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School Gardens: Reconnecting Children with Nature and Food

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**SCHOOL GARDENS:
RECONNECTING CHILDREN WITH NATURE AND FOOD**

by

ALYSSA BOYLE

**SUBMITTED TO SCRIPPS COLLEGE IN PARTIAL FULFILLMENT OF THE
DEGREE OF BACHELOR OF ARTS IN ENVIRONMENTAL ANALYSIS**

**PROFESSOR NANCY NEIMAN AUERBACH
PROFESSOR RICHARD HAZLETT**

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Introduction

In bridging my two passions—environmentalism and education, I have chosen to argue for the importance of elementary and middle school gardens. Such tools can effectively address larger environmental issues associated with the industrialized food system while also allowing children to spend more time outdoors within a natural context during their school day. Many of the environmental issues we face today have arisen from a disrespect of the natural world. If children are more exposed to natural settings and are given the opportunity to develop a connection with and an appreciation for the environment, they are more likely to value protecting nature throughout their lives. School gardens provide the space to develop such a respect of the natural world.

A great number of the environmental problems we face today stem from the overuse and abuse of the natural world. In attempts to modernize and industrialize society, people have become disconnected from the earth that sustains us. The current industrial food system, especially, shows how far removed people currently are from the natural environment. In order to grow as much as possible and thus maximize profit, farmers are taking measures that are having deleterious effects on the environment. All stages of the industrialized food system—production, processing, distribution, and waste—are environmentally harmful.

Furthermore, with the rise of modernization and urbanization, children are spending less time in natural settings. As a result, they are suffering the consequences of what Richard Louv has termed “Nature Deficit Disorder” in his *Last Child in the Woods*. As youth spend less time in contact with the natural environment, they suffer more from ADHD, depression, anxiety, low-self esteem, and stress. Evidently, exposure in nature contributes greatly to healthy child development. Additionally, children are not

developing biophilia, or a deep-felt appreciation for and love of nature. In fact, many are suffering from biophobia, which David Orr describes in his *Earth in Mind* as a fear of nature beyond human control. In this sense, people are growing up with a feeling of needing to control nature instead of developing an appreciation for the natural world. Perhaps this is why society is becoming increasingly modernized and separated from nature, and perhaps this is a reason why the food system has become so environmentally harmful.

There is a need to reconnect children to the natural world and instill in them a sense of biophilia as a means of ameliorating current practices associated with industrialized systems that are harmful to the environment. I see reaching out to children as an important step in effecting positive change in the world today that has grown so distanced from the natural environment upon which we depend. If children grow up feeling a connection to the earth and have positive experiences with the natural world, they are more likely to develop a sense of environmentalism and feel a need to protect the natural world. A solution to both addressing food system issues and reconnecting children with nature exists in the widespread adoption of school gardens.

School gardens are useful teaching tools that give meaning to classroom lessons while also putting children back in touch with the earth and enabling them to realize where their food comes from. Throughout this thesis, I will present the problems that must be addressed in order to have a healthier environment and a healthier society, namely the environmental issues that result from the industrialized food system as well as children's decreased exposure to nature and its effect on their development. I will then highlight how school gardens are an effective treatment for these modern environmental

and societal problems. Next, I will present a few specific case studies of successful school gardens in Southern California. Lastly, in order to encourage the creation of school gardens, I will provide a step-by-step how-to guide for implementing such projects successfully as well as example lesson plans to use them effectively as teaching tools in association with both the required curriculum and as a means of creating an awareness about food system issues.

Implementing school gardens is a practical, effective cure for many of the environmental issues today, especially in relation to the food system. As children are the future, I feel it is of the utmost importance to instill environmental values in them by providing hands-on, constructive experiences with the natural world. Providing these opportunities in schools ensures repeated exposure to nature and utilizing a garden is a surefire way to connect children to their food sources while also bettering their health and nutrition as they are continually exposed to fresh fruits and vegetables. While many may say that requiring students to do manual, menial labor is not education, it indeed can be used in educational ways in all subjects, as I will exemplify in Chapter VI. Additionally, connecting children directly to the natural world and educating them about where their food comes from is crucial in addressing environmental and food system issues today.

