production of the former.

Chapter 3: Conceptual Framework and Food Literacy Levels Analytical Tools

The first two chapters have shown the centrality of agrifood systems in daily life for the well-being of societies and the environment, as well as the benefits of adopting a more holistic approach to improve the level of food literacy of populations. I will now further discuss and critique the differing elements of this concept, as well as present a conceptual map to help to visualize a more comprehensive food literacy combining the different elements and layers.

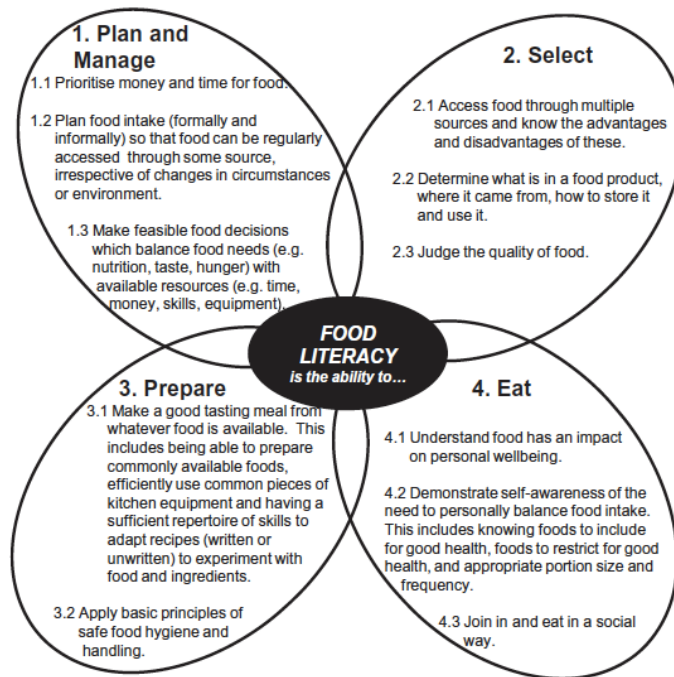
Re-Evaluating the Key Elements of Food Literacy

Food literacy is a compounded concept including multiple forms of knowledge such as “kitchen literacy”, “health literacy”, “nutrition literacy”, “garden literacy”, “agrifood systems literacy”, or “ecological literacy”. As previously stated, some scholars emphasize issues related to their area of expertise rather than looking at the overarching idea. For example, dietitians and health experts tend to focus more on the health aspects, including nutritional knowledge and food skills (Fordyce-Voorham, 2015; Murimi, 2013; Pendergast, Garvis, & Kanasa, 2011; Thomas & Irwin, 2011; Vidgen, 2016; Vidgen & Gallegos, 2012; Vidgen & Gallegos, 2014). In recent years nonetheless, other researchers and specialists have adopted a more holistic approach that also includes agrifood systems oriented aspects (Cullen et al., 2015; Palumbo, 2016; Ronto et al., 2016; Sumner, 2013; Yamashita, 2008).

Vidgen & Gallegos have been discussing the main components of food literacy since 2012. They have recently highlighted what they identified as the main components

of food literacy, which are: planning and managing, selecting, preparing, and eating (2014, p. 55). Other scholars agree with these four components, in addition to their seven auxiliary components presented in Figure 3, (Brooks & Begley, 2013; Colatruglio & Slater, 2014; Fordyce-Voorham, 2015). Although these elements are key to the functionality of an individual’s food literacy, Vidgen (2016) and Vidgen & Gallegos (2014) seem to have explicitly neglected agrifood systems elements in this framework. In critiquing this approach, there could be a more explicit emphasis about agrifood systems awareness in the “select” section of this framework, and an additional step pertaining to “waste” could also be added.

Figure 3: The Eleven Components (Sub-Components to the Main 4) of Food Literacy Derived from Expert and Young People Studies (Vidgen & Gallegos, 2014, p. 55)



Even though Vidgen (2016) recognized that “Australian food experts” identified the components above, some also pinpointed some agrifood systems elements (e.g., food

origin, organic, etc.), however they were not included in the framework in Figure 3 since they were not considered the *most* important elements. Thus, I am arguing that agrifood systems elements should be considered as of equal importance considering their impacts on agrifood systems at the meso and micro levels (i.e., price volatility, food security, etc.). Moreover, a lack of identification of these topics as of *high* importance to one's food literacy by "Australian food experts" does not necessarily mean they undervalue these elements, it moreover could highlight a lack of knowledge of the connections between these issues.

Colatruglio and Slater (2014), who agree with the above framework, also state that food literacy as a concept "extends beyond nutritional recommendations and cookery lessons, to fostering important and vital connections between food, people, health and the environment both theoretically and practically" (p. 36). Lauren Block and colleagues (2011), in their food well-being concept also state that food literacy goes beyond functionality to incorporate the practical and the theoretical knowledges leading to action. They state that food literacy has three main components, being 1) "conceptual or declarative knowledge" (i.e., knowledge of food sources, nutrition), 2) "procedural knowledge" (applying the latter, i.e., how to shop for, prepare, and sauté fresh broccoli) and the 3) "ability, opportunity and motivation to apply or use that knowledge" (Block et al., 2011, p. 7; see Table 12 in Appendix B for further explanation).

The inclusion of the concept of capacity or "ability, opportunity and motivation to apply or use" food literacy is especially important as it aligns with the critique originally brought up by Aya Kimura (2011). This critique highlighted that individuals may lack the capacity to enact their food literacy as a result of socio-economic status. Also, Kimura

(2011) highlights that public policy needs to be held accountable as enabling or inhibiting an individual's ability to act, rather than blaming the individual for the health-related dietary issues that they may be facing.

Rimante Ronto and colleagues (2016) also recognize the importance of “capacity” to enact literacy in their framework. In their analysis of adolescents' food literacy levels, they assess adolescents' food literacy levels through the categories of food and nutrition knowledge, food skills and capacity, in which they have included elements of the broader conceptualization (see Table 1). However, they could have split the food and nutrition knowledge section into two categories, including a 1) food and nutrition knowledge and 2) an agrifood systems knowledge category. This is important, as this thesis is seeking to demonstrate that environmental sustainability, where food comes from and animal welfare generally should not fall within the food and nutrition knowledge category, where it is not as explicitly recognized and gets lost under the nutrition lens.

Table 1: Aspects of Food Literacy (Ronto et al., 2016, p. 551)

Food and Nutrition Knowledge	Food Skills	Capacity
-Food safety and hygiene practices -Healthy and unhealthy foods -Where to find food and nutrition information -Appropriate portion sizes for different foods -Dietary guidelines -Where to obtain food from -Environmental sustainability (e.g., food miles, locally sourced food) -Where food comes from (food chain) -Animal welfare	-Prepare and cook food from basic/available ingredients -Use common kitchen equipment, utensils and appliances -Store food appropriately and safely -Follow and adapt recipes based on available foods -Select and prepare food in accordance with dietary guidelines -Plan and manage a budget for food -Identify and critically analyze food related information -Plan and manage time for shopping -Gather food from different sources (e.g., supermarkets, markets)	-Positive attitude towards cooking and healthy eating -Confidence and ability to improvise with ingredients -Regular social eating experiences

Furthermore, “[a] person cannot become food literate in a vacuum” (p. 69) and there are external determinants of food literacy as outlined by Desjardins & Azevedo (2013) which are; the socio-cultural environment (food experience, normalization of skills, emotional support), food and facilities (food availability, meal provision, cooking facilities), living conditions (income, employment, housing), and learning environment (literacy, numeracy, experiential learning, youth engagement). All of these factors can indeed affect the individual’s food preparation skills and experience, their organizational skills, their food and nutrition knowledge, and they have an impact on the psycho-social factors of their food literacy (Desjardins & Azevedo, 2013, p. 69).

Cullen and colleagues (2015) highlight that food literacy is affected by an individual’s community food security (see p. 28). This is echoed by Topley (2013) and the Greater Victoria Food Literacy Working Group who have also stated that food literacy plays an integral role in food security at both the community and individual levels. They state that “[a] food literate population is necessary to sustain the local food system because a food literate community is more aware of the value of buying local food, thus bringing more revenue to the local farmers and local markets” (p. 6).

This then begs the discussion about the broader conceptualization of food literacy, in which other authors discuss the idea of there being “micro and macro” aspects of food literacy. For example, Ronto et al. (2016) state that the micro aspects of food literacy can consist of food safety, hygiene practices and preparation skills while the macro aspects consist of elements such as knowledge regarding animal welfare and environmental sustainability (p. 550). Moreover, Jette Benn (2014) discusses a broader interpretation of food literacy which encompasses both the micro and macro elements. It goes much

farther than nutrition and diet, encompassing both the individual and social aspects and directs us towards “food system literacy” (as cited in Palumbo, 2016). Also recognizing “food system literacy” Widener & Karides (2014) emphasize the importance of an understanding of agrifood systems and their social, economic and environmental implications.

Also acknowledging a need for more agrifood systems knowledge and awareness, some scholars recognize the need for a more comprehensive or *critical* food literacy, which implies an understanding of the larger macro elements of food literacy (Cullen et al., 2015; Palumbo, 2016; Winslow, 2012) or critical food literacy (Yamashita & Robinson, 2016) for “tak[ing] action towards creating just, sustainable food systems” (p. 269). Likewise, Cassie Wever (2015) presents food literacy as “critical or emancipatory knowledge” that can lead to a “democratic, socially, economically and ecologically just food system” through critically thought out food behaviours (as cited in Yamashita & Robinson, 2016, p. 49). Additionally, food literacy today exists within a food system that needs to also recognize “power relations” and an ability to “read the world” by eating and being conscious of the way in which our agrifood systems are shaped, especially if we desire to change them (Sumner, 2013). This idea is echoed by Anelyse Weiler et al. (2015) in their idea of food sovereignty through agrifood literacy, including a strong emphasis on equalizing power within agrifood systems.

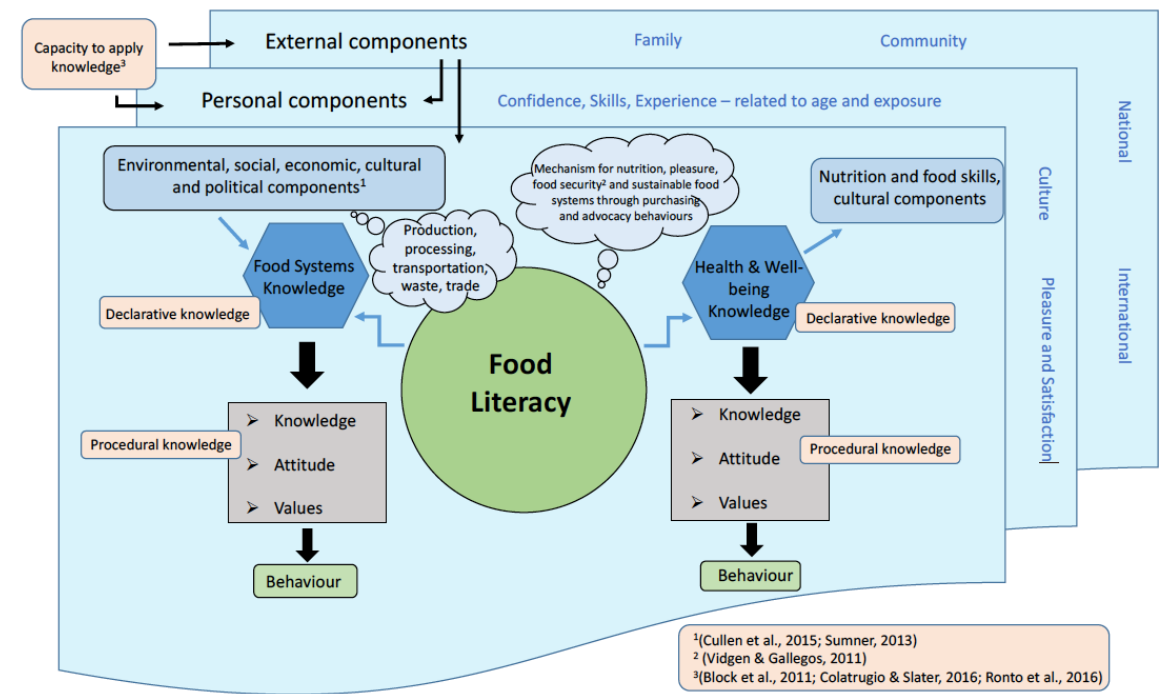
Although these ideas touch on the agrifood systems elements of food literacy, they do not or have not necessarily analyzed or measured food literacy in a comprehensive manner, or they focus mostly or only on the agrifood systems elements. Therefore, in this thesis, I am arguing for a broader conceptualization of food literacy,

which is presented and can be visualized further through the concept map found in the next section.

A Conceptual Map for Further Comprehension

I have created the concept map below in order to better understand how the many different elements of a broader food literacy interact. In this figure, it can be seen that there are two main sides or forms of knowledge – procedural and declarative – which I have further split into either agrifood systems and health well-being knowledge. Within the procedural knowledge, we can see that there is knowledge to carry out tasks as well as the attitudes and values (which can be influenced at both the personal and external/societal levels) that have a large influence on the actual performance of behaviour according to the theory of planned behaviour (Vermeir & Verbeke, 2008).

Figure 3: A Conceptual Map of Comprehensive Food Literacy



In addition to the different forms of knowledge (declarative and procedural) included in this concept map, I have incorporated some of the different personal and external layers (described in more detail above) that can either enhance or inhibit an individual's ability to apply their food literacy.

Largely, in summary of the different elements of food literacy above, it is important to remember that this concept consists of knowledge *and* action. Although part of food literacy is about food choices, consumption and health, it cannot be limited to a narrow consumerist perspective. In order to ensure that future generations will have the tools to make better decisions and adopt better practices, food literacy should be conceptualized in terms of its critical breadth, encompassing not only an individual's consumption habits but also their overall implications and involvement within and across various agrifood systems. This is why I argue that Ontario high school students would be better equipped with “agrifood system thinking” capabilities, inspired by a political ecology lens. In the next section, I present some of the approaches that have been taken to “assess” food literacy as well as my adaptation of the food literacy levels or scales of assessment which I will be using for the qualitative analysis of my field work data, described in a later section in this thesis.

A Framework for Analysis of Food Literacy Levels

Considering that food literacy is a concept consisting of both conceptual and declarative knowledge, and that assessing knowledge levels is very challenging, it is not easy to evaluate it on an individual let alone a community level or broader basis. Nonetheless, after addressing the aforementioned potential for impact and change by a

highly food literate society on agrifood systems, we need to do our best to assess it and find areas where improvements can be made.

Thus far, some scholars have broken down food literacy into levels – both hierarchical and non-hierarchical – to be able to assess the level advancement (i.e., basic, intermediate and advanced *or* functional, interactive and critical, etc.; see below), the majority of which have been three-tiered (Fordyce-Voorham, 2015). For example, Slater (2013) adapted a food literacy framework from the British Columbia Ministry of Education (2011) which presents three levels of food literacy; functional, interactive and critical²³ (see Table 2). Within the three levels of this framework, we can see elements relating predominantly to nutrition and dietary consumption with some agrifood systems elements beginning to be apparent at the critical level. Although these definitions or categorizations are a good starting point, they are very health and well-being oriented and could more holistically incorporate all elements of food literacy at each “level”.

Table 2: Food Literacy Framework (Adapted from the B.C. Health Literacy Framework, British Columbia Ministry of Education, 2011 as cited in Slater, 2013, p. 621)

Functional Food Literacy	Interactive Food Literacy	Critical Food Literacy
Basic communication of credible, evidence-based food and nutrition information, involving accessing, understanding and evaluating information	Development of personal skills regarding food and nutrition issues, involving decision making, goal setting and practices to enhance nutritional health and well-being	Respecting different cultural, family and religious beliefs in respect to food and nutrition (including nutritional health), understanding the wider context of food production and nutritional health, and advocating for personal, family and community changes that enhance nutritional health

²³ Following Nutbeam’s (2001) tripartite model of health literacy (Velardo, 2015)

From a slightly different approach, Desjardins & Azevedo (2013) identify and divide the measureable components of food literacy into three categories being “personal skills and attributes related to food preparation”, “external determinants” and “potential outcomes” (see Figure 8 in Appendix A for more details). These categories show that food literacy can in some ways be assessed in practical testing, but more predominantly through self-declared expressions of confidence and abilities.

Fordyce-Voorham (2015) also adapted a model of food literacy levels (see Table 16 in Appendix B) from several different publications on food literacy (Schnögl et al., 2006 and Slater, 2013 described by Colatruglio & Slater, 2014; Benn, 2014; Renwick, 2013 as cited in Fordyce-Voorham, 2015). In her framework, she categorizes food literacy into three levels; basic (operational), intermediate (cultural, micro-meso-system) and advanced (critical, exo-macro system) and declarative and procedural knowledge within each level. Also, Fordyce-Voorham (2015) presents Fordyce-Voorham and Lei Yeung’s (in press, n.d.) food literacy model for schools (see Figure 9 in Appendix B) with bi-directional arrows to show that individuals can move between “levels”. The health and well-being elements of food literacy, however, are the main focus of this framework. What’s more, is that the critical level only briefly mentions the agrifood systems elements through “ethical considerations”. Moreover, these elements appear to be mostly mentioned on an adhoc basis or out of formality of its general recognition without truly identifying the importance of a more comprehensive inclusion of these elements.

Although I agree with many elements of this framework, it is very health focused, and I believe that a “hierarchical” discussion of levels would make more sense. This is

because frequently the “exo-macro” or agrifood systems aspects in particular should fall into all three basic, intermediate and advanced levels of food literacy, but will just be more or less advanced at each level. Furthermore, although I do believe that it is possible to have elements of food literacy in basic, intermediate and advanced categories, I do not believe that an individual should fully fall under the category of having an advanced level food literacy without having grappled with a considerable number of both the agrifood systems and health and well-being elements of this concept.

For instance, if we are to develop the “levels” of food literacy in conjunction with the concept map (Figure 3) in the section above, it is essential to holistically incorporate *both the agrifood systems* (environmental, social, economic and political components) *and health and well-being* (nutrition, health and cultural components) knowledges (declarative knowledge) of the concept, but also attitudes and values which contribute to behaviours (procedural knowledge). All of this needs to be considered, in addition to both the personal and external components that may enhance or inhibit the development of use of food literacy as seen in Desjardins and Azevedo (2013) model.

All of these observations have led me to the development of the following levels of food literacy for high school students. This “rubric” is far from perfect, however it seeks to situate high school students’ food literacy with a large focus on exploring their agrifood systems literacy in order to address the questions specific to this research. This rubric can serve as a more comprehensive baseline for other scholars to continue to develop and assess food literacy levels. Further, in seeking to address food literacy from a broader conceptualization, this rubric seeks to combine ideas with an emphasis on both

the agrifood systems and health and well-being aspects of food literacy, which are incorporated at every level.

Table 3: Food Literacy Levels for High School Students²⁴

Basic (Functional/Operational) Level	• Operational interactions with food²⁵ • Has a limited understanding of how food is produced and how it reaches them • Nutritional knowledge is low and limited to knowledge of fruit and vegetable consumption and some reference to Canada's Food Guide • Lacking the confidence to cook without assistance or beyond "boxed" or prepackaged foods²⁶ • "Food is fuel" attitude and a positive relationship²⁷ with food is lacking
Intermediate (Transitional) Level	• Exploratory or transitional interactions with food, beginning to see and understand more than the food on their plate (i.e., agrifood systems discourses, marketing, etc.) although they cannot necessarily explain processes behind agrifood systems, they are aware of them • Understands macro nutritional information, portion sizes and Canada's Food Guide for a healthy diet • Has some confidence to be able to cook some simple and healthy meals from scratch (following recipes with few instructions) for themselves and their family and/or others • Developing a positive relationship with food
Advanced (Critical) Level	• Critical interactions with and <i>understanding of</i> the social²⁵ and more broadly the external environment (i.e., awareness and interpretation of corporate marketing, big business and environmental and social and animal welfare issues with agrifood systems), and understanding the wider context of food production and nutritional health, and advocating for personal, family, and community changes to enhance <i>the sustainability of agrifood systems locally and globally, food security and</i> nutritional health²⁸ • Ability to "examine one's own values with respect to food systems," "grapple with multiple values and perspectives that underlie food systems," "understand the larger socio-political contexts and factors that shape food systems," and "take action toward social justice in food systems and sustainability more broadly"²⁹ (p. 5) <i>in the future</i> • Ability and confidence to cook tasty, complex and nutritional meals for themselves and their family and/or others • Positive relationship with food

²⁴ This framework comes from a combination of frameworks, notably from Desjardins and Azevedo (2013), Fordyce-Voorham (2015), Slater (2013) and Yamashita and Robinson (2016).

²⁵ (Renwick, 2013 as cited in Fordyce-Voorham, 2015)

²⁶ (Desjardins & Azevedo, 2013)

²⁷ A positive relationship with food refers to an individuals' ability to eat mindfully, in moderation, while they are physiologically cued, taking dedicated time to value and enjoy eating in the day and finally, eating a majority of healthy foods but not inhibiting one's desires to occasionally indulge – this line of thinking and defining has come from eating disorder studies (Ruddock, Dickson, Field, & Hardman, 2015).

²⁸ (Slater, 2013)

²⁹ (Yamashita & Robinson, 2016)

Additionally, as seen in the rubric presented, the basic level is one that should be attainable for all of the students involved in this study. The next consecutive or intermediate level is more advanced than the basic level, showing that the knowledge here is already more developed. The elements included therefore become more complex and advanced at each level to reflect how high school students' food literacy could be gradually more or less advanced. Another element worth noting is that the intermediate level can also be seen as a "transitional" level, which shows the beginnings of development towards advanced systems thinking skills. Finally, the advanced level is set up in a way that it may be unattainable for most high school students, however, there may be some students who may already be transitioning to this level of food literacy or have demonstrated some but not all elements of an advanced level of food literacy. Overall, this rubric aids in assessing food literacy levels to see whether or not students are equipped to make healthy and informed food choices as well as become engaged citizens in regards to food and agriculture when they gain independence in the near future.

In addition to the aforementioned, this rubric has been created in a way that it can be used for individuals that either have, or have not been involved in an intervention or in this case, taken a food-related class. This is also significant because most evaluation tools have been designed for program evaluation rather than food literacy evaluation (i.e., they are not a general test of food literacy), which is not necessarily effective to get a general understanding of individuals' food literacy from different groups and backgrounds. Unless interventions are mandatory, it is not necessarily effective to only evaluate groups that have taken a food related course, especially if we cannot fully dictate the impacts of interventions, as well as determine the main influences on young people's food literacy.

Elements Analyzed of High School Students' Food Literacy

Considering that the literature has failed to address food literacy from a more comprehensive lens thus far, and that The Conference Board of Canada has highlighted that food literacy may be less developed than desired among Canadians, particularly in regards to the agrifood systems aspects (Brichta & Howard, 2013), these gaps have become the focus of this research. Many other elements of food literacy were also explored in my fieldwork, however only the elements highlighted in Figure 2 will be addressed to be able to speak to the research questions specific to this thesis.

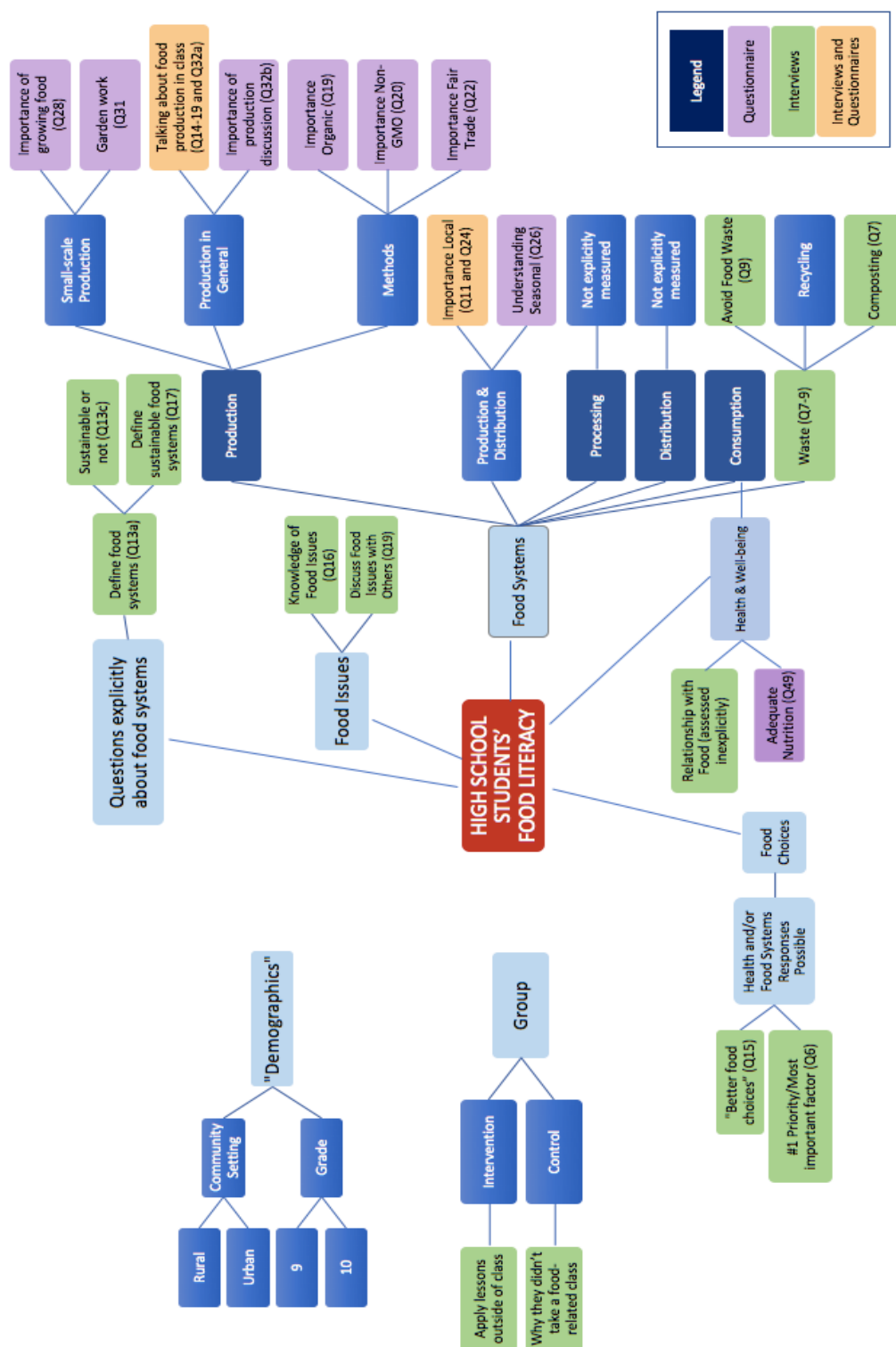
In Figure 4, we can see that the majority of elements that were selected to be analyzed regarding high school students' food literacy pertain to their knowledge about agrifood systems. Further, the majority of the responses to these questions, as outlined in the literature review framework, are being assessed in a way that is looking for exposure to and knowledge or awareness of agrifood systems. Moreover, the elements that were selected were ones that would fairly assess students' food literacy in relation to agrifood systems at this stage in their lives and intellectual development. There are also some elements that are related more explicitly to students' health and well-being knowledge, including their beliefs about their food, nutrition and cooking skills to eat a healthy diet, which were measured explicitly in the questionnaire. In addition to this, a couple of other questions that pertained to this aspect was their relationship to food, which was not explicitly assessed, as well as other questions that they could have answered in regards to either agrifood systems or health and well-being (i.e., food choice questions).

There are also a number of other elements indicated in blue in Figure 4. Of these elements, the ones on the right side of the chart, mixed in on the food systems side,

represent the different processes in agrifood systems. Meanwhile, the elements attached to these processes were the different questions that were asked to be able to address those elements of students' food literacy (purple = questionnaire questions, green = interview questions), as mentioned above. On the left side of the chart, the elements indicate the independent variables (i.e., community setting, grade and group) that the dependent variables were tested against, to look for differences between groups. In addition, the “group” element has an additional layer, since each of the groups were asked questions specific to either the “impacts of the intervention” or why they didn't take a food-related class, in the case of the control group students.

Now, in the next section, the methods that were used throughout the field research, data collection and analysis will be presented.

Figure 4: Elements Analyzed of High School Students' Food Literacy



Chapter 4: Methods

This exploratory study consists of a mixed methods approach involving both quantitative and qualitative data collection through questionnaire distribution and semi-structured interviews. The research phase or component took place at two different high schools in Ontario, one in a suburban neighbourhood/city with a population of approximately 60,000³⁰ people outlying a large city (City School, CS). The second high school is located in a rural town, 15 kilometers from the nearest city with a population nearing 100,000 people (Rural School, RS). In each of the two schools, four classes of grades 9 and 10 were selected to participate in the study based on the types of courses taken, as detailed in Table 4. Out of 8 classes, there were 4 intervention groups and 4 control groups divided between the two schools.

Table 4: Differentiation Between Schools and Classes Involved in the Study

	City School (CS) Technical Education (TE)	Rural School (RS) Social Sciences and Humanities (SSH)
Grade 9 (G9) Intervention Group	Hospitality and Tourism (HT)	Exploring Family Studies (EFS)
Grade 10 (G10) Intervention Group	Hospitality and Tourism (HT)	Food and Nutrition (FN)
Grade 9 (G9) Control Group	Visual Arts	Computer Studies
Grade 10 (G10) Control Group	Computer Studies	Music

The intervention group classes consisted of two different types of food-related courses offered in Ontario high schools which were: 1) Hospitality and Tourism (HT)

³⁰ Retrieved from greater city website. No disclosure of exact information is used to retain anonymity, as required by the School Board ethic committees.

from the Technical Education (TE) Curriculum, and 2) Exploring Family Studies (EFS), and Food and Nutrition (FN) from the Social Sciences and Humanities (SSH) Curriculum. All of these courses are electives and “open” meaning that the students from both academic (university bound) and applied (college bound) streams are eligible to register. The control group classes consisted of a music class, an art class and two computer studies courses, all of which were also “open” elective courses. The teachers who participated in the interviews were the teachers of the four food-related courses.

Study participants consisted of high school students in grades 9 and 10 between the ages of 14 and 17 who completed questionnaires and semi-structured interviews, as well as high school teachers who participated in semi-structured interviews.

Ethics

This study was approved by the University of Ottawa Research Board of Ethics and two Ontario School Boards. I also obtained consent from:

- High school principals for the school involved in the study;
- Teachers dedicating class time for questionnaire completion;
- Parents/guardians of students (under the age of 18) who wished to participate and agreed for their daughter/son to participate in the questionnaires, interviews and recording of the interviews (they had the option to choose only questionnaire or both, with or without recording);
- Students (under the age of 18) who wished to participate gave their assent (questionnaires, interviews and recording of interviews, as they chose); and
- Teachers from food-related intervention groups who agreed for their class to fill out the questionnaire and to be interviewed themselves based on their teaching experiences.

Please see Appendix C for all consent forms.

Study sample

The schools selected for this study are considered a convenience sample. This is as a result of my own capacity to get access and complete my field research in a timely manner, and also because of former relationships that I had built with individuals in both of the schools. Further, the two schools chosen were ideal as they allowed for program comparison, between curricula (HT and FS), and community setting due to one school being in an urban area and the other in a rural area.

Moreover, within those two schools, the classes that were chosen were based on enrolment rates and the semesters in which they were offered to allow for comparisons. Of the schools that were selected, the courses that were offered at the time of my fieldwork were all G9 and 10 “open” classes. Also, the timing with the semesters was important in completing my fieldwork since high schools in Ontario run on a two-semester system in which the students’ course schedules change halfway through the school year. Typically, the semesters run from September until the end of January, and from February until the end of June. This made it essential for the intervention groups to be surveyed before the end of January 2017 at both schools, before their semesters changed and they would no longer be easily accessible. It was also essential to wait until the end of the semester so that students had been fully exposed to the material covered in their food-related course. These groups subsequently identified as “intervention groups”; were surveyed in January 2017 at the request of the teachers. The control groups that were selected at both schools were also open G9 and 10 courses and were surveyed between February and March 2017. All of the interviews with students and teachers took

place between January and March 2017, within a week of the questionnaire being completed by students in their classes (for both teachers and students).

Finally, student participants were recruited through letters sent home to parents/guardians and to students, through their teachers, throughout the months of November and December 2016, and in January and February 2017 in the selected classes. Only students who had agreed and had obtained the explicit consent of their parent/guardian by signing and returning both the consent and assent forms were permitted to participate. Also, student interview participants were randomly selected through drawing names among those who had returned parent/guardian consent form and their own assent form and who had also agreed to participate in a recorded interview. Teachers were recruited for interviews at the time of questionnaire distribution in their classes.

Data collection tools and methods

Questionnaires

The questionnaire that was distributed to the students consisted of 54 questions that were open and closed ended and/or multiple choice (see Appendix D), however, only the closed ended questions were analyzed in this thesis. Seven of the questions were demographic questions. The majority of questions pertained to attitudes, knowledge, exposure and behaviours regarding agrifood systems (e.g., questions about food production, gardening, agriculture, waste, etc.), food and nutrition and eating habits, as well as some questions about parent/guardian cooking and grocery shopping habits. Therefore, in referring back to Figure 4, we can see the concepts being tested here pertain mostly to students' knowledge and awareness of agrifood systems with some concepts

pertaining to the health and well-being aspects of their food literacy. The questionnaire was pre-tested with 6 high school students from different schools but within the age range of the study participants. As a result of the pre-test, completion time was assessed and the questionnaire was edited to improve the clarity of the questions and to limit the time for completion to approximately 25 or 30 minutes.

Furthermore, in designing the questionnaire, questions were ordered following a certain “research rationale”, and then arranged to avoid leading questions or influencing respondents to answer in a predesigned way. This also meant that questions specifically addressing the main objectives and subject of the research were left to the end to avoid influencing participants in how they answered earlier questions, based on the specific interests of the research. Hence, all the questions that were explicitly related to agrifood systems as complex fields of governance that involved primarily environmental, but also socio-economic and political issues, were left to the end.

Interviews

Due to the exploratory nature of this project, and the relative novelty and complexity of food literacy assessments, interviews were a key component of the research methods used to ensure a more nuanced and in-depth data collection. For example, the interviews permitted a more detailed analysis and understanding of students’ food literacy through their abilities to describe their experiences, beyond brief and mostly closed-ended responses on the questionnaires. The number of students included for the interviews were limited to a small sample (8 overall, with 1 student per

class) due to limitations of resources and the scope of a master's thesis and time constraints.

The students selected for the interviews were either approached after completion of their questionnaire in class or via email, and were asked if they still wished to participate in an interview of about 30 minutes. They were given 48 hours to respond, and notified about this, before I proceeded to ask the next student who was randomly selected from the list. This was essential to limit delays in the completion of the overall data collection phase of my fieldwork. Student interviews varied from 15 to 45 minutes depending on their willingness to discuss.

Teachers of the four food-related classes were asked and all agreed to participate in the study through an interview. They received a letter of information about the study and the interview questions via email, which included information about confidentiality (see Appendix C). On the day of the interview, they signed the consent forms, including the permission for the interview to be recorded. Teachers' interviews varied from one to two hours in length.

The interviews that I conducted with students and teachers alike were semi-structured, which allowed me to follow a question guide while having enough freedom to have more of a conversation with participants. All of the interviews were recorded in English, and upon the agreement of participants, a recorder application on my cell phone was used to facilitate transcription and analysis afterwards, as well as to enable a more engaged conversation. Recording the interviews was very useful to ensure the quality of discussion between myself and the student or teacher, and to ensure a higher quality of analysis, especially considering the time and resource limitations, as well as the

exploratory nature of this study. Additionally, if my interpretation during the interview was unclear (about something participants had said or if the participants spoke softly or made gestures with body language rather than verbally), I made sure to confirm what they were trying to convey verbally, even if it was through a rhetorical question to ensure my own understanding while transcribing later on.

The types of questions that were asked during student interviews pertained to their personal backgrounds, their food consumption and cooking habits, and their knowledge about agrifood systems (directly and indirectly). See Figure 4 in the previous section for more details about how these concepts connect to the research questions. Overall, these questions were useful 1) to provide me with background information and context to better understand each participant's experiences, knowledge and perceptions, 2) to break the ice and make them comfortable, so that 3) they would hopefully elaborate on questions that were central to the main research questions and objectives of this thesis. Teachers were also asked questions about their personal backgrounds, in addition to questions about their perceptions of their students' food literacy both in relation to agrifood systems and health and well-being. They were also asked questions about the food-related programs at their schools, the curricula that they referred to and adapted for their courses, and their opinions about agrifood-related education programs in Ontario high schools more generally.

Data Entry

As questionnaires were completed, I entered responses into a computer using a paid subscription to Survey Monkey, which was only accessible to me. This process

helped to facilitate the data entry, which led to the eventual export of data into a spreadsheet that could allow for variables to be recoded in IBM SPSS Statistical Software (Version 23). Furthermore, for the interviews, I took notes during and after the completion of the interviews, and transcribed them all using Microsoft Office Word at the earliest convenience.

Data Analysis Methods

In analyzing both the questionnaires and interviews I have attempted to make comparisons between the intervention and control groups, and I have compared the intervention groups and school groups with each other. This is to see where students' food literacy levels are situated (low, in transition/intermediate, advanced) and whether or not they were more or less advanced if they have or have not taken a food-related course. Also, in comparing intervention groups with each other I have aimed to see if their food literacy levels are more or less advanced based on the type of food-related course that they have taken. Finally, in comparing the two different schools, based on their rural and urban locations, I have tested to see if community location has an impact on food literacy levels.

Questionnaires

To analyze the quantitative data collected with the questionnaires I used SPSS Statistical Software, as previously stated. I built charts, and used nonparametric statistical tests to search for and analyze the associations or differences in responses between groups (i.e., intervention and control groups, grades, and schools). The two tests used in particular were the Mann-Whiney U-test and Kruskal-Wallis H-tests. They were selected

due to the use of small samples, variables with two or more values and ordinal scales (Likert scales). The statistical significance was set at the .05 level. Additionally, due to the fact that the Kruskal-Wallis H-test is an omnibus test (does not identify where the differences are among groups with more than two groups) post hoc Kruskal-Wallis pairwise tests were run with a Bonferroni correction (to avoid type I errors), to search for the groups that were statistically significantly different from each other. Once the groups that were statistically significantly different were identified, mean ranks were used to interpret the dissociation between these groups (see Pett, 1997 for further explanation).

Table 5: Specification of the 6 Statistical Tests Run for Questionnaire Analysis

Test Set #	Test type	Post Hoc test	Independent variables
1	Kruskal-Wallis	Yes	School, Group and Grade ³¹
2	Kruskal-Wallis	Yes	School and Group
3	Kruskal-Wallis	Yes	Group and Grade ³²
4	Kruskal-Wallis	Yes	Intervention A, Intervention B and Control groups
5	Mann-Whitney	No	Intervention and Control
6	Mann-Whitney	No	School

For this portion of the analysis, six sets of tests were run in SPSS on ten dependent variables. Each of the six sets of tests was associated to an independent variable, such as the students' school, group (intervention or control), and grade (age/maturity). Meanwhile the dependent variables represent an element of food literacy, with the majority of these variables being related to the agrifood systems elements (e.g.,

³¹ School represents CS or RS; group represents Intervention or Control; and Grade represents either G9 or 10.

³² Three students were excluded from this test because their birth year was not the same as the rest of the students (1999 or 2000 rather than 2001 or 2002). This was because this variable was used to test for responses based on age and maturity.

understanding of fruit and vegetable seasonality). Out of the variables tested, nine pertained to the agrifood systems aspects of food literacy and one “combined variable”³³ represented the health and well-being aspect. These variables can be seen in Figure 4, which outlines the variables that were tested from the questionnaires.

Interviews

For interview analysis, I used NVivo qualitative data analysis software (Version 11) to search through the transcribed interviews for themes with queries and to code them for interpretation later on. I was able to code teacher and student interview data separately into their own nodes, whilst also looking at them simultaneously since everything was available in one file and window. NVivo was extremely useful to categorize participants based on school and intervention or control group in order to be able to make comparisons.

Further, student and teacher respondents were given pseudonyms to facilitate flow for the reader, rather than giving them respondent numbers. Moreover, their pseudonyms were given in a fashion for the reader to easily identify which community the interviewee was from. For example, students and teachers from the rural community were given names that started with the letter “R” and students and teachers from the city school were given names starting with the letter “C”.

³³ This variable included all of the following elements; food, nutrition and cooking skills to eat a healthy diet.

Additionally, for student interview analysis, responses were analyzed in comparison to the food literacy levels grid presented in the conceptual framework section above. Student responses between intervention and control groups were compared as well as between intervention groups and schools, again, to see if there were differences, especially in regards to agrifood systems.

Chapter 5: Results and Discussion

Participant Demographics and Response Rates

Overall, 94 students completed the questionnaires with a total of 64 girls and 30 boys. Response rates between the schools were relatively evenly split with 46 participants from city school (CS) and 48 participants from rural school (RS). Additionally, 53 of the respondents were from the intervention groups and 41 from the control groups.

Table 6: Response Rate by Class

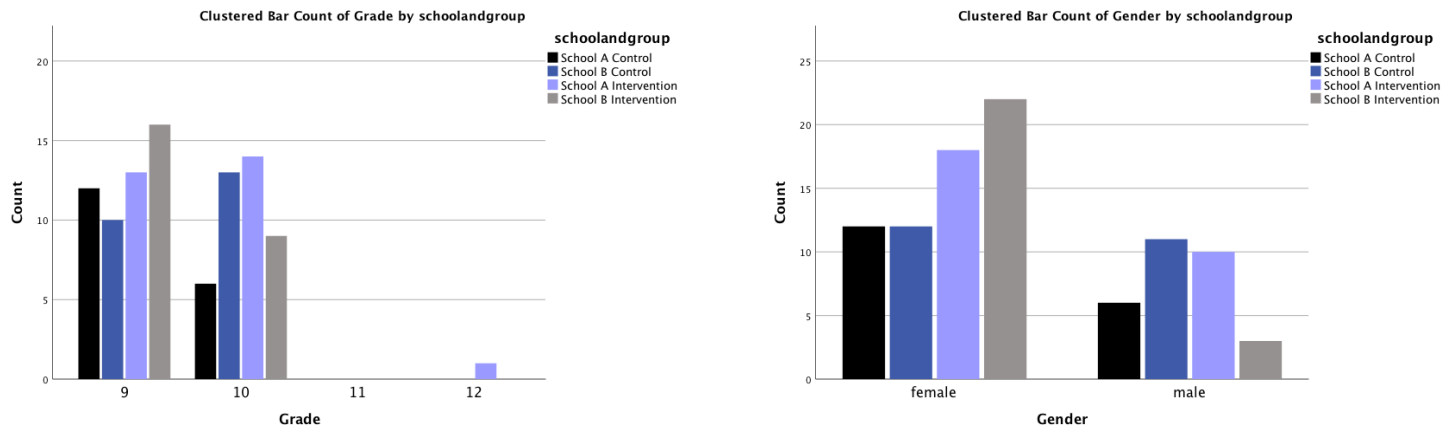
Class	Grade	School	Intervention or control	Total # of students in class	Number of participants (questionnaire)	Response rate
Hospitality and tourism (HT)	10	CS	Intervention	19	15	79%
Hospitality and tourism (HT)	9	CS	Intervention	18	13	72%
Visual arts	9	CS	Control	26	12	46%
Computer studies	10	CS	Control	25	6	24%
EFS – Foods	9	RS	Intervention	20	16	80%
Food and nutrition (FN)	10	RS	Intervention	21	9	43%
Computer studies	9	RS	Control	17	9	53%
Music	10	RS	Control	23	14	61%
Total				169	94	~56%

Average response rates were rather low (~56%). This could be a result of the need to return parent/guardian consent forms to be able to participate. Also, for control groups, a few (4) students in G10 had previously taken a food-related class in school, making them ineligible to participate. Nonetheless, questionnaire completion was high, with most respondents answering the vast majority of questions, with exception of the open-ended questions.

The bar charts below of Figure 5 show that the response rate numbers among G9s were higher than G10s, but overall, respondent numbers were low. One student indicated

that he was in grade 12 but taking one of the food-related courses at CS. Further, the charts indicate that more females participated in the study than males.

Figure 5: Response rate by Grade and Gender



As previously stated, for the 8 classes which completed the questionnaires, only 1 student per class was selected for an interview, resulting in a total of 8 student interviews, 4 from the intervention groups (3 girls, 1 boy) 4 from the control groups (3 girls, 1 boy). Additionally, all 4 of the teachers from the intervention groups were asked and agreed to participate in an interview (1 female, 3 males).

Teacher Descriptions of Classes and Curriculums

During their interviews, teachers were asked to describe the classes and curricula offered at their schools, and those that were involved in this study in particular. This section will examine these two elements of teachers' interviews to contextualize the type of material that was covered in their respective courses. According to the four teachers interviewed, there are food-related courses available in every grade from grades 9-12. However, only descriptions of the grades 9 and 10 classes that were involved in this study

will be discussed here. Furthermore, distinctions between teachers, their classes and schools can be found in Table 7 below.

Table 7: Teachers from Interviews

Interview	Teacher	Grade	School	Class
1	Mr. Rice	10	RS	FN
2	Ms. Rosemary	9	RS	EFS
3	Mr. Cumin	9	CS	HT
4	Mr. Chili	10	CS	HT

Program and Curriculum Descriptions at Rural School (RS)

To begin, at RS the food-related courses and programming pertain to the Social Sciences and Humanities (SSH), Family Studies (FS) curriculum and there are no food-related courses from the Technical Education (TE) curriculum offered. As it will be described in detail below, there are some identifiable contrasts between the G9 and G10 courses showing more of a specific focus on food in the G10 FN course while the G9 EFS course is much broader and touches on other “life skills” as well. Also, the teachers seem to work independently of one another.

Of the courses that were offered, the G10, FN course is primarily taught by Mr. Rice. He indicated that the emphasis is “basically on micro and macro nutrients, reading labels, basic marketing and advertising techniques”. He added that he puts an emphasis on the marketing portion of the course, noting: “I want them to have a very healthy dose of skepticism and they need to understand basic nutrition and how to read labels in order to cut through the crap”. There is also a practical element to this course allowing the students to cook “once every week [or every] week and a half” (Mr. Rice), which he adds is not often enough. This shows that the main focuses of this course, as taught by this

teacher, is to teach students the “health and well-being aspects” of food literacy as well as give them some practical food and cooking skills.

In describing the G9 Exploring Family Studies (EFS) course, Ms. Rosemary who teaches the majority of food-related courses at RS said that they “do a lot of cooking techniques and preparing foods and ... meals and just basic baking,” in addition to learning about “skills like laundry and shopping and meals on a budget”. This response highlights that the EFS course is slightly less focused on food than the FN course, but gives more of a general oversight into some cooking and baking as well as other life skills. Furthermore, since it is less evident how food would be incorporated into an “EFS” course, Ms. Rosemary explained that she treats the course like an “introductory to cooking and life skills” course and since cooking “touches on a million things” you “can learn all sorts of different things at one time”. She mentioned that she incorporates food and cooking with the “...social aspect of family and relationships, and learning to budget for... meals and learning some basic household... cooking techniques”. Further, the students in her class cook on a weekly basis.

In regards to the teachers’ backgrounds, Mr. Rice has a Bachelor of Science (BSc), and Ms. Rosemary has a Bachelor of Arts (BA). Also, both of the teachers have studied and completed an “Honours Specialist in Family Studies”³⁴.

³⁴ A (month long) teaching specialization course offered by the Ontario Teachers’ Federation (Ontario Teachers’ Federation, n.d.) which is highly recommended to for teaching Family Studies courses.

Program and Curriculum Descriptions at City School (CS)

In the CS, the intervention programming is geared mostly towards the Hospitality and Tourism (HT) and TE curriculum, however there are also, some FS courses that are offered at this school. The teachers at CS noted that they work closely together as a team and they share common goals of “practical skill building” and “demystifying” foods commonly purchased and available in households in their programming (i.e., eggs, meats, flour for breads and baking, etc.). In contrast to the facilities at RS, the kitchen/classroom at CS is modern and resembles an industrial kitchen, set up for TE programming.