As children become cut off from nature, our story of the universe or worldview has become increasingly individuated and lifeless. Numerous authors attribute this dysfunctional cosmology for most of our contemporary problems. Strip malls and urban blight are what greet our children today. I think we can do better. Doing better, yes; as a pressing matter of social justice, however, at this moment in our planetary history, it may be a matter of survival. Many scientists agree that all of our big-ticket items—air, water, soil—are at serious risk. The clock is ticking and as Stephen J. Gould says, ‘We cannot win this battle to save species and environments without forging an emotional bond between ourselves and nature as well, for we will not fight to save what we do not love.’¹

¹ Laurie Thorp, *The Pull of the Earth: Participatory Ethnography in the School Garden* (Lanham, MD: AltaMira Press, 2006), 5.

Chapter I: The Industrialized Food System and its Effect on the Environment

Food is an essential component of life, yet not everyone is aware of the origins of the food they ingest or the current state of the food industry in the United States. Humans have been practicing agriculture for more than 10,000 years, and many people continue to believe that their food comes from honest, small-scale farmers.² However, this is no longer the case—in the past 50 years or so, farmers have become more and more dependent on chemicals such as pesticides and synthetic fertilizers as well as farm machinery powered by fossil fuels.³ A disconnect between humans and nature occurred as people moved from the country, from their pastoral farmlands, to the city. This human-nature divide has enabled the development of the current state of food capitalism; in order for the current food system to develop so successfully, people needed to become “distant consumers” of food instead of “proximate producers” who respect the natural environment.⁴ The rise of the industrialized food system reflects people’s separation from nature and their desire to control the natural environment.

During World War II, the food production system began adopting principals of industrialization. Tractors replaced work animals. Hybrid seeds, synthetic fertilizers, and pesticides were introduced in order to increase the efficiency of farms, as there was an

² L. Horrigan, R.S. Lawrence, P. Walker, “How Sustainable agriculture can address the environmental and human health harms of industrial agriculture,” *Environmental Health Perspectives* 110, no. 5 (2009), 446.

³ L. Horrigan, R.S. Lawrence, P. Walker, “How Sustainable agriculture can address the environmental and human health harms of industrial agriculture,” *Environmental Health Perspectives* 110, no. 5 (2009), 446.

⁴ A. Blay-Palmer, *Food Fears: From Industrial to Sustainable Food Systems* (Ashgate Publishing Company, 2008), 7.

emphasis on quantity and large-scale production.⁵ As a result of such advances, the environment has suffered. Conventional agriculture connotes words such as “centralization, capital, labor, technology dependence, competition, domination of nature, increasing specialization and narrowing of production of resources, exploitation of resources that privileges short term over long term sustainability.”⁶ These terms exemplify how industrialized and far removed from respecting nature agriculture has become in the pursuit of increased production and profit. Each step in the process of the current industrialized food system— production, processing, distribution, and waste— is negatively affecting the world around us.

Effects of Production

Industrialized agricultural production contributes greatly to the decline in the quality of the environment. Within the industrialized food system, most agricultural ventures take the form of monocultures, vast plots of land planted with one type of crop year after year as a means of maximizing yield and efficiency.⁷ The addition of chemical pesticides and fertilizers to such plots as a method of eliminating all pests and maximizing output is eroding biodiversity and polluting the earth’s soil, water, and air.

Let’s first explore the effects of industrial agricultural production on soil quality. As crop production becomes increasingly specialized in the form of monocultures, farmers are forgoing the use of cover crops between seasons and simply letting the ground lay barren instead. This technique increases the degree of soil erosion, which

⁵ M. A. Grey, “The Industrial Food Stream and its Alternatives in the United States: An Introduction,” *Human Organization* 59, no. 2 (2000), 144.

⁶ A. Blay-Palmer, *Food Fears: From Industrial to Sustainable Food Systems* (Ashgate Publishing Company, 2008), 3.

⁷ M.A. Altieri, “Ecological Impacts of Industrial Agriculture and the possibilities for truly sustainable Farming,” *MONTHLY REVIEW-NEW YORK* 50, (1998), 62.

leads to a decrease in soil quantity. As the vast plots are not planted, there are no roots to hold the soil together and protect it from blowing away with the wind. Additionally, with the practice of monocultures, farmers must use more fertilizer to replace the nutrients that are missing in the soil. When the same crop is planted for many years in a row on the same land, it depletes the same nutrients from the soil over and over.⁸ Thus, conventional farming methods are decreasing the quality of the soil. Furthermore, adding synthetic fertilizers to the ground may actually harm crop production in the long run, as excess nitrogen leads to a reduction in the production of biomass. Chemical fertilizers also raise the level of acidity in the soil, which at a certain point will impede plant growth. Lastly, when plots are fertilized with chemicals, there is less biological activity in the soil food web than in land that has been treated with organic fertilizers like manure.⁹ As a result of such intensive farming methods, soil is being eroded at a faster rate than it can be replenished.¹⁰