Mr. Cumin stated that they teach their courses using “benchmarks” at CS with “basic skills” in mind in case the students “never [take] another cooking class” so that they will “at least be able to... put some food on the table.” Mr. Chili indicated that he and Mr. Cumin have designed the G9 HT course, while using the G10 curriculum as a “jumping off point” in regards to Ministry expectations (since it is a focus course that does not exist within the Ministry’s curriculum). Mr. Chili added that the G9 and G10 courses are very similar, and that the only major differences are the expectations that they have for the students (with more being expected of G10s than 9s). Within both courses, the students are expected to leave the course with “foundational skills” such as “measurement, knife skills, mise en place, organization, [and]... safety...”. Within their courses, the skills get progressively more challenging, however, in both they do “...baking and pastry work” to a subsequent more “savory side” involving some basic cooking. Mr. Cumin also expressed an interest in teaching students some resiliency for food security through egg cookery (G10 example), “because it’s a really versatile [and] very inexpensive, protein rich” ingredient, especially “if you’re a college or university

student looking to make food on a budget”. Additionally, regarding the frequency of cooking, Mr. Cumin said that the students at CS cook two or three days a week, and that about 70 percent of the course is hands on.

Furthermore, Mr. Cumin insisted on the emphasis of integrating elements of sustainability in their programming, which they do through the foods that they source (local, organic and ethical where possible, in his words) in addition to teaching the students about gardening and preserving (mostly in the fall semester).

Regarding their personal background, the teachers at CS both have a BA however, both are also former chefs, who worked in the industry for many years before going to teachers’ college.

Overall, although all of the teachers share a common concern for the students to acquire some “life” or “fundamental skills”, they differ, however, in the identification of agrifood systems and sustainability as key integral elements of discussion in their programming. As such, teachers from CS both have identified this aspect as part of their programming, whereas teachers from RS have not.

High School Students’ Food Literacy: Questionnaire analysis

Multiple Mann-Whitney U-test and Kruskal-Wallis H-tests sets were run to see if there were associations or differences in the responses to the questionnaire between different groups of students (refer to the variables outlined in Table 8, showing which ones were tested). The dependent variables that showed statistically significant differences were: the importance of purchasing local/regional food products, the understanding of fruit and vegetable seasonality, and the importance of purchasing

organic foods. These three variables pertain to the agrifood systems aspects of students' food literacy (see Table 8 for further details). The majority of the tests on the aforementioned three variables (with the exception of one that did not include school as a testing variable) showed statistical significance when comparing students' food literacy between schools, with little to no statistical difference being apparent between intervention and control groups. I will now discuss the results of each test by dependent variables – separated by the agrifood systems and health and well-being aspects of food literacy – in further detail as well as present the data in Table 9 showing the statistically significant results of these tests (post hoc and Mann-Whiney u-tests). A discussion of variables that lacked statistical significance will also follow. Additionally, all test results from all of the tests run can be found in Appendix E.

Table 8: Variables Tested for Statistical Significance

Variable Name	Food Literacy Knowledge Categorization	Statistical Significance	Tests Showing Significance
Adequate food, nutrition and cooking skills for a healthy diet	Health & well-being	No	
Understanding of fruit and vegetable seasonality	Agrifood systems	Yes	School and Group, Both Intervention Groups (A & B) and Control Group, School
Frequency of working in a garden that grows food	Agrifood systems	No	
Importance of growing food at home	Agrifood systems	No	
Importance of purchasing fair trade products	Agrifood systems	No	
Importance of purchasing local/regional food products	Agrifood systems	Yes	School, Group and Grade, School and Group, Both Intervention Groups (A & B) and Control Group, School
Importance of purchasing organic foods	Agrifood systems	Yes	Group and Grade
Importance of purchasing non-GMO foods	Agrifood systems	No	

Frequency of discussion of gardening, food or agricultural production in any class	Agrifood systems	No	
Importance of the discussion of gardening, food or agricultural production	Agrifood systems	No	
Adequate food, nutrition and cooking skills for a healthy diet	Agrifood systems	No	

Agrifood Systems Literacy Dependent Variables

In Table 9 below we can see the post hoc test results by variable for the variables that returned statistically significant results. To begin, in responding to the *importance of purchasing local/regional food products* the results show primarily that more students from RS than CS believe that it is more important to purchase said products (see Table 9). This can be seen in the majority of the results, but more particularly in the test comparing group responses from the different schools. Another interesting finding from these results is that the control group at RS (for G9s in particular) seems to be more concerned with purchasing local/regional foods than the intervention groups at CS (G9 in particular). This could then possibly be tied to the hypothesis that community location could have an impact on high school students' food literacy.

More generally, in looking at all students' responses to this question we can see that the majority of students believe that it is slightly to very important to purchase local foods, with a small percentage saying that it is "not important at all" (see Figure 11 in Appendix A for more details). This shows that the majority of students have formed an opinion on the topic of purchasing local/regional food products, by choosing a response between "important" to "not important at all". However, about 10% of all respondents

did not form an opinion (chose “I don’t know” as their response), perhaps indicating a lack of knowledge on the topic of local/regional food.

Table 9: Post Hoc Test Results by Variable

	Test	Difference Between Groups	Adj. Sig.
Importance of Purchasing Local/Regional Food Products	<i>All Eight Groups (Kruskal-Wallis)</i>	More students from RS G9 control group than CS G9 intervention group believe that it is important to purchase local/regional foods	.005
		More students from RS G9 intervention group than CS G9 intervention group believe that it is important to purchase local food	.022
	<i>School and Group (Kruskal-Wallis)</i>	More students from RS control group than CS control group at RS believe that it is important to purchase local food	.045
		More students from RS control group than CS control group believe that it is important to purchase local food	.002
	<i>Intervention Group (A&B) and Control Group (Kruskal-Wallis)</i>	More students from RS intervention groups than CS intervention groups believe that it is important to purchase local food	.028
		More students from the control groups than CS intervention groups believe that it is important to purchase local food	.025
	<i>School (Mann-Whitney U-test)</i>	More students from RS than CS believe that it is important to purchase local food	.000
Understanding of Fruit and Vegetable Seasonality	<i>School and Group (Kruskal-Wallis)</i>	More students from RS intervention groups than CS intervention groups believe that they have a better understanding of seasonality	.004
	<i>Intervention Group (A&B) and Control Group (Kruskal-Wallis)</i>	More students from RS intervention groups than CS intervention groups believe that they have a better understanding of seasonality	.002
	<i>School (Mann-Whitney U-test)</i>	More students from RS than CS believe that they have a better understanding of seasonality	.002
Importance of Purchasing Organic Foods	<i>Group and Grade (Kruskal-Wallis)</i>	More students from G9 control groups than G10 control groups believe that it is important to purchase organic	.029

Similarly, students’ responses regarding their *understanding of fruit and vegetable seasonality* seem to have led to a statistically significant difference related to school. This

can be seen in Table 9 where the statistically significant differences highlighted exist between schools. This cannot also be disproven or tied to any other conclusions at this point because of the lack of statistically significant difference between other groupings such as by intervention or control, or their grade (age).

In looking at all eight groups responses graphically, we can see that most students believe that they either understand seasonality “well”, or “somewhat well”, with students from RS being positioned more positively and students from CS being more on the less informed side. Contrarily, in general, most students seem to identify that they are aware of seasonality and somewhat informed on the topic (See Figure 12 in Appendix A).

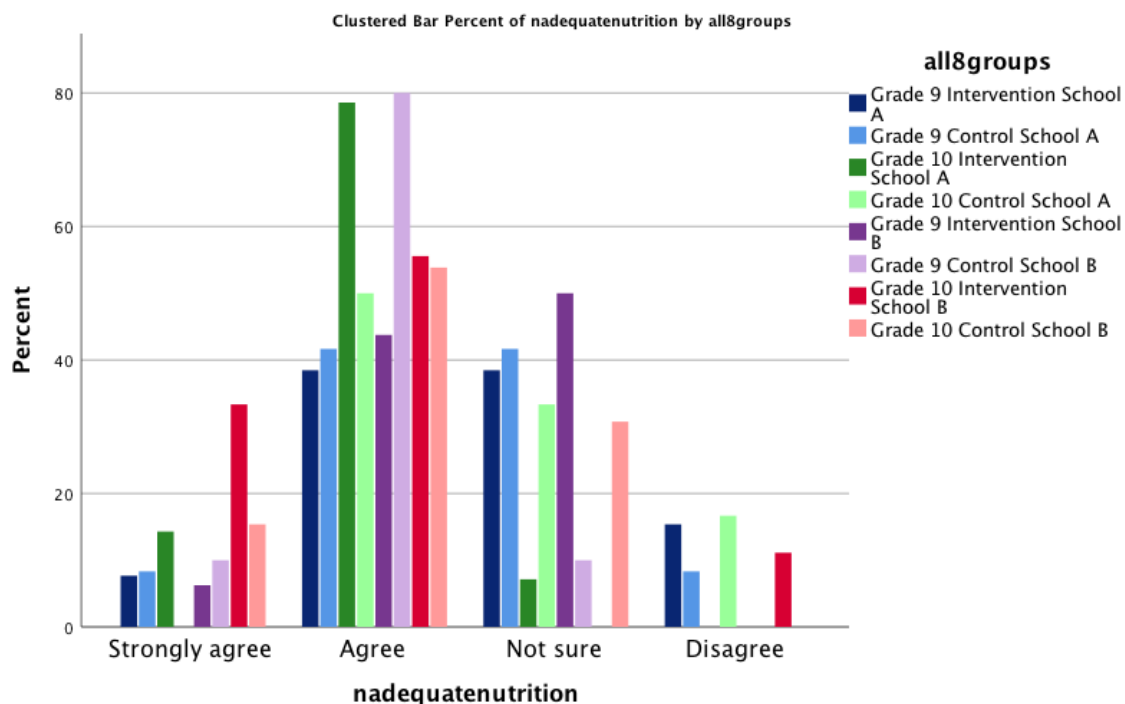
The final dependent variable related to students’ agrifood systems literacy that showed statistically significant differences between groups is their belief of the *importance of purchasing organic foods*. Out of the six tests, only one statistically significant difference was found between group responses. The difference identified was between the group and grade, and showed that more students from control groups in G9 than G10 believed that purchasing organic was important. No real conclusions nor inferences can be made from this finding at this time.

Nonetheless, a large number of students had identified that they believed that purchasing organic was important to some degree, with 11% or all respondents identifying it as “not important at all”. Additionally, about 10% of respondents did not form an opinion and selected “I don’t know” for this question signifying that they may be lacking the agrifood systems literacy to identify why purchasing organic would or would not be important (See Figure 13 in Appendix A).

Health and Well-Being Food Literacy Dependent Variable

For the health and well-being side of food literacy, the dependent variable tested returned no statistical significance in any of the tests, showing no difference between intervention and control groups, grades or schools. The question used to represent this dependent variable asked how much they agreed with the following statement: “I have adequate food, nutrition and cooking skills to eat a healthy diet” (question borrowed from Slater & Hinds, 2014). In response to this question, most students affirmed that they have adequate food, nutrition and cooking skills to eat a healthy diet, but just over 30% of all respondents identified that they were unsure or disagreed (see Figure 6). No students strongly disagreed to this statement.

Figure 6: Adequate Food, Nutrition and Cooking Skills to Eat a Healthy Diet by All Eight Groups



This could be positive in regards to adolescents' confidence in their food literacy, lowering their personal barriers to experiment or cook for themselves and continue to develop their food literacy (Desjardins & Azevedo, 2013). Contrarily, this could also be negative if these adolescents' have unhealthy food habits and perceive that they are adequate. It must also be noted that the positioning of the "not sure" response was interpreted as "neutral" as a result of its central positioning among the possible responses (e.g., strongly agree, agree, not sure, disagree, strongly disagree).

Other Agrifood Systems Related Dependent Variables

Other questions that were tested related to students' agrifood systems knowledge were their beliefs of the *importance of purchasing fair trade or non-GMO foods*; their *frequency of working in a garden that grows food*; their belief of the *importance of growing food at home*; and the *importance of discussing food production in class*. Although, no statistically significant differences were found between any of the groups for any of these variables, there are a couple of trends worth noting.

To start, the majority of students between all groups never or rarely work in a garden (see Figure 14 in Appendix A). Irrespective of their frequency of working in a garden, more students from CS than RS believed that growing food at home is "very important". Also, more respondents from RS said "I don't know" to this question, than students from CS (see Figure 15 in Appendix A). This could possibly be a difference as a result of course programming, or as a result of the urban versus rural nature in which they live and their geographical proximity to food production.

In regards to fair trade food products, students from the intervention group at RS seem to be less informed than CS on the subject of fair trade products, as a large percentage of respondents said “I don’t know” and formed an opinion on the purchasing of these products. Also, more generally, all students appear to be less informed about both non-GMO (23%) and fair trade (28%) products based on a high percentage of all respondents that selected “I don’t know” for these questions (see Figure 16 and 17 in Appendix A). This is interesting since these are two possible food choice options that may be discussed with less certainty in common discourse.

Another question that pertained to students’ agrifood systems literacy, particularly in relation to education, was how often they believe that gardening, food production or agricultural production are discussed in any of their classes. Interestingly enough, according to student responses, only a small percentage of students from the intervention groups at CS indicated that discussions about gardening, food and agricultural production are discussed frequently in any of their classes (see Figure 18 in Appendix A). Also, there was no statistically significant difference between any of the groups for this variable. Furthermore, in comparing intervention and control groups, the mean ranks were almost identical (intervention = 47.55 and control = 47.46), showing that there was little to or no difference between group responses. This is especially interesting because it highlights that the majority of students have identified that they “sometimes”, “rarely” or “never” discuss gardening, food and agricultural production in *any* of their classes. This also helps us to infer that students’ responses on the questionnaire – related to their agrifood systems literacy – can be correlated with their geographic location.

Conclusions

Overall, no statistically significant differences were found between intervention and control groups, inhibiting us from concluding notable impacts of interventions on high school students' food literacy involved in this study. This could be because the majority of questions pertained to agrifood systems and not health and well-being or the “practical skills” aspects of food literacy. If this assumption is true, we could assume that high school students who were involved in this study have similar levels of food literacy, except for those from the rural school (RS) who seemed to be more exposed to, and hence more literate about agrifood systems than students from the city school (CS). This was seen through their beliefs about the importance of purchasing local/regional food products and their understanding of seasonality. Moreover, considering the lack of notable difference between intervention and control groups at RS, the greater knowledge of agrifood systems among rural students may be related to their rural geographic location rather than food-related course, thus confirming our hypothesis.

In regards to the health and well-being side of high school students' food literacy, there is no statistically significant differences across groups, as the majority of students believed that they have adequate food, nutrition and cooking skills to eat a healthy diet.

For the purpose of this thesis, students who noted that purchasing local, organic, non-GMO and fair trade products is very important, because these products are potentially more sustainable (environmentally, socially, and/or economically) were classified as more food systems literate. Based on such criteria, the students' responses to these questions generally show a lack of food literacy in this area, as they did not have a strongly formed opinion (few respondents chose “very important”, see Figures 11, 13, 16,

17 in Appendix A). Additionally, if we are to situate high school students' food literacy more generally based on their responses to these and similar questions, we can see where they showed a level of awareness or complete lack thereof, by choosing the "I don't know" option. Consequently, in this instance, high school students appear to be less agrifood systems literate in regards to their understanding of fair trade and non-GMO products, due to the higher number of "I don't know" responses to these questions.

More importantly, in looking at the responses to the question about discussion of food production in any of their classes, students reported that it was not well covered, which also indicates a possibly low level of agrifood systems literacy, among most high school students. Finally, since these tests have only identified geographic location of community as an independent variable that affects food literacy, it is now valuable to triangulate with the qualitative portion of the analysis. The interviews with both students and teachers will help to better understand high school students' food literacy levels and whether or not there is in fact a difference between intervention and control groups and program types.

Interviews with High School Students' and their Self-Reported Food Literacy

In this section I will present information gathered from interviews with a small number of students involved in this study, permitting a more in-depth analysis beyond the closed-ended responses from the questionnaire. This will begin by discussing students' responses about discussions of food in school, their food habits and food choices, most of which show knowledge predominantly regarding the health and well-being aspects of their food literacy. Subsequently, discussion of students' agrifood systems literacy will be

presented through students' responses to questions that asked explicitly about agrifood systems and food issues. I have also summarized students' information including their grade, school, class, family situation and their current and former communities of residence in Table 10.

Table 10: Descriptions of Students from Interviews

Group	Student	Grade	School	Class	Parents/guardians	Current community; where they are from (if different)
Intervention	Charlie	10	CS	HT	Lives with both parents	CS; Mostly cities in the states, almost all urban (father is in the military)
	Chitra	9	CS	HT	Lives with both parents	CS; Urban areas across Ontario
	Rebecca	9	RS	EFS	Lives with both parents	Rural community around RS
	Rachael	10	RS	FN	Lives with both parents	Rural communities around RS
Control	Cho	10	CS	Computer Studies (CNT)	Parents live in China, student living with friends of parents	CS; Urban areas in China
	Robyn	10	RS	Music (CNT)	Lives with father and step mother	Rural communities around/in RS
	Ryan	9	RS	Computer Studies (CNT)	Lives with both adoptive parents	On a farm in RS area
	Carrie	9	CS	Visual Arts (CNT)	Lives with both parents	CS

Health and Well-Being: Prominent Topics in Discussion of Food at School

All of the eight students interviewed mentioned that food was discussed in school at some point or another and that most discussions pertained to the nutrition and health aspects of food, often in relation to the food guide and portion sizes. Robyn and Ryan also argued that these discussions took place mostly in health classes: “we had health, and it was one of those things where we didn’t do it every day like language or math” (Robyn). Carrie said that they talked about food “for healthy eating”; it was “the general stuff” that everyone learns when they’re “little kids”. Overall, all of the students had very

similar responses to this question, stating that it was an occasional discussion and often related to health and nutrition. Even the students that grew up in the United States (Charlie) and China (Cho) showed parallels with these responses. At this point, none of the students had identified that they had talked about the agrifood systems elements of food in school. This could be as a result of the fact that it is only very rarely discussed or not at all in their courses in more recent years.

Food Skills: Major Take-Away from Food-Related Courses

Students in intervention classes were probed further about what they had learned in class, as well as about what they did in their cooking labs. In all of the food related courses, students identified food safety (through safe food handling at the consumer level) as an integral element. They all also referred to an enhancement in their food skills through examples of the foods that they learned how to make. For instance, at CS, Chitra (G9, HT) said they made pastry and made quiche from scratch, and Charlie (G10, HT) explained that they cut a chicken into “8 whole parts” and did an “egg unit” in which he learned to make omelets and a soufflé. At RS, Rebecca (G9, EFS) explained that she learned how to make pizza with a dough from scratch as well as fettuccine Alfredo while Rachael (G10, FN) said that she learned how to make quiche, although they did not make the pastry from scratch and used “bought shells”. Rebecca (G9, EFS) noted that they also learned about owning a house, mortgages and budgeting, and that the course was not entirely about food since the EFS course was a more generalized FS course.

Based on the students' descriptions of their knowledge outcomes from their classes, they mentioned that they all received some practical, hands on experience working with food in addition to learning about safe food handling.

Classroom Discussion of Agrifood Systems

Overall, the students from intervention programs did not identify agrifood issues or agrifood systems as being a part of discussions in class, with the exception of Chitra (G9, HT, CS) who mentioned that she learned about the negative impact of pesticide usage in food production, the processing and grading of eggs, and biodiversity loss in apple varieties. Other students simply said “not really” (Charlie G10, HT, CS and Rebecca G9, EFS, RS). This is particularly interesting considering that both teachers from the intervention programs at CS emphasized that they are integrating sustainability and agrifood systems into their programming, which may indicate a lack of understanding on the students' behalf and/or a too limited amount of time spent on these rather complex issues for students to grasp the material. From this limited sample, one of the two students enrolled in those courses has digested this material. Contrarily, the lack of emphasis put on the agrifood systems aspects of the programming at RS (as reported by the teachers), does however seem to show parallels in the students' responses, seeing as they did not identify it as something that was discussed in their classes.

Food Choice

During the interviews, students were asked about their food habits and food choices, including a question about what they believe is the most important factor when purchasing foods (or in the future when they will be). Also, a second question for

intervention group students only, asked if they believe that their food-related class helped to prepare them to make better food choices currently and in the future, and to explain what was meant by “better food choices”. These questions explicitly sought whether high school students would identify elements pertaining to the health and well-being aspects and the agrifood systems aspects – only one, or both – as important to consider when purchasing foods.

In identifying the most important factor to consider when purchasing foods students noted price primarily as a key factor among others such as quality, expiry date, nutritional value and more. Charlie (G10, HT) said that the quality and expiry date of the food being purchased were important. In addition to also identifying price as the most important factor, Rebecca (G9, EFS, RS) also mentioned nutritional value as a second most important factor to price. Other students also mentioned price first, but added other factors such as local foods (Rachael, G10, FN) and “fresh instead of frozen” (Robyn, G10, CNT) or instead of “junk” (Ryan, G9, CNT).

Appearance and taste of the foods were also noted as important (Chitra G9, HT) and whether or not the products were organic (Cho, G10, CNT and Chitra). When asked about why purchasing organic would be important however, a reason could not be identified. In contrast with the others, Carrie only referenced staple products that are always “needed” in her household and stated that what is purchased is her “parents’ preference”, thus not really showing a personal opinion the subject.

Like Carrie, Rebecca (G9, EFS) and Rachael (G10, FN) also noted their parents, or *mothers’ preference*, particularly in regards to purchasing local food, which they highlighted as important to their mothers. Rebecca said that her mother “would rather

purchase from like Canada” and Rachael said “I know my mom tries to look for stuff that’s grown in Canada rather than in China or in Thailand or across the world”.

These responses show the influence of students’ parents or guardians who are still making the majority of food choices for them and therefore often explicitly or implicitly transmitting their own purchasing behaviours (or not at all in the case of Carrie). These two students’ responses also show that they have an awareness of their mothers’ purchasing habits and concerns *beyond* the health and well-being aspects of food literacy. Moreover, Rebecca and Rachel are from RS, which could indicate that growing up in a rural area helps to develop more advanced agrifood systems literacy levels, particularly in regards to purchasing “local food”. Nonetheless, this causal link cannot be demonstrated here but it would be interesting to test on a much larger scale, among rural and urban students, as well as potentially for their parents.

From this limited sample, we can see that most students have not explicitly identified agrifood systems aspects as factors of importance when deciding which food to purchase. By contrast, they often identify price and quality, which are affected by the hegemonic powers and large corporations within the systems, however, these responses do not allude towards knowledge or awareness of these realities. In fact, they moreover allude to the latter, in that these students value purchasing the cheapest possible foods, without being aware of why certain foods would be cheaper than others (i.e., processed vs. fresh foods, scale of production, McDonald’s vs. Freshii, etc.). This could also be due to a lack of value in actually purchasing products that might be identified as more sustainable and better for the working conditions and local dynamism of communities. It

could also be due to a lack of knowledge in food product selection more generally about the agricultural community and sustainability or lack thereof.

Food Choice and Habit Outcomes from Food-Related Courses

Students in the intervention groups were asked additional questions to verify if they believed that the food-related courses had improved their food-related knowledge, habits and choices. In the responses that follow, most students noted that their courses had some impact on their level of food literacy regarding their capacity to make “better food choices” after taking the course. Before answering the question however, they were asked to identify what they thought I meant by “better food choices” to which they said,

to have a healthier diet or a healthier life style (Charlie, G10, HT).

...healthy...what foods we think are healthy and also the process behind them and how like... and what they go through (Chitra, G9, HT).

... more like healthy and being like more cost efficient and stuff like that and just like overall better I guess (Rachael, G10, FN).

Although these responses are primarily health-related, the second half of the responses from Chitra and Rachael show some recognition of agrifood systems with elements related to the “process behind” the foods purchased, and the “cost efficiency” of farming practices (Rachael identified she knew of issues related to the cost of farming because her grandfather was a farmer). This question did however come after questions that asked explicitly about agrifood systems, thus coaching them and giving them a greater ability and confidence to answer this question in more than one way. Contrarily, Charlie only answered this question from a health perspective.

Subsequently, in answering the question about being prepared to make better food choices as well as in response to seeing changes in their food habits, all of the students responded positively showing some form of changes that they personally saw. For example, Charlie (G10, HT) noted that the course made him reflect on his food choices more and that he had increased abilities and resiliency in regards to cooking and feeding himself. For instance, he said “most of the time... I’d make Ramen or Mac and Cheese or just pasta, but now I know how to cut a chicken into 8 whole parts...”, in addition saying he now cooks omelets frequently, and sees improvement in his abilities and confidence with his knife skills. Rebecca (G9, EFS) also identified that she believes that the food-related class has changed her food habits, and she says that she now has the skills to make food, rather than eating pre-made or packaged foods, and that she tries to make something “from scratch” instead.

Rachael (G10, FN), similarly mentioned some changes in her food related habits after taking the foods course, however, she was more hesitant to report any large changes in the practical cooking aspects of her food skills (which she had expressed was her reasoning for taking the course). In the interview with Mr. Rice, he argued that students are often disappointed with the course because it is more theoretical than practical, as it is coming from the SSH Curriculum, rather than the TE curriculum.

In contrast with the others, Chitra (G9, HT), reported her shifts in her food habits a little more hesitantly than the others and said her parents control the food that is in her household. Nonetheless, when asked about being prepared to make better food choices in the future she said “I think like that I would... make like healthier choices and also...buy from local sources”. Therefore, she believes she will value making “healthy” food

choices, as well as possibly consider some of the agrifood systems elements, particularly food origin, in purchasing food. Moreover, Chitra (G9, HT) reported a significant change in her cooking habits after having taken her foods class. For example, she said: “before cooking class I really didn’t cook that much, I just wanted to learn which is why I took cooking class and now I cook like once every two weeks, just like dinner.”

Overall, we can see that students from the intervention groups that were involved in the interviews have reported changes in their food habits and cooking skills to some degree. Increased confidence in their abilities to cook was also exemplified, by Charlie in particular, but also by Rebecca and Chitra in their willingness to cook from scratch or more frequently. This is significant based on the findings of Desjardins and Azevedo (2013) reporting that confidence in one’s cooking skills can lead to more resilience in the ability to feed one’s self. Further, this is especially important because they will presumably become independent and move out of their parents’ homes in the near future.

On the other hand, most students demonstrated little concern about the agrifood systems elements when discussing food choice heuristics, with the exception of two students who mentioned that it is important to purchase local foods. By contrast, we can see that students’ general discussion and discourse pertaining to food is mostly connected to health and well-being elements of food literacy.

High School Students’ Agrifood Systems Literacy

In addition to asking questions about food choice and habits that could have included elements from either the agrifood systems or the health and well-being aspects of food literacy, students were also asked more explicitly about agrifood systems and the

sustainability of agrifood systems. Students' responses in regards to agrifood systems questions will therefore be addressed in this section.

Define a Food System

In defining food or agrifood systems, students' responses varied from rather basic, being able to only identify one or two elements of a food system, with others giving rather comprehensive and "educated guesses".

To begin, Charlie (G10, HT) and Rachael (G10, FN) talked about agrifood systems from a life cycle perspective. Meanwhile, Chitra, Cho, Robyn and Carrie all had rather similar responses which for the most part included growing, shipping, point of sale and "table", with some recognizing more elements than others. For example, they defined a food system as:

...the system it goes through, like it comes out of the ground, or like how they grow it, and then you pick it, and then you probably send it to trucks and stuff and get it looked at and then sent across the world maybe (Chitra, G9, HT).

Growing, then like packaging and shipping. (Carrie, G9, CNT).

...how to grow and then...and then transport to the market and the sale (Cho, G10, CNT).

...the things that are in place that go from like farmer to truck to supermarket to your table (Robyn, G10, CNT).

...how... they grow it, or how it's made kind of, I don't really know I've never heard that before... (Rebecca, G9, EFS).

Interestingly, even after having discussions about composting and food waste just prior to being asked to define agrifood systems, none of the students, recognized waste as a component of a food system.

Finally, Ryan showed the least accurate interpretation in making an attempt to define a food system, and was more inclined to think of it in relation to the Canadian Food Guide. The following dialogue is worth noting, especially since this student lives and grew up on a farm:

- Student 7: [long pause] the different types of food...like the different types of food?
- Interviewer: Sure, do you wanna expand on that for me?
- Student 7: Like veggies...I don't know I just think of the food table thing
- Interviewer: The food table? Like the food guide?
- Student 7: Ya.
- Interviewer: But what about the system?
- Student 7: [shakes head or gestures no]
- Interviewer: No? Don't know?
- Student 7: No.

This shows that he was not able to make the connection between the words “food system” and any aspect of his production experiences.

Sustainability of Agrifood Systems in Canada and North America

Following discussion about agrifood systems, students indicated whether or not they believed the dominant, or most common agrifood systems in Canada and North America, were sustainable. Sustainability was also defined for them as “socially, economically and environmentally viable or maintainable over a long period of time without compromising food security for future generations”.

Charlie (G10, HT), Rebecca (G9, EFS), Cho (G10, CNT) and Ryan (G9, CNT) were in agreement that the current system is sustainable with Rebecca stating that we have “enough food to feed everyone”, and Charlie stating that “so far it has been”. Meanwhile Chitra (G9, HT), Rachael (G10, FN), Robyn (G10, CNT) and Carrie (G9,

CNT) showed more reservation in giving a definite affirmative response or responded in disagreement to this question.

Rachael (G10, FN), was concerned about food waste and the expenses of farming and that it might not be sustainable in the long-term, which could have been of concern to her as a result of grandfather being a farmer (farmed corn and soy beans). However, in looking at the sustainability of agrifood systems more broadly, she contradicted herself in saying that it is “probably” sustainable because “it’s working now, ...everyone’s buying food and using it and going through the systems”. Also, although Carrie (G9, CNT) argued that current systems are unsustainable, her response to this question didn’t really make sense, as she said “cause we have like apples and other stuff like maple syrup”. Conversely, she eventually showed reservation in stating that our food system was sustainable since she believes there will not be enough food in the future.

Chitra (G9, HT) and Robyn (G10, CNT) showed more reservation from more of an environmental perspective. Robyn recalled issues she had learned of in her geography class about soil conservation as an issue. Also in expressing concern, yet not fully understanding of the issues at hand, Chitra referred to issues such as pesticide usage and genetic engineering of grapes and apples. She also indicated that these were issues that she had learned about in her HT class, which is notable regarding the exposure that this course has given her, regardless of her ability to explain said complex concepts.

Overall, for a G9 student, Chitra showed a rather *surface level* awareness of many issues related to sustainability and agrifood systems. Additionally, although Robyn seemed unsure about her response, like Chitra she showed genuine concern about the

sustainability agrifood systems, while Rachael and Carrie still seemed slightly unsure about their positions.

Moreover, in mentioning a way that a sustainable food system could be actualized, Chitra (G9, HT) recognized a need for issues to be more vocalized in common discourse. She insisted:

...I think we'd have to talk about it more 'cause food industries and stuff, they're not like, a big thing we talk about in the news, we'd have to get some people [to] actually start talking about it and then people will probably notice the problem and then we'd start fixing it from there.

This comment is especially interesting as we can see parallels with the ideologies behind political ecology, with a recognition of us needing to “expose flaws”, talk about them, then act on them accordingly.

Overall, based on the findings outlining students' definitions of agrifood systems and their beliefs about their sustainability, we cannot see whether or not there are any differences between students' food literacy levels between intervention and control groups or schools in regards to agrifood systems. We can however see, that Chitra's agrifood systems food literacy has augmented as a result of taking a food-related course. Further, Robyn also exemplified a rather advanced level of food literacy which can most likely be related back to the influences of her family on her food literacy (see coming sections). The remaining students' responses have shown that their food literacy in regards to agrifood systems is lacking or at a very basic level. In the next section, we can further analyze students' agrifood systems literacy based on their responses and knowledge about issues that they are aware of in agrifood systems.

Students' Examples of Food Issues Related to Agrifood Systems

In being asked to identify issues related to agrifood systems that they might be aware of, some students' responses were more advanced than others, while some were unable to come up with an example.

Rebecca (G9, EFS), Chitra (G9, HT) and Robyn (G10, CNT) identified an example of a food issue rather easily. Rebecca, in particular, indicated a rather advanced response and issue related to migrant workers and the struggles that they might face, which was brought to her attention via exposure from visiting her uncle's farm. For example, she said:

...down by my uncle's, he lives in the [an hour from RS] area, so there's a lot of farms around him that bring in a lot of Mexicans and Jamaicans to do all the like fieldwork and stuff and they obviously aren't just bringing them in to be nice, they're bringing them in because they're paying them a lot less than they would have to pay a Canadian.

This response shows an already advanced awareness that farmers seek to hire migrant workers to be able to pay them less.

Chitra (G9, HT), by contrast, mentioned examples of issue she has learned in class highlighting that there should be less processing of foods while discussing the process of grading eggs and noted issues about the diversity of apple varieties diminishing. Robyn (G10, CNT) gave an incredibly interesting example related to a "virus" among banana crops. She said:

...bananas may be no more, because there's a virus where...or a disease where they're growing...it's spreading like wildfire, there's no cure for it, and it's...they say that it can spread by like soil on peoples' shoes even...and it's really harmful, they're trying to burn all of the things that are infected, but it's....so they're trying to mutate a new type of banana that's immune to this disease.

She indicated that she heard this through the parents she babysits for as well as from her father. This shows that discussions about food issues occur with people she knows and at home.

Charlie (G10, HT) hesitated and came up with a less precise example, and stated that “sometimes the local people don’t get as much, like, I want to say attention, but ... since their stuff actually is like better... we always just buy like the cheaper stuff no matter what”. He therefore recognized inadvertently that purchasing local food can be more expensive, and although it may be “better”, in reference to supporting local farmers, they are concerned with price primarily in his family. This is interesting that this student is recognizing that price is possibly in contention with “quality”. This student also wanted to add to the importance and mentioned “bigger companies”, but could not elaborate on his thoughts, and said he was “unsure”. Although his thoughts on what he meant by “bigger companies” is unclear, it does potentially show the beginnings of an awareness of underlying power structures in agrifood systems.

As for other students, Carrie (G9, CNT) recognized drought as an issue, which Rachael (G10, FN), again was concerned with the costs of farming. Contrarily, Cho (G10, CNT) and Ryan (G9, CNT) could not come up with an example. This is especially interesting again, considering that Ryan lives and has grown up on a farm. As a result of his lack of response I inquired further and asked if he talked about any struggles that they might have on the farm at home with his parents, to which he replied, “...they don’t talk about any of that stuff”. Cho also indicated that she does not talk about food issues at home with her “aunt and uncle” beyond foods that go to waste in their fridge.

In this section, we can see that when students are asked about issues that might be related to agrifood systems, even after having discussed and defined the meaning of this, some of them still cannot identify issues at all. This is with the exception of Chitra (G9, HT), Rebecca (G9, EFS) and Robyn (G10, CNT) who have all given examples with surface level explanations of understanding and acknowledged that they have learned about them through a food-related course, rural exposure or discussions with parents. This last finding about how connected students' food literacy still to their parents' beliefs and actions has thus become even more apparent here and will now be discussed further in the next section.

Influence of Parents'/Guardians' Food Literacy

The influence of parent and guardians' food literacy on their daughter/son's food literacy seems to still play a very influential role on them at this stage in their lives. In regards to talking about food at home or with others, Charlie (G10, HT), Rebecca (G9, EFS), and Rachael (G10, FH) identified that they talk about the foods that they made in class, while Chitra (G9, HT) identified that she discussed the food issues that she learned in class at home with her parents. Further, Rebecca (G9, EFS), Rachael (G10, FN), and Robyn (G10, CNT) showed that they either overhear or listen to the types of food that their parents are buying, or recognize that they are with them and aware of it when they are grocery shopping. In the case of Robyn (G10, CNT), she identified that she discusses food and food issues frequently with her parents at home. Contrarily, Charlie (G10, HT0, Cho (G10, CNT), Ryan (G9, CNT) and Carrie (G9, CNT) state that they do not generally talk about food with their parents or guardians, other than food waste, in the case of Cho.

Robyn (G10, CNT), more than any other student stated that discussions about food and food issues were common discourse in her household. She said that these conversations occur in “car rides” and over “dinner conversations” and that they “bring up like world issues”. She also seemed to exemplify the most advanced level of food literacy out of all of the students, not only showing knowledge about agrifood systems, but about healthful eating and exemplifying a strong relationship with food as well (“eating to feel good”). In her interview, she also mentioned that her (step)mother was Celiac, which could help to explain a heightened awareness about food in their household.

Additionally, when students were asked about the importance of purchasing local or thinking about the origins of their food³⁵, the ones that showed that they didn’t care or didn’t think about it also said that their parents or guardians shared this sentiment (Cho, Ryan and Carrie), whereas those that seemed more informed talked about it with their parents (Robyn) or had discussed some of these issues in class (Chitra).

In addition to these findings, some students spend more time in the kitchen at home than others do, showing that is occasionally a place conducive to learning about the complexities of food and cooking. For instance, Rebecca (G9, EFS) stated that when she cooks with her parents, she usually does the “easier stuff” which she recognized to be “chopping vegetables or... flipping something that’s in a pan or putting something in the oven or taking it out”. Other students also identified that they do the “easy jobs” while

³⁵ Not possible to discuss in detail in this thesis due to limited space

helping their parents in the kitchen such as “chopping” (Chitra, G9, HT) or “washing” (Cho, G10, CNT).

Rachael (G10, HF) also identified that if her mom is away she will often prepare meals ahead of time, letting the rest of the family know when to eat what. Although this is an important “parenting duty”, if these adolescents are not involved in this process, nor preparing meals and occasionally fending for themselves, they are not developing skills or experience in the kitchen necessary for independence later on in life. Meanwhile, Rebecca (G9, EFS) also identified that the majority of time that her parents are cooking she is doing her homework. This is important to consider, especially since this is a G9 student, who will presumably have more and more homework each year, keeping her from developing her food literacy and skills in the evening with her parents. Significance can be drawn from these statements since “a lot of the time” students may not be in the kitchen, keeping them from developing their food literacy and skills, showing the importance of it being better integrated into the education system and more wide-spread.

Conclusions

Overall, learning about food in school and developing one’s food literacy outside of the home appears to be essential for many students who participated in this study. This is especially important when young peoples’ parents’ or guardians’ food literacy is also lacking, when students are not spending much time talking about food at home, or when they are not involved in the cooking and learning process at home.

Although all of the intervention students have not shown an intermediate/ transitional or advanced level of food literacy, they all have mentioned that their food-

related courses have been beneficial in regards to practical skill-building. In spite of this positive outcome, it seems that students' food literacy continues to be lacking the most in regards to agrifood systems, as predicted. Nonetheless, it seems that the food-related programs at CS, particularly for Chitra (G9, HT), might be more effective at introducing students to the complexities of agrifood systems than those at RS. By contrast, at RS, although the students from the food-related courses show some awareness of agrifood systems, this seems to be as a result of rural exposure rather than school intervention.

As for the students from control groups, with the exception of Robyn (G10, CNT), they have shown that their food literacy is lacking or very basic in regards to agrifood systems. This is especially concerning in regards to Ryan (G9, CNT), who has grown up on and still lives and works on a farm. Such examples certainly point towards the need to make food literacy courses mandatory, rather than leaving them as electives, especially considering the life-long, household and societal impacts that such knowledge may have for youth now and for passing on essential "life skills" to future generations, in a world in which climate and health problems are becoming more acute. These questions and concerns will be addressed further in the next section.

Teachers' Perceptions of High School Student's Food Literacy

Several topics were discussed with teachers from the food-related classes, however, due to the scope of this thesis, only a few have been analyzed. To better understand students' food literacy as presented in the previous sections, teachers descriptions of their students' knowledge before and after the classes, as well in regards to agrifood systems, are discussed. The final section examines the impressions of

teachers' about making food-related courses mandatory and the discretion that they exercise in designing and in delivering course material.

Student Knowledge Before and After Class

During the interviews, teachers were asked about the level of food-related knowledge of their students before and after having taken the course as well as program outcomes. Ms. Rosemary was eager to reply and said "they don't know much..." but that some kids are more informed than others, especially if they are athletes concerned about diet, exercise and nutrition. She added that, in her courses, they all know "the difference between healthy and junky food", and that she emphasizes "balanced meals", "plant based foods" and adding more "vegetables and fruits and water" into their diets. In terms of what students take away from her course, she said they "walk away with more cooking experience than they came in with".

Mr. Cumin and Mr. Chili stated that students' knowledge coming in is "really varied" (Mr. Cumin) and there is a "diversity of skill sets". Mr. Chili stated: "I have students that cook for their home 3...4...5 days a week and I have students that don't even know what a popsicle is, they don't have a clue... they don't even know how to hold a spoon". Likewise, Mr. Cumin said: "some kids... come in with absolutely no sense of food and where it comes from and how it should be cooked", while others are very informed coming from families with parents who are "big foodies", however they all leave with augmented skill sets.

Ms. Rosemary also echoed the influence of students' parents: "they don't know a whole lot, they know what their parents teach them at home...". Mr. Chili also mentioned

family influence in regards to “values” and “sharing meals” and food being a central part of “family time” and connection building. These last points show again the importance of familial beliefs and values regarding food, and the influence of parents’ or guardians’ knowledge and practices on students’ food literacy.

Students’ Knowledge of Agrifood Systems

Considering the particular interests for this master’s research, teachers were interviewed about students’ agrifood systems knowledge. Their answers varied slightly, with the two teachers from RS believing that their students are relatively informed, while the two teachers from CS were more reluctant to admit that their students were informed before their course, and even after. This could be highly related to these teachers’ expectations of the level of where they believe their students’ food literacy should be situated after having taken their course in addition to a potential comparison with the level advancement and breadth of their own food literacy.

Ms. Rosemary noted that the rural nature of the community has an impact on the students’ food literacy and that there are “a lot of kids liv[ing] on farms... where they have access to fresh, locally grown food”. She believed that her students leave her courses having “learned a few things like... the difference between organic and other foods... free range... you know, whether it’s antibiotic or hormone free...”. Mr. Rice, also argued that the rural location of the school plays a big role in the students’ awareness. For example, “by virtue of our somewhat rural nature here, I think that students have an idea as to where food comes from and umm... it’s not like the only time they’ve ever seen a cow is when it’s behind cellophane”. Both statements highlight that

Mr. Rice and Ms. Rosemary believe that their students have an awareness and some agrifood systems literacy as a result of living in the countryside and in close proximity to agricultural production.

Mr. Chili, unlike Mr. Rice and Ms. Rosemary, strongly disagreed about students' awareness about agrifood systems, and *everyone's* food literacy more generally. When asked if he believes that students are more aware about agrifood systems at the end of the semester, he said: "Yeah, absolutely... do they know everything? Gosh no...these are really complex questions." Mr. Cumin agreed with Mr. Chili about this lack of agrifood systems literacy among students, leading them to focus on this aspect in their programming.

In addition to these discussions, Mr. Cumin actually addressed and discussed the concepts of food literacy and kitchen literacy. He explained that he associates food literacy with "the understanding of consciously thinking about" the types of foods being purchased, where they are coming from, who is producing them and the scale of production, to be able to use this knowledge when walking into a grocery store. Also, for him, kitchen literacy is more associated with "basic cooking knowledge", knife skills, food safety and more. Further, he questioned whether or not someone can be food literate without having cooking skills and states that one can:

... know all the right things to do, because you know to compost and to shop locally and to, you know, buy organically wherever possible and to get your ingredients from the best suppliers and all that kind of stuff, but you don't actually know how to put the food together, are you still food literate? And the debate still rages on... I think that we would like our students to leave with a little dose of each...

These statements show that this teacher (like Mr. Chili, see section below) thinks it is key for students to be aware of the agrifood systems aspects when purchasing and in making decisions about food, in addition to acquiring cooking skills or “kitchen literacy” (in his words).

Overall, Mr. Rice and Ms. Rosemary’s interviews point to the assumption that their students have acquired some agrifood systems literacy thanks to their exposure to agrifood production in the rural community setting where they live. In contrast, Mr. Cumin and Mr. Chili mostly emphasized the lack of agrifood systems literacy, arguing that “they don’t have a... clue” (Mr. Chili), which led them to make efforts to include these specific elements in their programming.

Enrolment Rates in Food-Related Courses

During interviews, teachers were asked about the enrolment rates in their classes. None of them expressed difficulty in filling them, noting that enrolment rates are “strong” (Ms. Rosemary) and even, in the case of Mr. Chili, that he has waiting lists for these classes. Nonetheless, the teachers noted that they do not reach all or even the majority of students attending their school. Mr. Cumin and Mr. Chili also highlighted that there are many options to choose from at their school in regards to Technical Education (TE) courses. This echoes the reasoning of Carrie (G9, CNT) explaining why she had not yet taken a food-related class and might not take one. Ms. Rosemary also highlighted that some students “who are science bound, who want to do a senior science” are “going to take their senior science over taking a class like this” [referring to a food-related FS

course]. Based on such perceptions and findings, it is concerning that a majority of high school students in Ontario do not take a food-related class.

Mandatory Food-Related Class

As a result of the aforementioned reasons for students not taking food-related courses, and in noticing such concerns in the literature (Desjardins & Azevedo, 2013; Slater, 2013), teachers were asked during the interviews if they believed that a food-related course should be mandatory in high school. Every teacher agreed that high school students should have a certain amount of knowledge and skillsets regarding food, or “life skills” more generally, however, not all of them explicitly agreed that a food-related course should be “mandatory” per-se.

Mr. Rice was the most hesitant to state that a food-related course should be “mandatory” because the “libertarian” in him “just doesn’t buy that”. He nonetheless stated that although he believes that students should be able to choose these courses “at their own free will”, he would make sure that his “own children would take a food and nutrition course or a culinary course”. This last statement thus reveals that he does value these courses.

The remaining three teachers agreed more strongly that there should be a mandatory “nutrition”, “food preparation” or “life skills” course. Ms. Rosemary said:

Yeah, I think the kids should have a mandatory you know... Family Studies course, or nutrition course, or a *life skills course* because they all bring something from outside of academics... umm that they’ll be able to take with them when they leave school for sure... kids can take math and never use it again, like, they’ll know their basic accounting and budgeting and things like that... but in a Family Studies class they’re learning a lot of skills that maybe they didn’t learn at home... You know, it’s really a way to take care of themselves and real life skills... understanding, problem solving, analytical thinking...

Another key point that she raised, which also became evident in the interviews with the students, is that some students don't always learn necessary life skills at home, and that familial situation has a large impact on students' food literacy levels.

Mr. Cumin also highlighted that a course with an emphasis on food preparation should be mandatory. He argued:

I think that there should be *one* mandatory food class...and by food, I mean, food preparation class... whether that's, you know, a mandatory grade 9 or grade 10 class, I don't know... every kid should learn how to safely prepare food, handle a knife, understand how a kitchen works a little bit, understand how to store food properly, how to shop for food properly, and how to...within reason, put together a certain number of healthy meals... But more importantly, understand techniques... but yeah, I think it should definitely be mandatory. But I think it should be a food preparation course that encompasses the food systems side of things so that they understand about where their food comes from... but if they don't have the manual technical experience of actually cooking and preparing food, then I think that that's not what we need, because I think what's happening is a lot of young people are growing up without these skills and therefore you get to a situation where you get an over reliance on processed and packaged foods and take-out foods and stuff like that because there's this mystery surrounding how food gets made and where it comes from...but I think you need to have both, I think you need to have the food literacy piece and the kitchen literacy piece combined in one course that then should be mandatory...

This response highlights many elements of the value seen in having *one* mandatory food preparation course, as seen in the eyes of this teacher, and his beliefs about it not only encompassing the skillsets needed to make a meal and put food on the table, but to understand "food systems" as well. Accordingly, in being asked further about whether or not a course that would include a "food literacy piece" and a "kitchen literacy piece" could be possible (as he previously indicated), Mr. Cumin responded:

Oh ya... I think we touch on enough of those food literacy components that the kids should understand where their food comes from and how to prepare it properly. And then, we give enough of the technical background that they should be able to walk into a kitchen and grab a knife and look in the fridge and say "Ok,

you know I can make this, this and this if I have to make... if nothing else I can make an omelet for dinner tonight” sort of thing.

His last remark about being able to rely on making an omelet “at the very least” shows his concern and desire to go beyond the “hospitality” elements, to teach the students resilience and give them the skills to feed themselves. Accordingly, Charlie (G10, HT) from his class, had indicated that he now cooks omelets at home for himself frequently, thus showing the value in this lesson for at least some students.

Mr. Chili also exhibited a strong opinion for young people to be learning about food. In response to being asked whether a food-related course should be mandatory or not, he responded with the following rhetorical question: “Do you have expectations to eat?” In expanding on this he passionately testified:

I don’t think it’s realistic that everyone’s going to have to solve quadratic equations when they’re forty, and thankfully there’s someone who knows everything about a quadratic equation and can solve those types of issues, but that person that can solve the quadratic equation is gunna eat, and the person that maybe, you know, ends up doing some sort of other career, is gunna eat... the commonality to me, it just doesn’t make any sense that we’re not giving fundamental life skills to everyone...

This teacher is thus recognizing that food-related courses, in comparison with other courses such as math, are no longer being valued in a way that they should be, which is reiterated by Slater (2013).