Industrialized agriculture is also greatly affecting our water sources. The modern agricultural system claims 70% of the nation's freshwater sources, which could be diverted for other possible uses, such as domestic, industrial, recreational, and environmental purposes. Not only does agriculture consume a large portion of the United States' water supply, but it also reduces the quality of the water that it does not use directly for irrigation. Water becomes polluted by the release of chemicals, such as

⁸ Oran B. Hesterman, *Fair Food: Growing a Healthy, Sustainable Food System for All* (New York: PublicAffairs, 2011), 17.

⁹ L. Horrigan, R.S. Lawrence, P. Walker, "How Sustainable agriculture can address the environmental and human health harms of industrial agriculture," *Environmental Health Perspectives* 110, no. 5 (2009), 446.

¹⁰ L. Horrigan, R.S. Lawrence, P. Walker, "How Sustainable agriculture can address the environmental and human health harms of industrial agriculture," *Environmental Health Perspectives* 110, no. 5 (2009), 445.

fertilizers and pesticides, utilized by large-scale industrial farming operations. In fact, only 30-50% of nitrogen fertilizers and 45% of phosphorous fertilizer are actually used by the crops—the surplus nutrients remain in the environment and negatively affect natural systems.¹¹ A large amount of this leftover fertilizer ends up in our surface or groundwater supply.¹² In fact, the United States Environmental Protection Agency places 70% of the blame on current industrial farming practices for the pollution of the nation's rivers and streams. Another report by the EPA revealed that 173,000 miles of waterways in America have been polluted by runoff of chemicals, silt, and animal waste from modern farming practices.¹³ Evidently, today's intensive agricultural system is overusing and polluting our nation's vital water sources.

Due to the declining quality and increasing pollution in our land and waterways as a result of industrialized agriculture, biodiversity is on the decline in the United States. Large-scale land clearing for agricultural purposes and overgrazing has greatly decreased the amount of biodiversity in the nation. Furthermore, industrial agriculture tends to favor using a genetically identical species repeatedly on one plot of land. Therefore, the complex natural vegetation of ecosystems is being replaced by a narrow range of crop species. This unistrata field in the midst of a natural ecosystem also fragments natural habitats, which leads to declining animal populations. Additionally, monocropping requires a high amount of artificial pesticides in order to eliminate the risks of disease

¹¹ G. O'Kane, "What is the Real Cost of Our Food? Implications for the Environment, Society and Public Health Nutrition," *Public Health Nutrition* 1, no. 1 (2011), 269.

¹² M.A. Altieri, "Ecological Impacts of Industrial Agriculture and the possibilities for truly sustainable Farming," *MONTHLY REVIEW-NEW YORK* 50, (1998), 65.

¹³ L. Horrigan, R.S. Lawrence, P. Walker, "How Sustainable agriculture can address the environmental and human health harms of industrial agriculture," *Environmental Health Perspectives* 110, no. 5 (2009), 447.

and attacks from pests, for if a disease were to infect one organism in the field, it would likely spread to many if they are identical species. The use of pesticides reduces biodiversity as not only are target pests eliminated but beneficial insects and other organisms, like wild bees, are killed.¹⁴ In fact, there have even been findings that the number of honeybee colonies on US farmland has decreased from 4.4 million in 1985 to only 1.9 million in 1997 due to the use of pesticides.¹⁵ Honeybees are important pollinators and are thus a vital component of crop production. Industrial agriculture is harming important animal species and leading to a reduction in biodiversity.

Essentially, industrialized agricultural production is eroding our natural environments. The decreased quality of soil and water as well as the decrease in biodiversity will ultimately affect humans in a deleterious manner. The intensive agricultural methods of production are unsustainable, and people must be made aware of these processes in order to become conscious consumers and reverse the environmental damages that are being inflicted by such a system.

Effects of Distribution

While we've touched on the issues involved in industrial agricultural production that have negative effects on the natural world, the distribution stage also has a negative impact on the environment. In the US, the average distance a food travels from its point of production to its point of consumption is 1500 miles. In order to transport food such long distances, a great deal of fossil fuel is required. The road from the farm to the dinner

¹⁴ G. O'Kane, "What is the Real Cost of Our Food? Implications for the Environment, Society and Public Health Nutrition," *Public Health Nutrition* 1, no. 1 (2011), 269-270.