Mr. Chili also elaborated and discussed “life skills” more generally, with food still at the centre of the acknowledgement of the necessity of these courses being mandatory:

...I know how to sew... I don’t think a lot of these kids do... I don’t think it’s unreasonable to have these types of life skills, and I can’t see why they shouldn’t be part of the curriculum. I mean, we have students until they’re 17/18, why can’t we fit some of these you know essential... “you’re gunna interact in the real world, you’re gunna eat, you’re gunna have to mend something, you’re gunna have to, you know, balance your banking book, you’re gunna have to understand

how to do laundry”, umm... None of these things are really represented in meaningful ways within the context of secondary and elementary school, they’re just not... so do I think it should be mandatory... Absolutely.

Furthermore, in recognition of the importance of a more holistic food literacy and understanding of the world around them, as well as the individuals’ impacts on said world, Mr. Chili stated that the person is political, along with their actions: “... in my opinion, I think that the person is political.” He then gave many examples of how this statement was “true”, and many examples of decisions that he makes based on his personal values and political agenda. However, he also added:

... the shoes you wear, the scarf you buy, the type of shampoo that you buy... everything that you intersect with in an economical way is a political act... I think if you’re going to engage in this world meaningfully you need to be armed right... and that’s not happening...

These last statements are incredibly pertinent to this thesis, as it shows that this teacher believes that his students should be able to go out into the world, understand the implications of their decisions, and be informed in their “political acts”. This is important because this idea relates back to the ideas present within the political ecology lens of being aware, and “exposing flaws” within the system to eventually work towards and seek change within society.

These individuals’ statements are important to consider and credible since they experience the food literacy levels of high school students firsthand, and work with the youth who will soon be independent members of Canadian society.

Moreover, we can piece together the potential necessity of at least one of these courses being compulsory. Depending on the course selection career path laid out for students, they might not be able to fit one of these courses into their schedule, or they

might choose a different elective if they do not believe that it is necessary for them personally. Generally, this highlights the value in and significance of making one of these courses mandatory.

Teacher Discretion

On a slightly different note, one of the most interesting and perhaps pertinent findings and themes from this entire study pertains to the teachers' personal interpretation of the curriculum and their delivery of the affiliated course material. All of the teachers that were involved in the interviews for this study reiterated this observation, some more explicitly than others. The following examples will help to explain what is meant by this observation.

In being asked about meeting curriculum expectations, Ms. Rosemary stated that the time spent on covering the different aspects of the curriculum often depends on the teacher, their beliefs of how those units should be covered and how they develop the course. She expressed:

...well the whole thing with the curriculum is that you can take... a whole lot of time with one thing, or you can take a little bit of time with one thing... so if I decide "Oh! The kids need to learn about Canada's Food Guide", then I'm gunna take... a week, so they're gunna learn about Canada's Food Guide, they're gunna look at other food guides, compare them, and then they're gunna do a food guide assignment to do with their own meal planning, so that could take a week...if I want to do.... teach them about... I don't know, you know...some sustainable agriculture, you know, I could take half a period and be done with it...but I've touched on that. So, the breadth and depth of the curriculum is based on the teacher who has developed the course... so umm, you know, sometimes it's hard to hit every little...the overall expectations are much easier than hitting every single specific expectation in the curriculum guide...

Her discretion is also evident in the way that she teaches the G9 EFS course. Ms.

Rosemary at another point in the interview mentioned that she could spend more time

sewing, but she chooses to take a direction that involves more cooking because she enjoys that, and believes that the students do too.

Also exemplifying his discretion when talking about interpreting the curriculum in designing his course, Mr. Cumin expressed that he includes what he believes is most important to cover in regards to course material, in addition to the skills that he is giving to his students. He conveys:

I started to decide you know, what should kids learn in grade 10... if you're coming into a cooking class and more importantly, if you were leaving a cooking class, what should you learn how to do... what sort of basic skills did I believe were important that if they never took another cooking class that they would at least be able to... put some food on the table.

Mr. Cumin later added that he does his best to incorporate the curriculum expectations in “a meaningful way” and that they’re not delivered as an afterthought. He gives incorporating environmental aspects as an example in which he says:

...we do our best to cover the majority without covering them for the sake of covering them... the curriculum expectations that we achieve with the students, as far as I’m concerned, are done in such a way that they’re integrated in the course in a meaningful way... they’re not delivered in an ad hoc basis or in an afterthought basis... “Oh, by the way, we need to do something about the environment, so we better throw something in there” (Mr. Cumin).

Mr. Cumin also adds that the integration of the discussion of environmental sustainability as an integral message in the program at CS exists out of personal interest. For example, he says that “it’s mostly out of personal interest...that aspect is not covered as widely in the curriculum as I think it should be”.

Also, in addressing discretion, Mr. Chili states that he covers material from the curriculum that he and Mr. Cumin believe are the most enriching elements. He mentions:

...we break a lot of rules, not like ethical rules, but we break a lot of rules in curriculum expectations, when you get down to it, we are representing the

curriculum, but we are still focusing on a certain aspect which we think is much more enriching...

He adds that in covering the nutrition aspects of the course they don't necessarily "toe the line of the Ministry's notions of what it is to eat nutritious food". Despite this comment, he also states that they do try to talk about balanced meals and nutritional health from a perspective that is less scientifically contested.

Mr. Rice also expressed that he emphasizes the curriculum elements that he finds to be the most important his G10 FN course. Once he had asked about the more specific research questions and goals, to which I identified were to find out about students' food literacy with a particular emphasis on the agrifood systems aspects, he attempted to explain how he "touched on" this aspect but "maybe not in terms of formal teaching all the way through". He then indirectly identified that the "ecological things" are not necessarily his main priority in teaching this class, which he followed up with:

I mean... Yeah I just, to me there are so many other aspects of the course that umm...like right now the first month is just trying to get 'em safe and get 'em some basic measurement and some basic kitchen skills and that takes up over a month of the course...and then there's all these expectations about the influences on food and yada yada yada and then the marketing and nutrition and so on, and uhh... the big picture ecological things are ... you know, there's just not enough hours in the day, umm... to me yeah you could do a whole course on sustainable food and that sort of thing you know... (Mr. Rice).

Before this statement was made, he also added that he does "try to emphasize local" in response to a question that asked if he touched on aspects about where food comes from and not just the nutritional aspects. However, in a way, he also expressed that he believes that students are already relatively informed about where their food comes from because of their community's location, as formerly stated above. Finally, he also added that he

had injured himself near the end of the semester, and that finally, that unit was not emphasized in that particular class.

Irrespective of the way that these teachers have identified that they decide to address the material laid out in the curriculum, they also have voiced their concerns about the breadth of material covered in these documents.

...it is challenging sometimes because the document is quite extensive and I think the thing that people need to realize is that the curriculum document is a guide and there is an interpretation and a professionalism that is inherent in making sure that you use it as that guide to inform your teaching practice (Mr. Cumin).

In addition to the breadth of the documents, another challenge that teachers face addressing the material in the curricula is the need to teach based on current societal, local and global events. Ms. Rosemary noted that:

...you are changing things around and...things, statistics, data and articles and what's happening in our society changes and what's popular and what's a current fad and what's nutritious and you know, what we're trying to teach the kids and you're trying to keep up with that too.

Mr. Chili added that the broadness of these documents often leads to simply “paying lip service to some aspects...to fulfil the ministry requirements” while Mr. Rice also emphasized that the curriculum has too many elements to consider. This can be seen from when Mr. Rice said “name a high school course that is not over expectationed to death”.

All of the above statements show that teachers are perhaps making trade-offs when it comes to teaching specific units outlined in the curriculum based on what they believe is most important. This is most likely due to time constraints, as outlined above, however, another element to consider could be that teachers are possibly unsure of how to incorporate all of the different elements throughout the course in an integral way, as Mr. Cumin has outlined that they do at CS.

Teacher Program Descriptions in Comparison with Ministry Requirements

As teachers have emphasized above, it is potentially out of reach for teachers to always meet all of the Ministry of Education's curriculum requirements in a comprehensive manner. As Ms. Rosemary said, it may not be possible to "hit every little" expectation, but that it is easier to meet and cover the "overall expectations". Having said that, based on the overall expectations for the G10 FN, Family Studies course, the "local and global foods" unit is one of five of the Ministry's overall expectations (Ontario Ministry of Education, 2013). This proves to be problematic if it was not emphasized, included or potentially skipped altogether in this course.

Conversely, without having probed further on this subject and in only having touched the surface of it, nor having research tools available that test the exact depth and breadth to which this expectation was covered, it is not possible to draw solid conclusions on this finding. This also runs true for the other courses that were involved in this study, however, based on the teachers' descriptions of their courses, it seems that they may have more comprehensively covered the Ministry's overall curriculum expectations for their courses.

Conclusions

We can see that the teachers interviewed for this study believe that their students' food literacy is potentially lacking, depending on the student and the influences of their family, before they take a food-related class. In their view, their students learn some valuable "life skills" in their courses and that this type of course should either be mandatory or their lessons better integrated into the overall education system. In addition

to these findings, we can see that the teachers from CS and the more urban-based community believe that their students are not very informed when it comes to the agrifood systems aspects of their food literacy, whereas the teachers from RS believe that their students are more informed on this subject due to the rural nature of their community setting.

Although these statements do confirm the third hypothesis of this research, no strong conclusions can be made in regards the actual agrifood systems aspects of students' food literacy and further assessment is needed. Contrarily, there are definite trends, as seen in the former sections. Finally, we can see that these beliefs, as addressed by teachers, have contributed to the ways in which they decide to teach their course and what they believe is most important to cover in terms of Ministry expectations.

Chapter 6: Tying it all together

General Discussion

Based on the data gathered during my field work, students' food literacy seems more developed in terms of the health and well-being aspects of this concept. Moreover, in general, students' food literacy in regards to agrifood systems emerges as basic or lacking, thus confirming the initial hypothesis.

This research has examined many different elements in an attempt to evaluate the level of high school students' food literacy in Ontario. Some trends have become apparent regarding the particular research questions of this thesis. One of them is the effect of community location on the agrifood systems aspects of students' food literacy. Both the questionnaires and the interviews show that the students from RS are more agrifood systems literate than the students from CS. Interviews with the teachers also supported this finding. Nonetheless, it is important to keep in mind the small sample of this study, as well as the fact that it may apply only to some elements of their understanding of agrifood systems (like seasonality and the importance of local foods).

The interviews have shown that the specific context of each student can also play a key role, especially when looking at the responses from Ryan (G9, CNT). This student grew up and still lives and works on a farm, but has an overall limited understanding of agrifood systems. This shows that community, rural or even farm exposure may not provide young people with the ability to think critically about agrifood systems.

For the influence of food-related courses on students' food literacy, the interviews generally pointed out that students believe that by taking a food-related class, they have

acquired food literacy primarily in regards to their food skills. Only one of the students interviewed from the city school (Chitra) demonstrated amelioration in her agrifood systems knowledge as a result of taking a food-related course. Based on the limited scope of this research, it remains uncertain what the differences are in program outcomes. However, based on the teacher interviews and questionnaire responses, the food-related programing at the urban-based school (CS) appears to be incorporating agrifood systems elements more frequently than at the RS.

Another interesting finding is the significance of the impacts of parent or guardians' own food literacy, habits and discussions about food on their children. This emphasizes the importance of taking this element into account when thinking about the best way to design curriculum for high school students. Since parents or guardians are then the primary source of information for their children and that many of them may be lacking a good understanding of agrifood systems, especially in urban settings, it becomes crucial to promote mandatory courses which incorporate a broader approach to food and nutrition than those presently offered on a non-compulsory basis. Teachers also expressed concerns about these elements and supported the idea of making a food-related or "life skills" course mandatory. Ideally this would incorporate elements of nutrition and food preparation, or "kitchen literacy" (Mr. Cumin), as well as education highlighting the fact that each "person is political" through the way they are consuming and eating, teaching students about the power that they hold when making such decisions in their everyday life.

Another interesting finding is the discretion of each teacher in deciding what they believe is most important to teach or emphasize in their food-related courses, as seen

through the interviews. This discretion may have led to the agrifood systems aspect being less emphasized in one of the four food-related courses under study, not only where it could have been better integrated, but also where the teacher chose to focus mostly on other elements. Overall, we can see that food-related courses have a positive impact on at least some aspects of high school students' food literacy levels, but that their agrifood systems literacy still appears to remain basic or lacking. It is also uncertain to what extent the health and well-being elements of high school students' food literacy are developed, but this aspect seems to be more developed than agrifood systems knowledge.

Recommendations

This thesis started from the assumption that it is necessary to better integrate, rethink and improve the education system regarding how young people are being taught about food in schools. This was seen as especially important considering the current problems with the dominant agrifood system globally and in Canada, which is based on export-led, capital and energy-intensive monoculture. It was also presumed from this same assumption that it would be logical for the Ontario Ministry of Education to incorporate education for comprehensive food literacy as a key educational objective, aligning with their environmental educational policies. However, in this same context and based on the results, this thesis was unable to conclude whether or not current programs are indeed effective in regards to enhancing food literacy beyond food skills. Therefore, the Ministry needs more research to act on and may also need to consider changing, re-organizing and continuously updating not only their programming but also their professional development programs for teachers who work in the realm of food-related

education for enhanced knowledge based outcomes (i.e., agrifood systems and nutritional knowledge).

As a result of the exploratory nature of this study, the food literacy outcomes (for both agrifood systems and health and well-being) from food-related education and students' subsequent ability to make meaningful decisions in the future cannot be said with certainty. There were not enough responses from teachers and students and other challenges arose as a result of questionnaire design. Nevertheless, some of the results from this study did show that teachers (notably from CS) believe that their students are being exposed to flaws within agrifood systems, which was also demonstrated by Chitra in her responses. Contrarily, teachers from RS did not emphasize or may not have initiated these discussions in their classrooms, therefore showing a lack of possibility for such knowledge outcomes to be acquired as a result of students' food-related courses – if it was present it would have been gained from another source (i.e., parents, other classes, etc.). Some of these findings, notably those from RS demonstrated a lack of discussion of agrifood systems this study points towards the relevance for a revised and more comprehensive food education program, which could be integrated at all levels of schooling, from kindergarten until grade 12. Further research would therefore be useful to confirm these statements.

This research also highlighted the importance of professional and extended development of teachers' skills and knowledge, especially about agrifood systems knowledge. Specific trainings and materials are needed to adequately support well-intentioned teachers, curriculum developers and school boards in order to reach the expectations and benefits of a holistic and well-integrated program. To have the much-

needed courses that are truly interdisciplinary and cross-sectional, teachers need training and support that is of this nature and that crosses discipline boundaries. This is especially important when considering the complexity of these issues and their interactions with many other dimensions of individual and collective well-being, as well as the centrality of healthy ecosystems and diets for future generations. It is in line with the Canadian Government's objectives of taking environmental issues seriously and of reducing the public costs of health care given a growing and aging population.

Moreover, based on the teachers' reflections showing how complicated it is to incorporate every curriculum expectation in a "meaningful way", the Ministry of Education should address these issues on a more frequent basis during professional development days. This is especially important when there are revisions in a curriculum, in order to educate teachers about these changes as well as give them specific ideas and tools about how to incorporate agrifood-related lessons when updating their course material. Teachers need adequate support in order to incorporate the Ministry's expectations, especially as their tasks are already quite demanding in a time of reduced budget and resources, as well as being up to date with the issues that are relevant locally and globally in regards to agrifood systems.

Additionally, considering that we know that feeding oneself properly is an essential "life skill" that is not necessarily transferred to all students at home, especially if parents or guardians themselves are lacking the food literacy to teach their children. This essential knowledge is not something that should be left to chance, which reinforces the argument for making such courses mandatory and universally integrated in secondary schools.

Further research is also needed for developing more comprehensive measurement tools incorporating *both* the agrifood systems and the health and well-being aspects of food literacy, but also for using such tools to measure food literacy among Canadians more generally. We need more studies that actually measure food literacy *comprehensively* among high school students to be able to update the programming accordingly, to arm young people with the tools to develop value systems and translate this knowledge into practice as they consume, cook, produce and waste food, but also as they raise the next generation.

In addition to this, a full curricula analysis needs to be undertaken to look at where discussions of food exist and how explicitly they appear. This will help to make food-related educational requirements more obvious for teachers, primarily in regards to agrifood systems, so that they can properly interpret the information within these documents.

Finally, this study highlights the need for identifying benchmarks, agreed upon by a diversity and variety of scholars, public health experts and educators, to decide the desired food literacy level for each age category. For instance, these benchmarks for high school students could be created in a way that they reflect the entire curricula, from elementary school, up until the point of secondary school graduation. This would again assist teachers and schools in ensuring that programming is being incorporated and delivered effectively.

Challenges and Limitations

Considering that this research was exploratory and the concept of food literacy is still being developed and contested, there were many challenges and limitations in terms of the methodology and research tools. A primary limitation is that the results are not generalizable across a broader population of high school students in Ontario. This is due to the small sample size, as well as the multiple layers of analysis that were included in the study (four different intervention groups). However, the review of the literature and analysis of this research provide rich and innovative findings for this field, as well as important recommendations for future research projects, teacher training and the design of food-related courses.

In regards to the research tools, some challenges were encountered in the inability to create combined variables, the variation in question formats (i.e., Likert scales, yes or no, etc.) and the lack of continuous data (inhibiting the use of many different statistical tests). These challenges made it difficult to come up with concrete and reliable information to measure food literacy and to determine the students' food literacy levels and the changes based on taking the food-related courses, rather than simply identifying trends and making subjective observations.

The requirement to obtain parental consent for students under the age of 18 to participate and students forgetting to bring their consent forms was another challenge. This added delays in the research process, especially considering the limited time frame to complete the research, which may have limited the number of consent forms that were returned in time for students to participate in the study.

Finally, the most important limitations for this research are the time constraints and the scope of the fieldwork. It was incredibly challenging to make it through multiple ethics boards, complete the data collection, data entry, clean-up and analysis and the writing of the thesis within the time frame of this master's degree. Nonetheless, interesting findings have been identified, as well as gaps in the research for further investigation.

Conclusions

Do you think that [food issues are] important to keep talking about with your friends and family? (Interviewer)

Yeah, so everyone can have better knowledge about it and we could do something to fix it. (Chitra)

As agrifood systems have been changing and will continue to do so for better or for worse, we have witnessed fundamental shifts in people's food habits, not only in regards to the foods that they are consuming, but also in their abilities to cook and prepare meals. Moreover, the nutrition and culinary transitions have been encouraged and capitalized on by industry with the practices of said transnational agrifood corporations being environmentally destructive for the most part. They have also created social inequities and economic difficulties for farmers and countless other people worldwide.

Concurrently, as fewer families and individuals cook and prepare meals on a regular basis and more women have entered the workforce, food-education courses have been undervalued and seen as "optional". This is at least in part because an increasing number of individuals and institutions have been convinced that industry can compensate and provide an increasing array of ready-to-eat meals that only require reheating. The

optional nature of taking a food-education course among an increased and the increasing distance between farm, food, producer and consumer, have led to a presumably decreased and decreasing food literacy. In addition to lost practical abilities to produce and prepare food, numerous people also lack connections to the foods that they are choosing and a good understanding of the food production chain that brings food from the field or forests and oceans, to their tables and waste bins, on a daily basis. Researchers discuss these concerns, but a glaring issue is that individuals are seemingly working in silos at a time when interdisciplinary thinking is urgently needed, not only for population health, but also for environmental sustainability and economic prosperity. This is especially important right now to make sure that the new National Food Policy for Canada will integrate agrifood systems thinking.

As a result of these realizations and gaps in the research, this thesis has highlighted a lack of interdisciplinary discussion – mainly in academic literature – in the development of a comprehensive conceptualization of food literacy. This was realized through an analysis of the food literacy literature, adopting a political ecology perspective which contributed to “exposing flaws” and proposes an innovative way to map out and evaluate the multiplicity of agrifood issues more systematically.

Moreover, after having presented food literacy in a more comprehensive manner, I have also sought to situate the development of high school students’ food literacy levels, with a particular interest in their knowledge of agrifood systems. In doing so, I compared students’ food literacy between four different food-related programs from two different curricula in two Ontario high schools, with four additional classes of students who have not taken a food-related course. This was done to see the degree to which their

food literacy levels were developed, as well as to analyze the influences and outcomes of the different food-related courses, in addition to community location (urban versus rural).

These objectives were addressed through analyzing both quantitative and qualitative primary data, which was collected through questionnaire distribution and interviews with high school students as well as interviews with their teachers. The findings from the research have shown that food-related education programs have enhanced high school students' practical cooking skills and food safety knowledge. Also, the HT program at CS appears to be more effective in delivering material in regards to agrifood systems. This is most likely tied to teachers from CS putting more emphasis on integrating material about agrifood systems into their lessons and courses than the teachers from RS. However, students' food literacy in regards to the health and well-being aspects appear to be more developed, and that the majority of students still seem to lack food literacy in regards to agrifood systems. The research also demonstrated that the students from RS are slightly more agrifood systems literate than students from CS, most likely because they live in a rural area. However, this may not be true for all students. More research would be needed to confirm this finding.

As some trends regarding Ontario high school students' food literacy have been highlighted in this thesis, it would be extremely important and timely for researchers to continue to investigate this area, and to improve the tools to facilitate more in-depth evaluations of a greater number of young people's food literacy.

In conclusion, this research has echoed the concerns raised by the Conference Board of Canada (2013) in regards to food literacy lacking among Canadians, especially in regards to agrifood systems and among Ontario high school students in particular.

Furthermore, knowledge and awareness about the multitude of existing issues in our agrifood systems today are essential for the amelioration of practices and more comprehensive sustainability moving forward. This is especially timely as the federal government is developing its first ever National Food Policy.

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Appendix A: Figures and Charts

Figure 8: Food Literacy: Measureable Components (Desjardins & Azevedo, 2013)

Personal skills and attributes related to food preparation	External determinants	Potential outcomes (as expressed by young people themselves)
• Food skills (techniques, knowledge, planning) • Self-efficacy and confidence • Ability to improvise and problem-solve • Ability to find and use social & other supports	• Socio-cultural environment • Learning environment • Food access, cooking facilities • Living conditions (income, employment, housing)	• Preparation of healthier meals and greater likelihood of consuming a healthier diet • Feeling better, physically & mentally • Greater connectedness to others with respect to food and eating • Improved response to change • Feelings of satisfaction in preparing food for themselves and others • Attraction to culinary training and job opportunities (for some) • Improved household food security

Figure 9: Fordyce-Voorham's Food Literacy Model for Schools (Fordyce-Voorham & Lei Yeung, in press as cited in Fordyce-Voorham, 2015, p. 4)

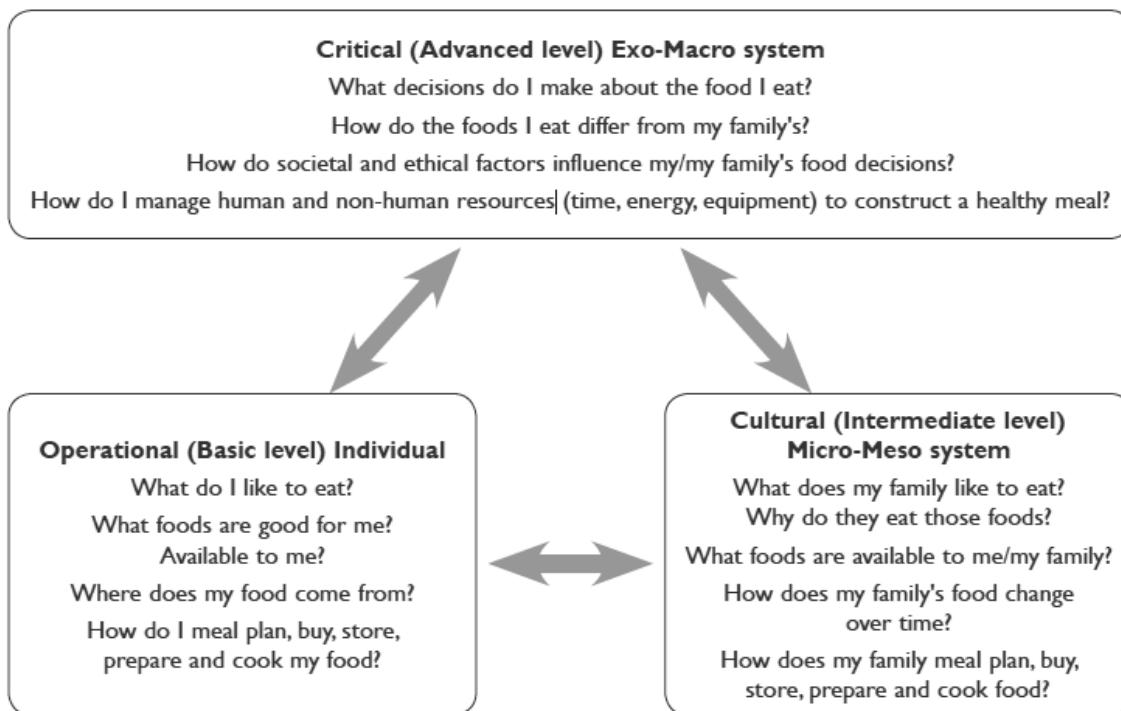


Figure 10: Food Literacy Levels, a Combination of Different Authors Theoretical Models and Descriptions of the Different Levels of Food Literacy (Fordyce-Voorham, 2015, p. 5)

Theoretical Model	Description	Rationale
European food literacy (Schnögl et al., 2006) described by Colatruglio and Slater (2014)	Three-tiered approach in which the individual 'organises everyday nutrition' in: - a self-determined way - a responsible way - an enjoyable way.	Focuses on an individual's cultural norms and values to foster positive nutrition and healthy eating outcomes.
Food literacy framework (Slater, 2013) described by Colatruglio and Slater (2014)	Three-tiered approach: - functional food literacy - interactive food literacy - critical food literacy.	Designed to meet developmental capacities of individuals as they advance through programs.
Food literacy-Food 'Bildung' (Benn, 2014)	Three-tiered approach: - nutrition literacy - food, growing, kitchen cooking literacy - cultural and social literacy.	Presented as a pyramid to display three levels of food literacy designed to foster critical understanding of food, meals and wellbeing.
Critical food literacy (Renwick, 2013)	Three-tiered approach: - operational (interactions with food) - cultural (interactions with people and the near environment) - critical (interactions with the social environment).	Presented as a non-hierarchical model displayed in three scaffolded dimensions that could be used independently or interdependently to meet developmental capacities of individuals as they advance through programs.

Figure 11: Importance of Purchasing Local/Regional Foods by All Eight Groups
Clustered Bar Percent of importance local by all8groups

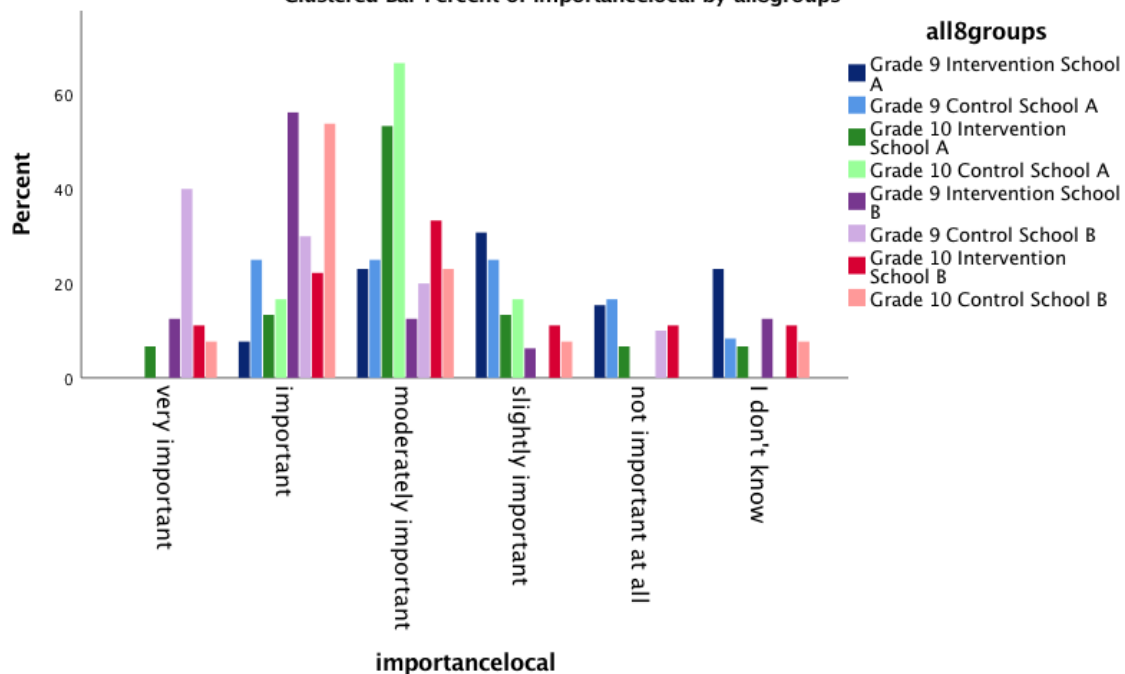


Figure 12: Understanding of Fruit and Vegetable Seasonality by All Eight Groups

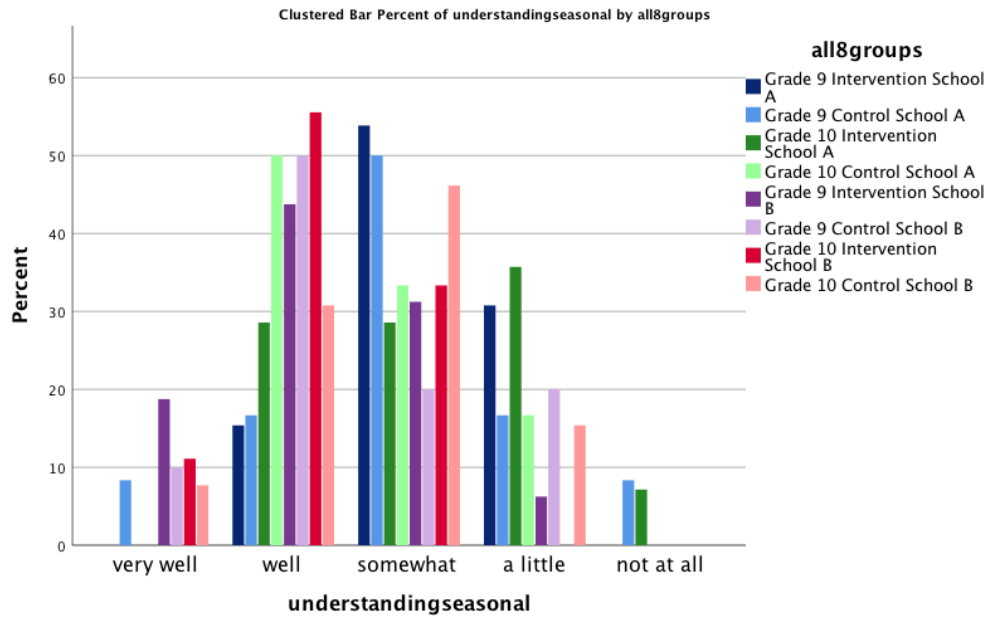


Figure 13: Importance of Purchasing Organic Foods by All Eight Groups

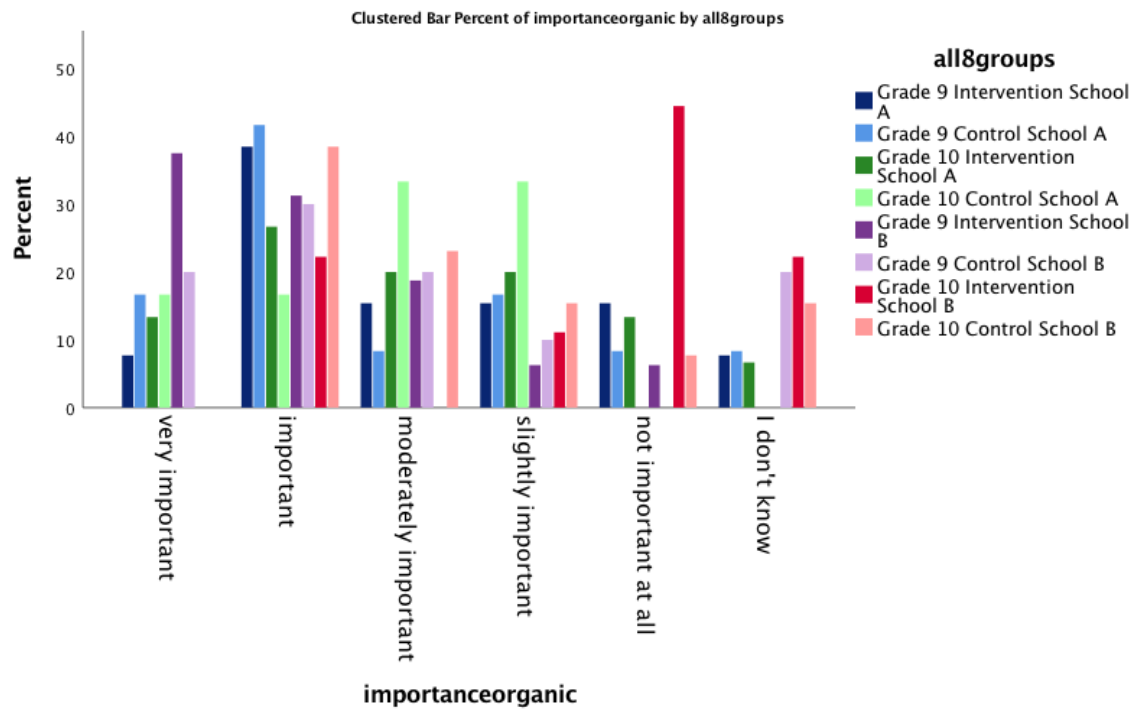


Figure 14: Frequency Working in a Garden that Grows Food by All Eight Groups

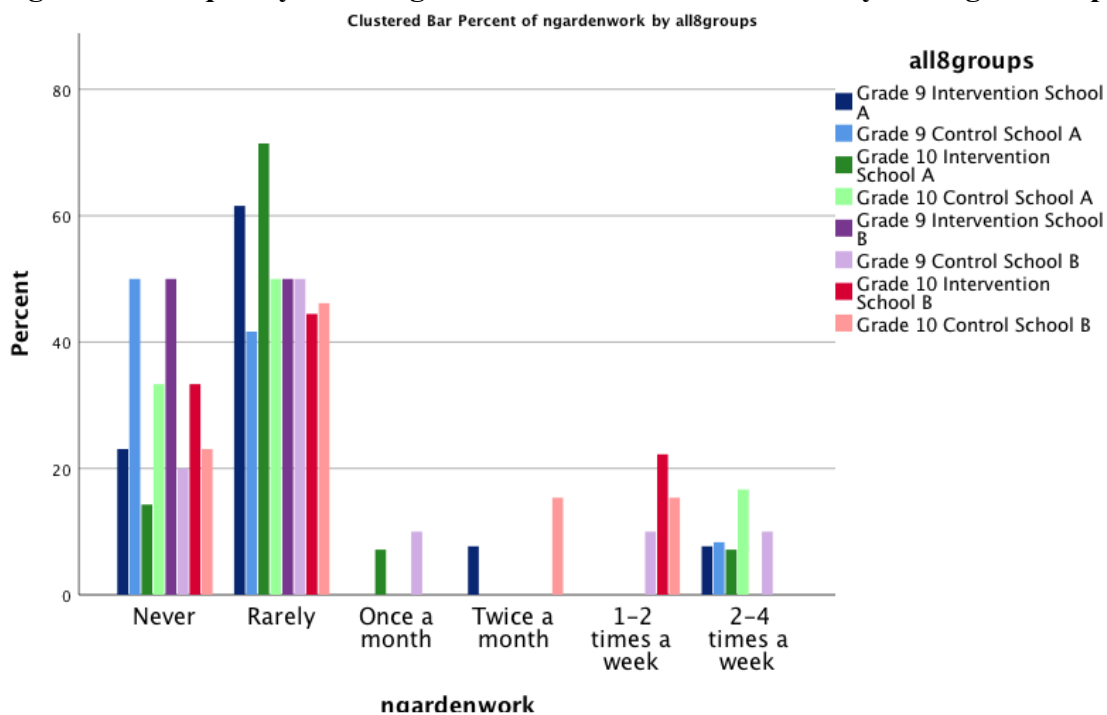


Figure 15: Importance of Growing Food at Home by All Eight Groups

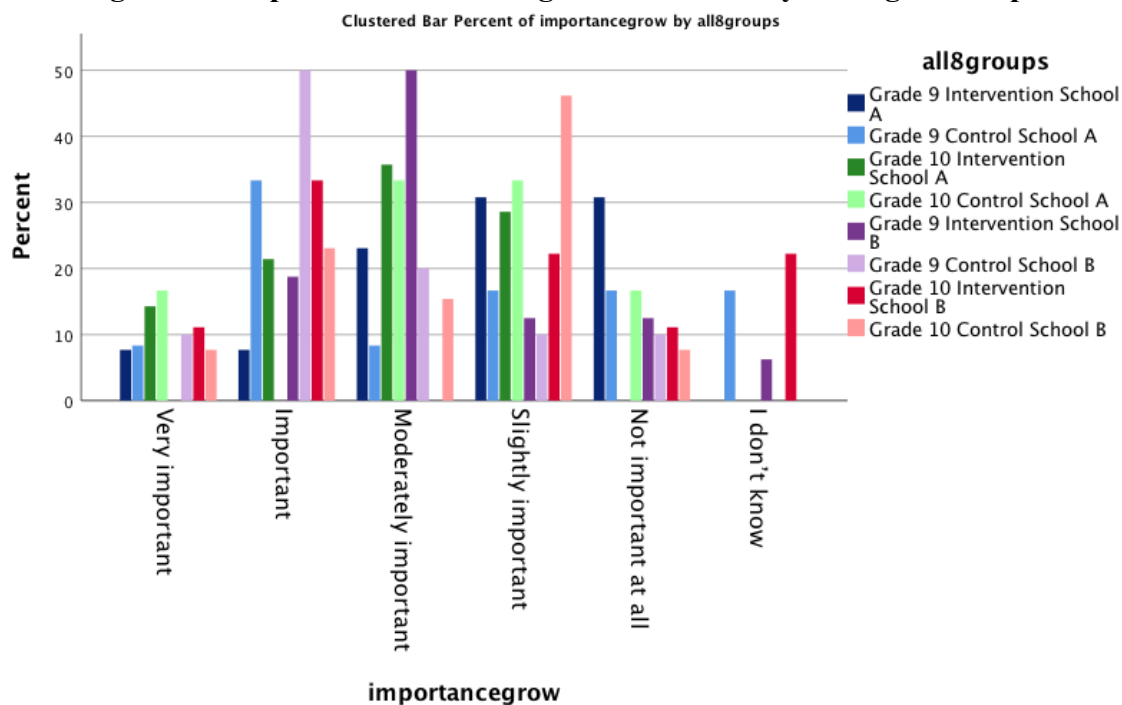


Figure 16: Importance of Purchasing Fair Trade Products by All Eight Groups

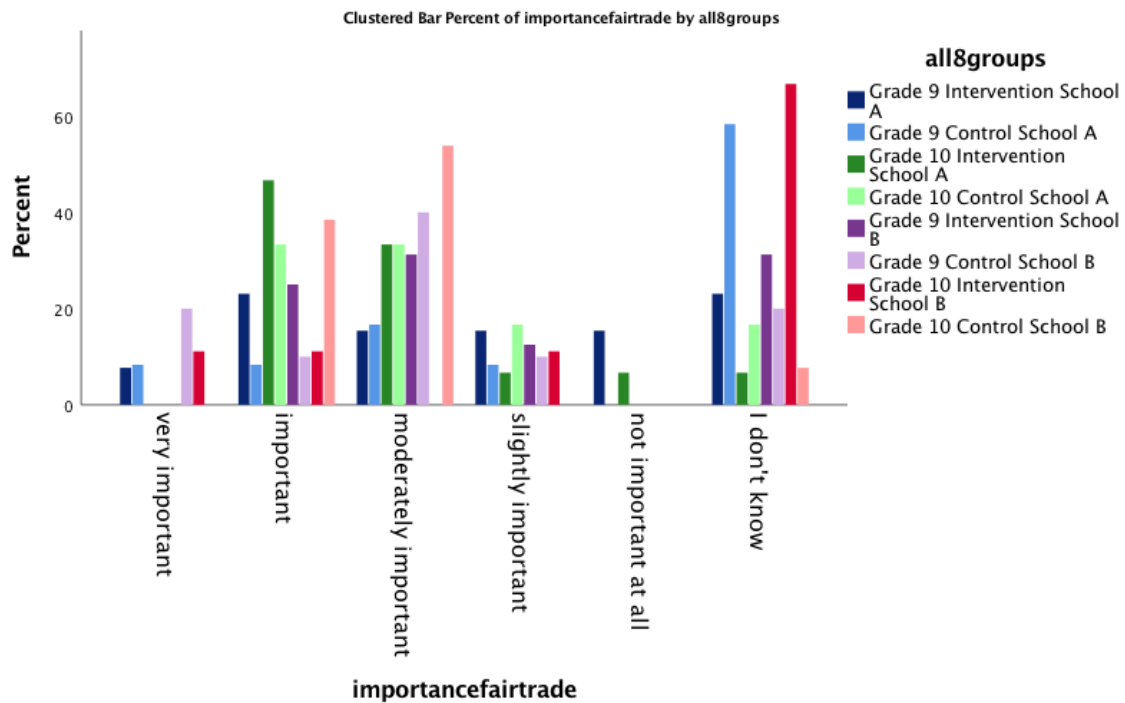


Figure 17: Importance of Purchasing Non-GMO Products by All Eight Groups

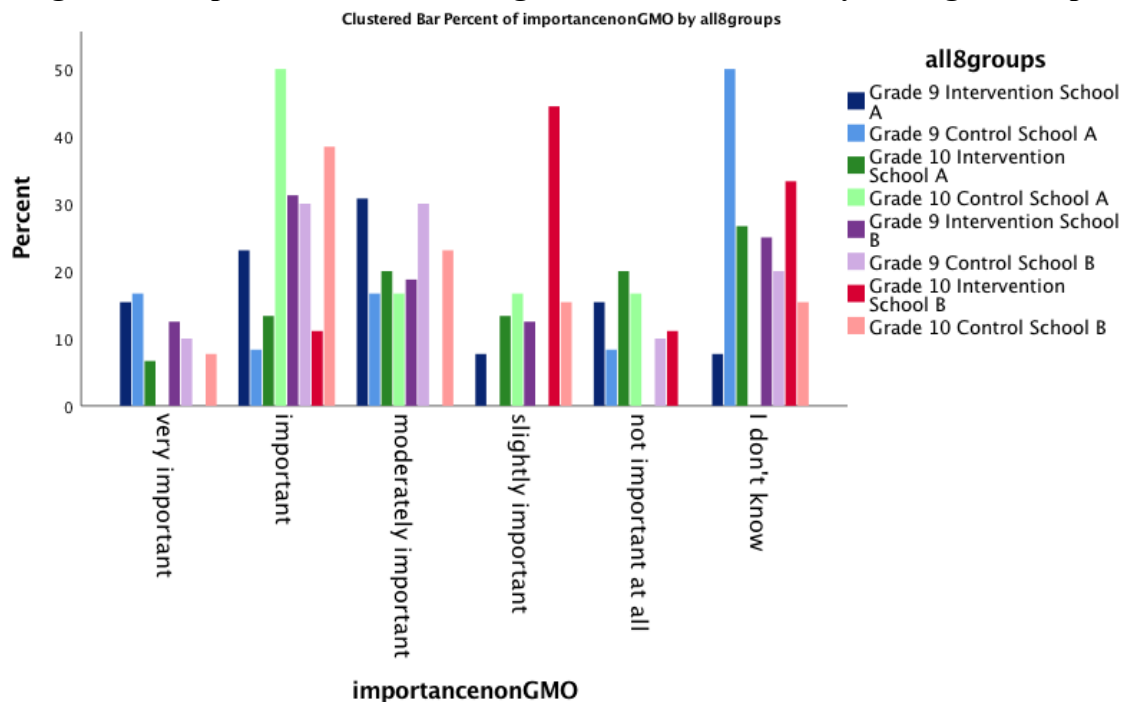
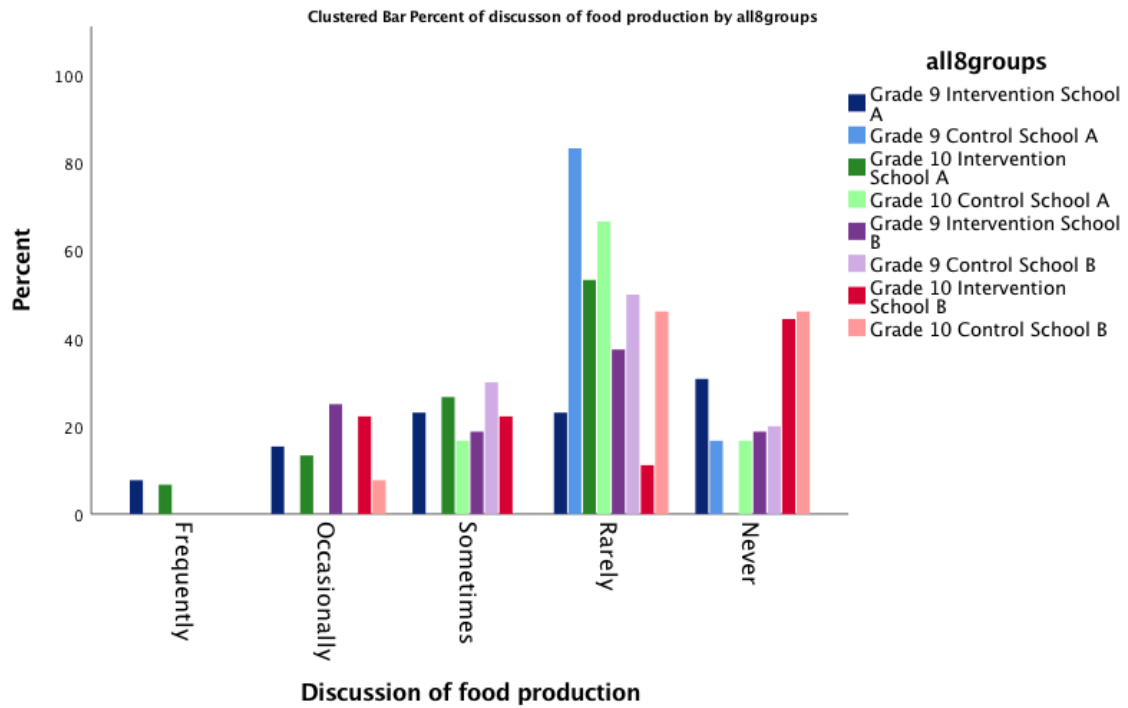


Figure 18: Frequency of Discussion of Gardening, Food Production or Agricultural Production in Any Class by All Eight Groups



Appendix B: Tables

Table 11: Summary Table of Key Food Literacy Definitions

Author	Food Literacy is...	Focus on... Strengths	What's Missing/Critique
Vidgen (2016)	... a collection of inter-related knowledge, skills and behaviours required to plan, manage, select, prepare and eat foods to meet needs and determine food intake. Food literacy is the scaffolding that empowers individuals, households, communities or nations to protect diet quality through change, and support dietary resilience over time (p. 70)	Dietary quality and intake Skills and behaviours that Vidgen has identified to realize the action piece of food literacy. Food literacy <i>empowers</i> individuals, households and communities or nations to make good food choices that contribute primarily to health outcomes	Agrifood systems approach
Desjardins & Azevedo (2013)	... a set of skills and attributes that help people sustain the daily preparation of healthy, tasty, affordable meals for themselves and their families. Food literacy builds resilience, because it includes food skills (techniques, knowledge and planning ability), the confidence to improvise and problem-solve, and the ability to access and share information. Food literacy is made possible through external support with healthy food access and living conditions, broad learning opportunities and positive socio-cultural environments (p. 69)	Displays the ways in which food literacy can be inhibited and deprived due to food insecurity, personal and external barriers Food literacy is “made possible through external support” referring to the fact that individuals’ food literacy develops with “support” referring to their socio-cultural (and economic) contexts, which can refer to practices and financial conditions within a specific household, cultural environment and more.	Agrifood systems approach
Sumner (2013), adapted from an earlier definition produced by (Yamashita, 2008) in her doctoral dissertation	... the ability to “read the world” in terms of food, thereby recreating it and remaking ourselves. It involves a full-cycle understanding of food – where it is grown, how it is produced, who benefits and who loses when it is purchased, who can access it (and who can’t), and where it goes when we are finished with it. It includes an appreciation of the cultural significance of food, the capacity to prepare healthy meals and make healthy decisions, and the recognition of the environmental, social, economic, cultural, and political implications of those decisions” (p. 86)	Much broader and critical view of the concept Touches on both the agrifood systems and nutrition and well-being components of food literacy while incorporating the action piece Emancipatory and critical stance regarding the implications that our actions have on agrifood systems and on our ability to “recreate it”	Comprehensive approach
Yamashita & Robinson (2016)	Critical food literacy is...the ability to (1) examine one’s own values with respect to food systems; (2) grapple with multiple values and perspectives that underlie food systems; (3) understand the larger socio-political contexts and factors that shape food systems; and (4) take action toward social justice in food systems and sustainability more broadly (p. 5).	Agrifood systems focus	<u>More</u> pertinent for understanding a more critical level of food literacy (as it is entitled)

Table 12: Block and Colleagues Three Aspects of Food Literacy (2011, p. 7&8)

Conceptual or Declarative Knowledge	Procedural Knowledge	Ability, Opportunity and Motivation to Apply or Use that Knowledge
Reading and acquiring knowledge about food, food sources, nutrition facts, and other knowledge acquisition and apprehension activities involving food and nutrition	Applying conceptual or declarative knowledge to food decision making, including food shopping and preparation skills Requires the development of food scripts – food-related sequences of events, actions, or routines that occur in a particular context (e.g., how to shop for, prepare, and sauté fresh broccoli)	Development of food literacy involves the ability, opportunity, and motivation to identify, understand, interpret, communicate, and use information about food in various contexts

Table 13: Explanation of Food Literacy Model for Schools (Fordyce-Voorham, 2015, p. 5)

	Basic Level (Operational Individual)	Intermediate Level (Cultural, Micro-Meso System)	Advanced Level (Critical, Exo-Macro System)
Tasks Performed...	Focus on individuals and their interactions with food	Individual interacting with people (family, teachers, students and local food vendors) in their near environment	Individual interacting with the social environment (media, culture, society, technology) and making ethical decisions about food
Understanding of...	An individual's food likes and dislikes How to access different varieties of food (for example, fresh and processed) The origins of food (‘paddock to plate’) Chemical (nutritional) and sensory (aesthetic) properties of food in relation to health	Family food likes and dislikes Who makes food decisions (‘gate-keeping’ of food – who and what influences the food planned, purchased, stored, prepared and consumed in the home and school) Availability of, and access to food in the home (for example, farmyard and backyard/balcony gardens for production and/or preservation of, for example, eggs, fruits, nuts and vegetables) and in the community (for example, supermarkets; strip shopping fresh food vendors such as butchers, green grocers and bakeries; roadside stalls and farmers’ markets)	Social (including television, digital and print media, marketing activities and technology), ethical, sustainability and cultural factors influencing family food decisions and choices
Ability to...	Prepare and cook food for themselves	Contribute to family food decision-making Prepare and cook healthy meals for the family	Manage resources to prepare and cook healthy meals
This Level Aligns With...	Renwick’s (2013) operational dimension in her critical food literacy model, and with functional food literacy and interactive food literacy in Slater’s (2013) food literacy framework	Renwick’s (2013) cultural dimension and with Critical food literacy described by Slater (2013)	Renwick’s (2013) Critical dimension and Slater’s (2013) Critical food literacy. This concept of a food-literate individual operating as a citizen able to make ethical and responsible food decisions also aligns with Schnögl et al.’s definition of food literacy, as noted in their food literacy guidelines and toolbox (2006)

Appendix C: Consent Forms



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Exploring student's food literacy levels – Principal Information and Invitation Letter

Dear Principal _____,

I am a Master's of Arts in Political Studies Candidate at the University of Ottawa, and I write to you because I am interested in conducting a portion of my research in your school.