¹⁵ L. Horrigan, R.S. Lawrence, P. Walker, "How Sustainable agriculture can address the environmental and human health harms of industrial agriculture," *Environmental Health Perspectives* 110, no. 5 (2009), 446.

table is energy intensive due to transport, processing, and packaging—steps that require a high amount of fuel.¹⁶ In an energy audit of America's food system, it was found that in order to create 1.4 calories of food energy, 10.3 calories of fossil fuel energy are utilized.¹⁷ Additionally, food quality has been declining due to the fact that it is being produced for long distance transport and long-term storage. There is a lower nutrient density in produce that must travel from far away than produce that is eaten shortly after being harvested.¹⁸ As a result of increasing specialization and larger farming operations, produce must be shipped across the nation as different areas of the nation specialize in different food items. Since this produce must be shipped, many crops are picked before they are ripe and are artificially ripened; the produce does not contain the same amount of nutrients as if it were picked and eaten shortly after harvest. The step of distribution within the industrial agricultural system is negatively affecting the environment and human health as well, as it requires a great deal of fossil fuels in transportation and crops are less nutritious when picked early for the long voyage.

Not only is the declining concentration of nutrients in foods a nutritional problem, but as a result of the industrial food system, there is also a high prevalence of diet-related illnesses such as diabetes and obesity in the United States today. Due to a food system characterized by an abundant production of crops that are used to create highly processed

¹⁶ L. Horrigan, R.S. Lawrence, P. Walker, “How Sustainable agriculture can address the environmental and human health harms of industrial agriculture,” *Environmental Health Perspectives* 110, no. 5 (2009), 448.

¹⁷ Oran B. Hesterman, *Fair Food: Growing a Healthy, Sustainable Food System for All* (New York: PublicAffairs, 2011), 7.

¹⁸ Oran B. Hesterman, *Fair Food: Growing a Healthy, Sustainable Food System for All* (New York: PublicAffairs, 2011), 15.

foods, many people are consuming too many unhealthy calories and are gaining weight.¹⁹ There was a 22% increase in the amount of fats and oils present in the food system between 1970 and 1996 as well as a 23% increase in the amount of sugars and sweeteners that were consumed in America.²⁰ Additionally, between 1967 and 1990, there was a 1000% increase in the consumption of high-fructose corn syrup, a cheaper alternative to sucrose, which now counts for 40% of the sweeteners in food and beverages. In accordance with such an emphasis on high amounts of efficient production and the prevalence of highly processed poor quality food, in the last decade, the amount of fast-food restaurants in America has doubled.²¹ Because of such changes in the food system, recent studies have shown that almost three-quarters of adults and one-third of children in the US are above the healthy weight range.²² Such nutritional issues stem from the bigger picture—the industrial food system—and are ailing America’s population.

Effects of Waste

Lastly, there is the issue of waste. At all stages of the food chain, from production to purchase, there is food waste. In the US, a large amount of the food loss occurs in the food service or consumer level of the food chain.²³ 16.9 million tons in the US municipal

¹⁹ Oran B. Hesterman, *Fair Food: Growing a Healthy, Sustainable Food System for All* (New York: PublicAffairs, 2011), 18-19.

²⁰ G. O’Kane, “What is the Real Cost of Our Food? Implications for the Environment, Society and Public Health Nutrition,” *Public Health Nutrition* 1, no. 1 (2011), 270.

²¹ G. O’Kane, “What is the Real Cost of Our Food? Implications for the Environment, Society and Public Health Nutrition,” *Public Health Nutrition* 1, no. 1 (2011), 270.

²² G. O’Kane, “What is the Real Cost of Our Food? Implications for the Environment, Society and Public Health Nutrition,” *Public Health Nutrition* 1, no. 1 (2011), 270.

²³ M.C. Heller, G.A. Keoleian, *Life Cycle-Based Sustainability Indicators for Assessment of the US Food System* (University of Michigan: Center for Sustainable Systems, 2000), 35.

waste stream come from food and beverage packaging each year.²⁴ In terms of the actual food wasted, 90.8 billion pounds, which is equivalent to 26% of the edible food that is available for consumption in America, is thrown away.²⁵ Since agriculture uses about 70% of the freshwater supply, one quarter of this water is therefore wasted.²⁶ Additionally, since it takes 3 kcal of fossil fuel to produce 1 kcal of food before taking into account the energy used in processing or transportation, 300 million barrels of oil per year are being wasted because of food waste in the production stage alone. Adding to this wasteful use of fossil fuels and its effect on climate change, food waste sitting and decomposing in landfills also releases methane, a gas that contributes 25 times more to global warming than CO₂.²⁷ Food waste is contributing a great deal to environmental damage as well, and people should become aware of the effects of food waste in order to conserve natural resources.