For my Master's thesis I will aim to measure high school student's food literacy levels or knowledge about food in a holistic and comprehensive manner, including aspects about food systems as well as health. Please see below for a brief overview of my study.

There are many issues surrounding food consumption in today's society – whether health related, political, social or environmental – which makes an individual's knowledge about food of growing importance. This knowledge about food is what I refer to as food literacy.

It is known that there is a gap in the literature concerning young individual's food literacy, especially in regards to food systems. Thus, for my thesis project, I intend to complete an exploratory analysis in which I would measure high school students' food literacy levels, from three different schools across Ontario – all of which have different food-related program specializations (eg. culinary arts, agriculture/gardening and a basic foods class). To complete my research in the schools, I intend to distribute questionnaires to students who are taking a food-related course and to students who intend to take one, to have an "intervention group" and a control group. Students will be recruited from a grade 11 culinary arts class (intervention group) and I will ask for a list of students who are enrolled in this course in the following semester, to send them an invitation to participate. If I am unable to get this information, a control group will be recruited from a similar course stream (eg. "college" level or technical education class). I also want to deepen my understanding of their experience and knowledge through interviewing a small number of students from the selected groups. The main objective and contribution of this study will aim to make curriculum recommendations to ameliorate food-related courses that are offered in high schools across Ontario.

Since this is a Master's thesis project and an exploratory study, it will not require an extensive time commitment on your behalf. The extent of participant involvement would be limited to a 20 minute questionnaire completed by 40-60 students as well as an additional 30 minutes from about 4-8 students and 1-2 teachers willing to participate in my interviews. I would also like to complete this research between _____ 2017.

The data collected will be analyzed and used in my Master's thesis and potentially in journal publications and presentations to different audiences, while guarding participant anonymity. Also, once the study has been completed the results of the research will be sent to participants and parents through a one-page summary of findings (either by email or in printed format to teachers). A full research report will also be available upon the request of interested individuals.

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Moreover, the _____ School Board and the University of Ottawa have granted approval for this study, and it is being funded by the Social Sciences and Humanities Research Council (SSHRC).

If you have any additional questions or need any clarification, please do not hesitate to contact myself or my thesis supervisor Dr. Marie-Josée Massicotte.

If you agree that your school participate in this study, could you please sign the attached consent form, which I can either pick up at the school, or you could sign, scan and send back to me via email. Your time and support is extremely appreciated.

Sincerely,

Alicia Martin
M.A. Candidate, Political Science
School of Political Studies - University of Ottawa
Email: [REDACTED]
Phone: [REDACTED]

Thesis Supervisor
Dr. Marie-Josée Massicotte, Associate Professor
Email: [REDACTED]
Phone: [REDACTED]



Exploring student's food literacy levels

PRINCIPAL CONSENT FORM

I Principal _____ (please print your full name) acknowledge that the purpose and topic of this research has been explained to me in a clear and comprehensible manner and that any questions I have asked have been answered and clarified.

I understand that my school's participation is voluntary and that I can withdraw our participation in this study at any time without penalty. I have read the letter of information provided by Alicia Martin and agree for my school to participate in this study.

Signature: _____

Date: _____

Exploring student's food literacy levels – Questionnaire and Interview

LETTER OF INFORMATION

Dear students,

I write to you to inform you that I will be coming to your classroom to distribute a questionnaire as well as interview some of you in an exploratory study for my Master's thesis research at the University of Ottawa. Below you will find information regarding my questionnaire and interviews.

If completion of the questionnaire needs to take place outside of class time, an acceptable room in the school will be found for you to complete the questionnaire.

Purpose of study: The results of this questionnaire and interviews will help me to assess your levels of food literacy or knowledge about food. This will help me to highlight the strengths and weaknesses of your knowledge to be able to make policy recommendations for curriculum developers. The data collected will be analyzed and used in my Master's thesis and potentially in journal publications and conference presentations. Also, the questions that will be asked will pertain to high school students' knowledge and habits regarding food, where it comes from, how it is produced, as well as questions about high school students' eating and cooking habits and nutritional knowledge.

Confidentiality and anonymity: This is an anonymous survey and you do not have to write your name on any part of the questionnaire sheet. In addition, all of the data will be aggregated so that no one can find out who has answered what to each question. If you wish to be a part of my interviews you will not be required to provide me with your name at any time during the interview, however you will be required to sign an assent form, but your name will not be used nor associated with the content of your interview and you will be given a pseudonym when the interview is transcribed. Moreover, your school and/or school board not be identified in any public documents or presentations. The results will only serve the investigator and will be saved on a computer with a protected password. The data will be conserved for a minimum period of 5 years, beginning in April 2017 and ending in April 2022. Such data will be stored in my supervisor's office in a locked filing cabinet and any digital/electronic data will be saved on her computer with a protected password. At the end of the conservation period, the data will be properly destroyed, shredded and deleted.

Voluntary participation and withdrawal: Your participation in this study is voluntary, which means you may refuse to participate, refuse to answer any questions and may stop at any time if you feel uncomfortable or do not wish to continue. If you are involved in my interviews, you may also choose to not have your interview recorded or have the recording be stopped at any point in time during the interview. You are also entitled to have your interview data

withdrawn from the study.

If you have any questions about your rights as a research participant or the conduct of the study you may contact the Office of Research Ethics at the University of Ottawa at 550 Cumberland Street, Room 159, Ottawa, Ontario K1N 6N5 Canada, 613-562-5387 or by email at ethics@uOttawa.ca. The University of Ottawa has granted approval for this study, and it is being funded by the Social Sciences and Humanities Research Council (SSHRC).

Consent: Please sign the attached form if you have understood the information provided and if you agree to participate voluntarily in this exploratory study. Please note, only a minimal number of students will be included in my interviews due to time limitations and capacity, and they will be chosen at random by _____ if more than the required number of interviewees return consent forms.

If you are under the age of 18, please have your parents sign the attached form if they consent for you to participate in my study.

Sincerely,

Alicia Martin
M.A. Candidate, Political Science



Exploring student's food literacy levels
QUESTIONNAIRE AND INTERVIEW- STUDENT CONSENT FORM (18
YEARS OF AGE AND OLDER)

I acknowledge that the purpose and topic of this research has been explained to me in a clear and comprehensible manner and that any questions I have asked have been answered and clarified. I understand that my participation is voluntary and that I can withdraw my participation in this study at any time without penalty.

QUESTIONNAIRE:

I have read the letter of information provided by Alicia Martin and agree to participate in this questionnaire.

Signature: _____

Name (printed): _____

Date: _____

INTERVIEW:

I have read the letter of information provided by Alicia Martin and agree to participate in this interview.

Signature: _____

Name (printed): _____

Date: _____

RECORDING OF INTERVIEW:

I agree to allow this interview to be audio-recorded and to be saved on a secure computer drive with a password, and I understand that this recording will be transcribed and destroyed once the research is completed.

Signature: _____

Name (printed): _____

Date: _____

Exploring student's food literacy levels – Questionnaire and Interview
LETTER OF INFORMATION

Dear parents and guardians,

My name is Alicia Martin and I am a Master's student at the University of Ottawa in the School of Political Studies. This letter is to inform you of an exploratory study that I will be conducting in your daughter/son's classroom. I will distribute a questionnaire as well as interview some of the students if you consent for me to do so. Below you will find information regarding my study.

If completion of the questionnaire by your daughter/son needs to take place outside of class time, an acceptable room in the school will be found for them to complete the questionnaire.

Purpose of study: The results of the questionnaire distributed and my interviews will help me to assess your daughter/son's levels of food literacy or knowledge about food. This will help me to highlight the strengths and weaknesses of your daughter/son's knowledge to be able to make policy recommendations for curriculum developers. An intervention group (students that are taking a foods class) as well as control group (students that have not taken a foods class) will be included in the study. The data collected will be analyzed and used in my Master's thesis and potentially in journal publications and conference presentations.

The questions that will be asked will pertain to high school students' knowledge and habits regarding food, where it comes from, how it is produced, as well as questions about their eating and cooking habits and nutritional knowledge (eg. Do you like to cook? Do you know where your food comes from? Where does your family buy groceries?).

Confidentiality and anonymity: This is an anonymous survey and your daughter/son's name will not be required on any part of the questionnaire sheet or at any point in time in the interview. In addition, all of the data will be aggregated so that no one can find out who has answered what to each question. Additionally, if you consent for your daughter/son to take part in my interviews, their names will be kept confidential and they will not be required to say their name at any point in time during the recording of the interview. After the interview each individual will be given a pseudonym when the interview is transcribed and stored. The results will only serve the investigator and will be saved on a computer with a protected password. Moreover, your daughter/son's school and/or school board will not be identified in any public documents or presentations.

The data will be conserved for a minimum period of 5 years, beginning in April 2017 and ending in April 2022. Such data will be stored in my supervisor's office in a locked filing cabinet and any digital/electronic data will be saved on her computer with a protected password. At the end of the conservation period, the data will be properly destroyed, shredded and deleted.

Voluntary participation and withdrawal: Your daughter/son's participation in





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this study is voluntary, which means they may refuse to participate, refuse to answer any questions and may stop at any time if they feel uncomfortable or do not wish to continue. Also, if you do not wish for your daughter/son to take part in my interviews, you may withdraw their participation. You are also entitled to have their interview data withdrawn from the study.

If you have any questions about your rights as a research participant or the conduct of the study you may contact the Office of Research Ethics at the University of Ottawa at 550 Cumberland Street, Room 159, Ottawa, Ontario K1N 6N5 Canada, 613-562-5387 or by email at ethics@uOttawa.ca

The University of Ottawa has granted approval for this study, and it is being funded by the Social Sciences and Humanities Research Council (SSHRC).

Consent: If you consent for your daughter/son to participate in my questionnaires and interviews please sign the attached consent form. Please note, only a minimal number of students will be included in my interviews due to time limitations and capacity, and they will be chosen at random if more than the required number of interviewees return consent forms.

Please do not hesitate to contact myself, or my thesis supervisor Dr. Marie-Josée Massicotte if you have any questions or concerns.

Sincerely,

Alicia Martin
M.A. Candidate, Political Science
School of Political Studies - University of Ottawa
Email: [REDACTED]
Phone: [REDACTED]

Thesis Supervisor
Dr. Marie-Josée Massicotte, Associate Professor
Email: [REDACTED]
Phone: [REDACTED]





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Exploring student's food literacy levels INTERVIEW - PARENT/GUARDIAN CONSENT FORM

I acknowledge that the purpose and topic of this research has been explained to me and that any questions I have asked regarding my daughter/son's participation have been answered and clarified. I understand that my daughter/son's participation is voluntary and that I can withdraw their participation or that they can withdraw their participation in this study at any time without penalty.

I have read the letter provided by Alicia Martin and I AGREE to allow my daughter/son _____ (daughter/son's name) to participate in:

- ☐ Written questionnaire
- ☐ Interviews

Signature: _____

Name (printed): _____

Date: _____

RECORDING OF INTERVIEWS:

I agree to allow the interview with my daughter/son to be audio-recorded and to be saved on a secure computer drive with a password, and I understand that this recording will be transcribed and destroyed once the research is completed.

Signature: _____

Name (printed): _____

Date: _____

Alicia Martin
M.A. Candidate, Political Science
School of Political Studies - University of Ottawa
Email: [REDACTED]
Phone: [REDACTED]

Thesis Supervisor
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Exploring student's food literacy levels INTERVIEW - STUDENT ASSENT FORM

I acknowledge that the purpose and topic of this research has been explained to me in a clear and comprehensible manner and that any questions I have asked have been answered and clarified. I understand that my participation is voluntary and that I can withdraw my participation in this study at any time without penalty.

QUESTIONNAIRE:

I have read the letter of information provided by Alicia Martin and agree to participate in this questionnaire.

Signature: _____

Name (printed): _____

Date: _____

INTERVIEW:

I have read the letter of information provided by Alicia Martin and agree to participate in this interview.

Signature: _____

Name (printed): _____

Date: _____

RECORDING OF INTERVIEW:

I agree to allow this interview to be audio-recorded and to be saved on a secure computer drive with a password, and I understand that this recording will be transcribed and destroyed once the research is completed.

Signature: _____

Name (printed): _____

Date: _____



Exploring student's food literacy levels - Teacher interview *LETTER OF INFORMATION*

Dear teachers,

I am writing to you because in addition to distributing a questionnaire and interviewing some of your students for my Master's thesis research at the University of Ottawa, I would also like to interview you regarding their levels of food literacy. Below you will find information regarding my questionnaire and interviews.

Purpose of study: The results of these interviews will help me to assess your student's levels of food literacy or knowledge about food. This will help me to highlight the strengths and weaknesses of their knowledge to be able to make policy recommendations for curriculum developers. The data collected will be analyzed and used in my Master's thesis and potentially in journal publications and conference presentations.

Confidentiality and anonymity: The information from this interview will only be used in a way that will protect your identity and you will also be given a pseudonym when the interview is transcribed. To further protect your anonymity, I will attempt to avoid using any sensitive information, or information that would give away your identity, or that of your school. You will also have the opportunity to review the transcription of the interview, which will be sent to you in a password protected and encrypted Word document. The results will only serve the investigator and will be saved on a computer with a protected password. The data will be conserved for a minimum period of 5 years, beginning in April 2017 and ending in April 2022. Such data will be stored in my supervisor's office in a locked filing cabinet and any digital/electronic data will be saved on her computer with a protected password. At the end of the conservation period, the data will be properly destroyed, shredded and deleted.

Voluntary participation and withdrawal: Your participation in this study is voluntary, which means you may refuse to participate, refuse to answer any questions and may stop at any time if you feel uncomfortable or do not wish to continue. You may also choose to not have your interview recorded or have the recording be stopped at any point in time during the interview. You are also entitled to have your interview data withdrawn from the study.

If you have any questions about your rights as a research participant or the conduct of the study you may contact the Office of Research Ethics at the University of Ottawa at 550 Cumberland Street, Room 159, Ottawa, Ontario K1N 6N5 Canada, 613-562-5387 or by email at ethics@uOttawa.ca

The University of Ottawa has granted approval for this study, and it is being funded by the Social Sciences and Humanities Research Council (SSHRC).



Consent: In signing the attached consent form you are confirming that you have understood the information provided. Please sign the attached form if you agree to participate voluntarily in this exploratory study.

Sincerely,

Alicia Martin
M.A. Candidate, Political Science



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Exploring student's food literacy levels INTERVIEW - TEACHER CONSENT FORM

I acknowledge that the purpose and topic of this research has been explained to me in a clear and comprehensible manner and that any questions I have asked have been answered and clarified. I understand that my participation is voluntary and that I can withdraw my participation in this study at any time without penalty.

I have read the letter provided by Alicia Martin and agree to participate in this interview.

Signature: _____

I agree to allow this interview to be audio-recorded and to be saved in a secured space with a password code, and I understand that this recording will be transcribed and destroyed once the research is completed.

Signature: _____

Name (printed): _____

Date: _____

Alicia Martin

M.A. Candidate, Political Science

School of Political Studies - University of Ottawa

Email: [REDACTED]

Phone: [REDACTED]

Thesis Supervisor

Dr. Marie-Josée Massicotte, Associate Professor

Email: [REDACTED]

Phone: [REDACTED]

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Appendix D: Research Tools

Food literacy levels of high school students

The purpose of this study is to measure the knowledge levels about food among high school students.

This is an anonymous survey and you do not have to write your name on any part of the questionnaire sheet. In addition, all of the data will be sorted so that no one can find out who has answered what to each question. The data will be used and analyzed only by the principal investigator.

This questionnaire should take about 20 minutes to complete. Please answer all of the questions to the best of your ability and choose the response that most accurately represents your personal situation. Feel free to stop at any time if you feel uncomfortable or do not wish to continue with the survey.

1. In what year and month were you born?
 - Year: _____
 - Month: _____
2. Are you a:
 - Female
 - Male
 - There is not an option that applies to me, I identify as (please specify): _____
3. Did you grow up in:
 - A city or a suburb
 - The country-side or rural area
4. Did you grow up on a farm?
 - Yes
 - No
5. What grade are you currently in?
 - 9
 - 10
 - 11
 - 12
6. How many parents/guardians are there in your family?
 - 1
 - 2
 - 3
 - 4

7. Please check a box under each applicable guardian *selecting only one response per guardian (one response per column)* for each of the following statements based on what best represents your parent/guardian's cooking preferences:

	Guardian 1 Female Male (please circle one)	Guardian 2 Female Male (please circle one)	Guardian 3 Female Male (please circle one)	Guardian 4 Female Male (please circle one)
Loves cooking				
Likes cooking				
Doesn't mind cooking				
Doesn't like cooking				
Hates cooking				
I don't know				

8. Please check a box under each applicable guardian *selecting only one response per guardian (one response per column)* for each of the following statements based on the one that best represents your parent/guardian's cooking habits:

a)

	Guardian 1 Female Male (please circle one)	Guardian 2 Female Male (please circle one)	Guardian 3 Female Male (please circle one)	Guardian 4 Female Male (please circle one)
Always cooks				
Cooks sometimes				
Rarely cooks				
Never cooks				

b) *(select one response per column/guardian)*

	Guardian 1 Female Male (please circle one)	Guardian 2 Female Male (please circle one)	Guardian 3 Female Male (please circle one)	Guardian 4 Female Male (please circle one)
Cooks from scratch (following a recipe using "basic" ingredients)				
Cooks frozen/ready-to-eat processed foods				
Doesn't cook and orders take-out food				

9. Please state how much you agree or disagree with the following statement: "I love cooking/baking and enjoy doing it myself".
- ☐ Strongly agree
 - ☐ Agree
 - ☐ Undecided
 - ☐ Disagree
 - ☐ Strongly disagree
10. **In an average week**, how often do you cook at home (alone and/or with your parents/guardians)?
- ☐ Never
 - ☐ Rarely
 - ☐ Once a month
 - ☐ Twice a month
 - ☐ 1-2 times a week
 - ☐ 3-4 times a week
 - ☐ 5-7 times a week
11. When you personally cook at home, who do you cook with? **Please select all that apply.**
- ☐ I cook on my own
 - ☐ I cook with my siblings/friends
 - ☐ I cook with my parents/guardians or other adults
 - ☐ I don't cook
12. How often do you personally cook from scratch (following a recipe using "basic" ingredients)/and/or experimenting?
- ☐ Never
 - ☐ Rarely
 - ☐ Once a month
 - ☐ Twice a month
 - ☐ 1-2 times a week
 - ☐ 3-4 times a week
 - ☐ 5-7 times a week
13. What is your favourite meal that you like to cook?
-
14. Is this meal:
- ☐ Homemade/from scratch
 - ☐ Prepackaged
 - ☐ Prepackaged from frozen

15. Where did you learn the majority of your food preparation or cooking skills? **(Select all that apply)**

- ☐ Mother/female guardian
- ☐ Father/male guardian
- ☐ Home economics/course in school
- ☐ Self-taught
- ☐ Other (please specify): _____

16. How often do you eat out (meals that you eat by yourself and with your family)?

- ☐ Never
- ☐ Rarely
- ☐ Once a month
- ☐ Twice a month
- ☐ 1-2 times a week
- ☐ 3-4 times a week
- ☐ 5-7 times a week

17. How often do you and your family eat ready-to-eat prepackaged or processed foods (e.g. microwaveable meals, frozen pizzas, etc.)?

- ☐ Never
- ☐ Rarely
- ☐ Once a month
- ☐ Twice a month
- ☐ 1-2 times a week
- ☐ 3-4 times a week
- ☐ 5-7 times a week

18. Please estimate the percentage of food that you and your family throw out that has gone to waste (produce gone bad, stale or mouldy bread or uneaten food served on a dinner plate)? 0% being none and 100% being all of the food that you or your family purchases. **Please circle the closest value.**

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

19. How important do you feel that it is to purchase organic foods?

- ☐ Very important
- ☐ Important
- ☐ Moderately important
- ☐ Slightly important
- ☐ Not important at all
- ☐ I don't know

20. How important do you feel that it is to purchase non-GMO (genetically modified organism) foods?

- ☐ Very important
- ☐ Important
- ☐ Moderately important
- ☐ Slightly important
- ☐ Not important at all
- ☐ I don't know

21. Do you feel that you know where your foods come from and understand how they are produced?

- ☐ Yes
- ☐ No

Please explain (Do you pay attention to where foods come from? (eg. place where it was produced, province, state or country) Is the way that food is produced important to you? (eg. genetically modified, non-GMO or organic) Do you think about this at all?:

22. How important do you feel that it is to purchase fair trade products?

- ☐ Very important
- ☐ Important
- ☐ Moderately important
- ☐ Slightly important
- ☐ Not important at all
- ☐ I don't know

23. Where do you or your parents/guardians usually buy groceries? **Please select all that apply.**

- ☐ Large supermarket chains (eg. Metro, Loblaws, Sobeys, Costco, Foodland, Zehrs, Freshco, Giant Tiger, Food Basics, IGA, No Frills, Shoppers Drug Mart, Walmart, etc.)
- ☐ Smaller/local supermarket chains (eg. Farmboy, Herb & Spice, local grocery Co-op, etc)
- ☐ Local Market or directly from farmer
- ☐ Other (please specify): _____

24. How important do you feel that it is to purchase local/regional food products?

- ☐ Very important
- ☐ Important
- ☐ Moderately important
- ☐ Slightly important
- ☐ Not important at all
- ☐ I don't know

25. On average, how often do you personally visit a farm?

- ☐ Never
- ☐ Once to a few times in my life
- ☐ Once to a few times a year
- ☐ Every month
- ☐ Every week
- ☐ I live on a farm

26. How well do you feel that you personally understand fruit and vegetable seasonality (foods that grow and that are accessible locally during that period of the year, e.g. squash in the fall, apples in the fall and winter, strawberries in the summer)?

- ☐ Very well
- ☐ Well
- ☐ Somewhat
- ☐ A little
- ☐ Not at all

27. Of the food that you and your family eat, what percentage is seasonal (0% being none; 100% being all)? Please circle the closest value.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

28. How important do you feel that it is to grow food at home (eg. have a vegetable garden, grow fruits, vegetables and/or herbs)?

- ☐ Very important
- ☐ Important
- ☐ Moderately important
- ☐ Slightly important
- ☐ Not important at all
- ☐ I don't know

29. What is grown in the garden at your school? ***Please select all that apply.***

- ☐ Vegetables
- ☐ Fruits
- ☐ Flowers
- ☐ Other plants (eg. shrubs/bushes)
- ☐ We do not have a garden in my school
- ☐ I don't know
- ☐ Other (please specify): _____

30. Are the students involved in gardening?

- ☐ Yes
- ☐ No
- ☐ I don't know

31. How often do you personally work in a garden that grows food (either at home or at school)?

- ☐ Never
- ☐ Rarely
- ☐ Once a month
- ☐ Twice a month
- ☐ 1-2 times a week
- ☐ 2-4 times a week
- ☐ 5-7 times a week

32. a) How often do you talk about gardening, food production or agricultural production in any of your classes?

- ☐ Frequently
- ☐ Occasionally
- ☐ Sometimes
- ☐ Rarely
- ☐ Never

b) How important do you believe these discussions are?

- ☐ Very important
- ☐ Important
- ☐ Moderately important
- ☐ Slightly important
- ☐ Not important at all
- ☐ I don't know

33. Have you ever learned about how food is produced and do you talk about agriculture or nutrition in school lessons (in the past and currently). Please specify the class and the topic that was discussed.

34. In your opinion, what is the #1 priority that everyone should care about and consider when choosing food?

35. How concerned are you about the use of pesticides in food production (0 being not at all concerned and 10 being very concerned)? **Please circle the closest value.**

0 1 2 3 4 5 6 7 8 9 10

36. To what extent is being environmentally friendly in general important to you in your daily life (0 being not at all important and 10 being very important)? **Please circle the closest value.**

0 1 2 3 4 5 6 7 8 9 10

37. On a scale of 1 to 10, how much garbage does your household recycle (0 being no recycling and 10 as much as possible)? **Please circle the closest value.**

0 1 2 3 4 5 6 7 8 9 10

38. Does your family compost food waste at home?

- ☐ Yes
- ☐ No
- ☐ I don't know

39. Is there a composting system in your school?

- ☐ Yes
- ☐ No
- ☐ I don't know

40. If yes, on average on a scale out of 10, how often do you compost (0 being never and 10 being always)? **Please circle the closest value.**

0 1 2 3 4 5 6 7 8 9 10

41. For eating lunch at school do you usually **(Select only ONE response):**

- ☐ Bring lunch from home
- ☐ Go out for lunch
- ☐ Eat in the cafeteria
- ☐ I don't generally eat lunch

42. What do you most often use to bring your food from home? **Please select ONE option.**

- ☐ Reusable containers (eg. Tupperware, Rubbermaid, Glass jar, etc.)
- ☐ Plastic baggies (eg. Ziploc bags)
- ☐ Tin foil
- ☐ Saran/plastic wrap
- ☐ Other (please specify): _____
- ☐ I don't bring food from home/eat lunch

43. If you bring food from home, is it mostly **(please select all that apply):**

- ☐ Leftovers
- ☐ Frozen dinners (e.g. Michelina's, Hungry Man, etc.)
- ☐ Cold lunch (eg. sandwiches, salads)
- ☐ Other (please specify): _____
- ☐ I don't bring food from home/ I don't eat lunch

44. **Please order the following options from 1 – 9** based on what you believe to be the most or least important factors that you consider when purchasing or selecting your food? **(1 being the most important and 9 being the least important)**

- ___ Quality
- ___ Name brand
- ___ Culturally appropriate (e.g. traditional to your family)
- ___ Taste
- ___ Price
- ___ Local/regional foods
- ___ Production Methods
- ___ Nutritional information
- ___ Other (please specify): _____

45. Do you eat meat? (If no, skip to question 48)

- ☐ Yes
- ☐ No

46. Please select the meats that you eat *(select all that apply)*.

- ☐ Poultry (non-game)(meat from birds eg. chicken, turkey, duck, goose, etc.)
- ☐ Fish/seafood
- ☐ Beef or veal
- ☐ Pork
- ☐ Lamb
- ☐ Game meat (e.g. venison/deer, rabbit, etc.)

47. How, many times to do you eat meat **in an average week?**

- ☐ Three times a day
- ☐ Twice a day
- ☐ Once a day
- ☐ 3-6 times a week
- ☐ 1-2 times a week
- ☐ Less than once a week

48. If you limit your meat consumption, or do not eat meat, why is this?

49. How do you feel about the following statement? "I have adequate food, nutrition and cooking skills to eat a healthy diet."

- ☐ Strongly agree
- ☐ Agree
- ☐ Not sure
- ☐ Disagree
- ☐ Strongly disagree

50. How do you feel about the following statement? "I have adequate knowledge to purchase sustainably produced food products and eat a sustainable diet."

- ☐ Strongly agree
- ☐ Agree
- ☐ Not sure
- ☐ Disagree
- ☐ Strongly disagree

51. What is your cultural/ethnic **background**?

- ☐ Indigenous
- ☐ Latin/South American
- ☐ African
- ☐ Asian/Middle Eastern
- ☐ European
- ☐ Canadian
- ☐ Other (please specify): _____

52. Do you know of any links between food choices, agriculture, climate change and the environment?

53. Circle where you think your household/home income is situated.

- ☐ Low income household (\$35 000/year or less)
- ☐ Middle income household (\$35 000-\$100 000/year)
- ☐ High income household (+ \$100 000/year)

54. Is there anything else you would like to add or share from your experiences or point of view that can be useful for this research project?

Thank you very much for participating in this questionnaire

Question 36 borrowed from (Yamashita, 2008) and Question 49 borrowed from (Slater & Hinds, 2014)

Semi-structured Student Interview Questions/Guide

The purpose of this study is to measure the level of food literacy among high school students.

This interview will be about 45 minutes to an hour in length, and if you agree, it will be recorded. The recorded interview will be transcribed or written out word for word. However, you will be given a pseudonym to protect your identity. If at any time during the interview you do not wish to continue or prefer to not answer specific questions, feel free to let me know and we can stop or skip a question.

The findings from this interview will be used for my master's thesis and possibly in journal publications and conference presentations, but your identity will be confidential and you will not be able to be identified by anyone but myself.

Student Interview Questions

The goal of the interview with students is to find out about their food habits, and their nutritional knowledge of agrifood systems (production, processing, transportation, marketing, consumption, etc.) and nutrition. In this sense, I will aim to explore the extent to which they are aware of the functioning of agrifood systems as well as their understanding of the life cycle of food.

1. a) To begin I would like to ask you if you have ever taken a food-related course in high school, and if you did, when was it?
2. Please describe the area where you grew up, where it was, if it was a rural or an urban area, if you lived on a farm or in a city, which country and or city for example. How many years did you live there?
3. Do you still live there, and if not where do you live now? How many members in your family? Upper, middle or lower class you would say?
4. Tell me about your cooking experiences as a child and presently. For example, a) do you remember when you first got involved in the kitchen? What did you do in the beginning?
b) Do you like cooking, how often do you cook, what kinds of food do you cook normally? Do you usually cook with your parents, relatives or guardians, and what types of foods do they typically cook?
5. In general, what do you enjoy eating and what are your favourite foods? What is your favourite meal that your parents or guardians prepare for a special occasion for you?

6. What do you think is *the* most important factor when you are purchasing foods—or eventually when you will? Is there more than one that is important for you? What comes to mind? (e.g. taste, price, origin, quality, healthy...)
7. Do you compost at home or in school? Do you know how and what to compost? How often do you compost? And what about others in your household?
8. Do you ever find yourself throwing food out or wasting foods? How often would you say you waste food and approximately how much do you throw out? (per day/week/meal? The household as a whole?)
9. Do you do anything to curb or avoid food waste at home? For example, sometimes when my apples go bad in my fridge or have lots of brown spots on them, I make applesauce instead of throwing them out, or put bananas in the freezer to make smoothies, muffins or cake later on.
10. a) Do you know where your food comes from?
b) Is this something that you and your parents/guardians feel is important to consider when purchasing food?
11. a) Do you think that purchasing local food is important, and why or why not?
b) Do you think that it is easy?
c) If it seems difficult to you, what are some of the main obstacles?
12. a) Do you have a “vegetable” garden at home or at school (e.g. growing fruits and/or vegetables and/or herbs)?
b) Do you participate in the gardening process/are you allowed to?
c) Do you think that gardening and growing food is important?
13. a) If I say “food systems” or “agrifood systems” what comes to your mind?
b) Do you know what these concepts refer to? If so, can you define it in your own words?
[Interviewer will provide interviewee with a basic agrifood systems definition after they have given their response]
Food systems definition: “activities connecting food production, processing, distribution, consumption, and waste management”
c) Do you think that the dominant (most common) food system that we have here in Canada and in North America is generally sustainable? Why or why not? By sustainable I mean environmentally, socially and economically viable over a long period of time, without compromising food security for future generations.

[Questions 14-15 and question 18-19 for students that have been involved in intervention courses, hence were exposed to some food-related teaching – not for control groups – the course that the student is in will be noted by the interviewer before the interview begins – known through recruitment]

14. Do you believe that this course has changed your food habits and/or your knowledge about food and agrifood systems? If so, what are some of the most important issues that you learn about and you will now carry with you? Why you feel these are important learning aspects?
15. Do you think that this course has contributed to preparing you to make better food choices now and in the future? (How, how much, sufficient, essential course?) (What do you think I mean about better food choices?)
16. Can you give me an example of a food issue, or of issues related to agrifood systems that you know of and that you find interesting or problematic?
17. How would you define a sustainable food system? What elements are the most important and how can they be implemented/put into place/action?
18. Do you apply what you have learned in school about food issues outside of the classroom? If yes, how so? If not, why not?
19. Do you think that the knowledge you have gained in this food-related course has led you to think more critically about, and to discuss and debate, food issues with your friends, family and other community members? If yes, what do you usually discuss with them or tell them? If you do not talk about food, why not?

[For students who have not taken a food-related/intervention course]

1. Do you discuss and debate food issues with your friends, family and other community members? If yes, what do you usually discuss with them or tell them? If not, why not?
2. Is there any reason why you have not taken a foods class?

Teacher Semi-Structured Interview Guide/Questions

The purpose of this study is to measure the level of critical food literacy among high school students.

This interview will be about 45 minutes in length, and if you agree it will be recorded. The recorded interview will be transcribed. To protect your identity your name will not be used in any published documents and a pseudonym will be used in its place. You will also have the opportunity to review the transcripts. If at any stage in the interview you do not wish to continue, you would like to skip a question or if you would like me to stop the recording, please feel free to let me know and we do so.

The findings from this interview will be used for my master's thesis and possibly in journal publications and conference presentations. No information about your personal identity, school or school board will be revealed.

The goals of the interviews with teachers will be to find out what they believe the students have learned from their food-related course or program, to understand the goal of the class that they are teaching and to hear in their own words about the course/curriculum, as well as in which domain(s) the students' knowledge is lacking regarding agrifood systems and critical food literacy.

1. How long have you worked at this school/how long have you been a teacher?
2. What is your area of specialization? (i.e. Background & education)
3.
 - a) Did you request to teach this course, or was it assigned to you?
 - b) If you could liberally choose a discipline to teach, would it be this one?
 - c) Why are you interested in teaching this course/family studies courses/home economics/culinary arts courses?
4. What are you interested in related to food? What is your connection to it?
5. Where are you from? Where did you grow up? What is your familial/cultural background?
6. Please describe the food related interventions that exist in your school and their objectives.
7. Do you know when the food intervention program/course was first put in place at your school, and if the program has been offered every year since then?/ Has it always existed?
8.
 - a) Did you contribute to the implementation or amelioration of the food intervention program in your school? If not, who did?

- b) If yes, what motivated you to start an intervention program in your school?
9. a) What do you think are the most important tools or is the most important knowledge that the students have gained from the course?
b) Is there anything in regards to farming and/or agrifood systems? Do you talk about different food production methods (GMO/Organic, non-GMO foods, local/global foods)?
10. Do you think that your students have good food and nutrition habits? Also, please tell me what you think I mean by this.
11. What were the main teaching objective(s) in the course? Do you feel that most of the main teaching objectives are actually met by your program (if not, why not)?
12. a) Which curriculum do you make reference to for this course?
b) Does the curriculum specify to discuss agrifood systems, agriculture/food production/food choice?
13. What do you think students learned from this cooking course/the food preparation part of the course? In your opinion, what was their knowledge like before taking this course?
14. How often do the students get to actually cook or handle food?
15. If not you do not think that the dominant agri-food system is sustainable, what is missing and how would you define a sustainable agri-food system? What elements are the most important in your opinion?
16. a) Do you think that your students have a good understanding of agrifood systems?
b) If so, is it mostly due to the fact that they had the opportunity to take this course?
17. a) How would you describe the students that you had in your class last semester?
b) Who are the typical students taking this class, or why do you think that they are usually interested in this type of class/program?

18. a) Are students more likely to take this course in the first two years of high school (9 & 10) or in upper years (11 & 12) due to more freedom in choice in course selection?
b) Are there any obstacles in taking this course?
c) What are the enrolment numbers like in grade 9 & 10 versus grade 11 & 12? d) How many courses are generally offered per semester per grade?
19. Are there any challenges/what was or is (are) the biggest challenge(s) that you have experienced in keeping your program running? Are there any other significant challenges or barriers?
20. How do you think student's personal background, culture or socio-economic status may have affected their levels of food literacy before completing this course?
21. Do you believe that home economics/family studies/foods/hospitality & tourism courses should it be mandatory? Why (not)?
22. What are your thoughts on food-related education programs in general?
23. If you could, and had 100% freedom in designing of the curriculum, what would you add, or get rid of, or do differently and why?

Appendix E: SPSS Test Results

Table 14: Kruskal-Wallis Test Results for Test 1 by School, Group and Grade (Variable all8groups)

	CS								RS								
	Intervention				Control				Intervention				Control				
	9		10		9		10		9		10		9		10		
	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	p
Adequate food, nutrition and cooking skills for a healthy diet	13	51.85	15	41.40	12	51.67	6	45.17	16	51.66	9	49.94	10	36.60	13	49.00	.749
Understanding of fruit and vegetable seasonality	13	60.85	15	56.53	12	55.25	6	45.58	16	34.94	9	33.44	10	41.10	13	47.58	.063
Frequency of working in a garden that grows food	13	54.46	15	55.44	12	40.88	6	42.92	16	45.75	9	38.56	10	43.40	13	51.23	.606
Importance of growing food at home	13	57.85	15	52.17	12	38.79	6	62.58	16	39.28	9	39.22	10	38.30	13	55.77	.164
Importance of purchasing fair trade products	13	49.38	15	36.47	12	61.50	6	43.92	16	50.91	9	63.39	10	41.95	13	36.15	0.84
Importance of purchasing local/regional food products	13	69.23	15	52.00	12	57.92	6	50.25	16	36.03	9	50.06	10	27.55	13	37.38	.003
Importance of purchasing organic foods	13	49.62	15	49.53	12	43.33	6	46.17	16	31.09	9	69.61	10	45.60	13	53.85	.060
Importance of purchasing non-GMO foods	13	39.85	15	55.07	12	57.00	6	38.42	16	43.13	9	63.28	10	42.90	13	39.85	.225
Frequency of discussion of gardening, food or agricultural production in any class	13	42.00	15	57.57	12	49.75	6	54.67	16	47.63	9	38.22	10	57.15	13	34.85	.237
Importance of the discussion of gardening, food or agricultural production	13	55.19	15	51.03	12	38.75	6	39.00	16	40.16	9	57.33	10	49.75	13	48.23	.543

Table 15: Post Hoc Tests (Kruskal-Wallis Pairwise Comparisons with Bonferroni Correction for Multiple Tests) for Test 1 by School, Group and Grade

Test Variable	Associated groups	Adj. Sig.
<i>Importance of purchasing local/ regional food products</i>		
	G9 Control RS – G9 Intervention CS	.005
	G9 Intervention RS – G9 Intervention CS	.022
<i>Importance of purchasing local/ regional food products without I don't know option</i>		
	G9 Control RS – G9 Intervention CS	.023
	G9 Intervention RS – G9 Intervention CS	.012

Table 16: Kruskal-Wallis Test Results for Test 2 by School and Group (Variable schoolandgroup)

CS					RS				
Intervention			Control		Intervention		Control		
	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	<i>p</i>
Adequate food, nutrition and cooking skills for a healthy diet	28	46.25	18	46.25	25	51.04	23	43.61	.734
Understanding of fruit and vegetable seasonality	28	58.54	18	52.03	25	34.40	23	44.76	.007
Frequency of working in a garden that grows food	28	54.93	18	41.56	25	43.16	23	47.83	.226
Importance of growing food at home	28	54.80	18	46.72	25	39.26	23	48.17	.210
Importance of purchasing fair trade products	28	42.46	18	55.64	25	55.40	23	38.67	.057
Importance of purchasing local/ regional food products	28	60.00	18	55.36	25	41.08	23	33.11	.001
Importance of purchasing organic foods	28	48.57	18	44.28	25	44.96	23	50.26	.824
Importance of purchasing non-GMO foods	28	48.00	18	50.81	25	50.38	23	41.17	.601
Frequency of discussion of gardening, food or agricultural production in any class	28	50.34	18	51.39	25	44.24	23	44.54	.690
Importance of the discussion of gardening, food or agricultural production	28	52.96	18	38.83	25	46.34	23	48.89	.347

Table 17: Post Hoc Tests (Kruskal-Wallis Pairwise with Bonferroni Correction for Multiple Tests) for Test 2 by School and Group

Test Variable	Associated groups	Adj. Sig.
<i>Understanding of fruit and vegetable seasonality</i>		
	RS Intervention – CS Intervention	.004
<i>Importance of purchasing local/ regional food products</i>		
	RS Control – CS Control	.045
	RS Control – CS Intervention	.002
<i>Importance of purchasing local/ regional food products without I don't know option</i>		
	RS Control – CS Control	.017
	RS Control – CS Intervention	.003
	RS Intervention – CS Intervention	.020

Table 18: Kruskal-Wallis Test Results for Test 3 by Group and Grade (Variable groupandgrade)

		Intervention				Control			
		9		10		9		10	
	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	p
Adequate food, nutrition and cooking skills for a healthy diet	22	43.36	18	47.44	29	50.12	22	42.02	.614
Understanding of fruit and vegetable seasonality	22	46.36	18	45.67	29	44.12	22	48.39	.946
Frequency of working in a garden that grows food	22	41.09	18	46.39	29	48.45	22	47.36	.728
Importance of growing food at home	22	37.41	18	56.86	29	45.98	22	45.73	.131
Importance of purchasing fair trade products	22	50.75	18	38.42	29	48.47	22	44.20	.436
Importance of purchasing local/ regional food products	22	42.09	18	40.36	29	48.69	22	50.98	.470
Importance of purchasing organic foods	22	42.18	18	50.06	29	37.34	22	57.91	.031
Importance of purchasing non-GMO foods	22	48.64	18	38.78	29	40.00	22	57.18	.063
Frequency of discussion of gardening, food or agricultural production in any class	22	51.75	18	37.72	29	44.02	22	49.64	.279
Importance of the discussion of gardening, food or agricultural production	22	42.70	18	44.14	29	45.78	22	51.11	.715

Table 19: Post Hoc Tests (Kruskal-Wallis Pairwise with Bonferroni Correction for Multiple Tests) for Test 3 by Group and Grade

Test Variable	Associated groups	Adj. Sig.
<i>Importance of purchasing organic foods</i>		
	G9 Control – G10 Control	.029
<i>Importance of purchasing organic foods without I don't know option</i>		
	G9 Control – G10 Control	.059
	SPSS States to reject the null hypothesis and that it is still significant, although it is not highlighted in the second model window	

Table 20: Kruskal-Wallis Test Results for Test 4 by Both Intervention Groups (A &B) and Control Group (Variable interventiongroupcontrol)

	Intervention CS		Intervention RS		Control		
	n	Mean Rank	n	Mean Rank	n	Mean Rank	p
Adequate food, nutrition and cooking skills for a healthy diet	28	46.25	25	51.04	41	46.20	.704
Understanding of fruit and vegetable seasonality	28	58.54	25	34.40	41	47.95	.003
Frequency of working in a garden that grows food	28	54.93	25	43.16	41	45.07	.157
Importance of growing food at home	28	54.80	25	39.26	41	47.54	.106
Importance of purchasing fair trade products	28	42.46	25	55.40	41	46.12	.186
Importance of purchasing local/ regional food products	28	60.00	25	41.08	41	42.88	.011
Importance of purchasing organic foods	28	49.57	25	44.96	41	47.63	.820
Importance of purchasing non-GMO foods	28	48.00	25	50.38	41	45.40	.759
Frequency of discussion of gardening, food or agricultural production in any class	28	50.34	25	44.24	41	47.55	.689
Importance of the discussion of gardening, food or agricultural production	28	52.96	25	46.34	41	44.48	.404

**Table 21: Post Hoc Tests (Kruskal-Wallis Pairwise with Bonferroni Correction for Multiple Tests)
for Test 4 by Both Intervention Groups (A &B) and Control Group**

Test Variable	Associated groups	Adj. Sig.
<i>Understanding of fruit and vegetable seasonality</i>		
	Intervention B – Intervention A	.002
<i>Importance of purchasing local/ regional food products</i>		
	Intervention B – Intervention A	.028
	Control – Intervention A	.025
<i>Importance of purchasing local/ regional food products without I don't know option</i>		
	Intervention B – Intervention A	.010

Table 22: Kruskal-Wallis Test Results for Test 5 by Group (Variable groupnumeric)

	Intervention		Control		<i>p</i>
	n	Mean Rank	n	Mean Rank	
Adequate food, nutrition and cooking skills for a healthy diet	41	46.20	53	48.51	.652
Understanding of fruit and vegetable seasonality	41	47.95	53	47.15	.882
Frequency of working in a garden that grows food	41	45.07	53	49.38	.402
Importance of growing food at home	41	47.54	53	47.47	.991
Importance of purchasing fair trade products	41	46.12	53	48.57	.656
Importance of purchasing local/ regional food products	41	42.88	53	51.08	.137
Importance of purchasing organic foods	41	47.63	53	47.40	.966
Importance of purchasing non-GMO foods	41	45.40	53	49.12	.503
Frequency of discussion of gardening, food or agricultural production in any class	41	47.55	53	47.46	.987
Importance of the discussion of gardening, food or agricultural production	41	44.48	53	49.84	.325

Table 23: Kruskal-Wallis Test Results for Test 6 by School (Variable school2)

	CS		RS		<i>p</i>
	n	Mean Rank	n	Mean Rank	
Adequate food, nutrition and cooking skills for a healthy diet	46	47.52	48	47.48	.993
Understanding of fruit and vegetable seasonality	46	55.99	48	39.36	.002
Frequency of working in a garden that grows food	46	49.70	48	45.40	.399
Importance of growing food at home	46	51.64	48	43.53	.140
Importance of purchasing fair trade products	46	47.62	48	47.39	.966
Importance of purchasing local/ regional food products	46	58.18	48	37.26	.000
Importance of purchasing organic foods	46	47.50	48	47.50	1.000
Importance of purchasing non-GMO foods	46	49.10	48	45.97	.571
Frequency of discussion of gardening, food or agricultural production in any class	46	50.75	48	44.39	.229
Importance of the discussion of gardening, food or agricultural production	46	47.43	48	47.56	.981