The current energy intensive food system is viewed as efficient as it creates a high yield for the short-term. Yet the long-term effects of this industrial food system, such as decreased soil quality, diminishing biodiversity, and poor nutrition must be addressed soon or future generations will have to pay for these hidden detrimental costs. Education in this area is currently of extreme importance. Children must become aware of the aspects and issues involved in the current food system. They are the future that will have

²⁴ M.C. Heller, G.A. Keoleian, *Life Cycle-Based Sustainability Indicators for Assessment of the US Food System* (University of Michigan: Center for Sustainable Systems, 2000), 35.

²⁵ M.C. Heller, G.A. Keoleian, *Life Cycle-Based Sustainability Indicators for Assessment of the US Food System* (University of Michigan: Center for Sustainable Systems, 2000), 35.

²⁶ K.D. Hall, J. Guo, M. Dore, C.C. Chow, "The Progressive Increase of Food Waste in America and Its Environmental Impact," *PLoS One* 4, no. 11 (2009).

²⁷ K.D. Hall, J. Guo, M. Dore, C.C. Chow, "The Progressive Increase of Food Waste in America and Its Environmental Impact," *PLoS One* 4, no. 11 (2009).

to deal with such environmental and health effects, and now is the time to address them.

If children are opened up to these issues at an early age, they will likely feel a need to change such a system and support alternative, more sustainable food systems.

Furthermore, our population is in danger as the quality of health decreases and diabetes and obesity are on the rise. One in three children are considered overweight or obese and practice poor nutrition. With the introduction of school gardens, children will learn to grow their own food, improve their nutrition and knowledge of healthy living, and become aware of the current issues in the food system mentioned above.

This globalized food system that promotes competitiveness, devalues personal relationships, discourages connections with nature and with food producers and imposes substantial environmental, social and health costs cannot remain sustainable. None of the environmental costs that come from the production and transport of food are included in the cost of food for the consumer. It will be up to future generations to pay for these hidden externalities of our current, “efficient” agricultural production methods.²⁸

²⁸ G. O’Kane, “What is the Real Cost of Our Food? Implications for the Environment, Society and Public Health Nutrition,” *Public Health Nutrition* 1, no. 1 (2011), 271.

Chapter II: “Nature Deficit Disorder” and its Effect on Children

Perhaps one of the reasons that our current food system has become so harmful to the natural world is the fact that people are being exposed to natural settings less and less with the increased urbanization of neighborhoods and the rising popularity of television and video games. As Richard Louv notes in his *The Last Child in the Woods*, “for the young, food is from Venus; farming is from Mars.”²⁹ In the last 50 years, the culture has moved away from a time when gardening was a common activity to “the current age of shrink-wrapped, lab produced food.”³⁰ Not only is the fact that children’s direct exposure in nature is decreasing affecting the food system, but Richard Louv argues that contact with nature is also necessary for the healthy development of children.³¹ As Louv states, “childhood has moved indoors, and children are paying the price.”³²

Decrease in Children’s Exposure to Nature

In the United States, children are not spending as much time playing outdoors. According to a study by Sandra Hofferth at the University of Maryland, there has been a decline in 50% from 1997 to 2003 in the number of children aged nine to twelve who spent time outside.³³ Robin Moore, in his *Childhood’s Domain: Play and Place in Child Development*, noted that children’s primary experience of nature is being replaced by the “secondary, vicarious, often distorted, dual sensory (vision and sound only), one-way

²⁹ Richard Louv, *Last Child in the Woods: Saving our Children from Nature-Deficit Disorder* (Chapel Hill, North Carolina: Algonquin Books of Chapel Hill, 2009), 20.

³⁰ Richard Louv, *Last Child in the Woods: Saving our Children from Nature-Deficit Disorder* (Chapel Hill, North Carolina: Algonquin Books of Chapel Hill, 2009), 21.

³¹ Richard Louv, *Last Child in the Woods: Saving our Children from Nature-Deficit Disorder* (Chapel Hill, North Carolina: Algonquin Books of Chapel Hill, 2009), 2.

³² M. Driessnack, “Children and Nature-Deficit Disorder,” *Journal for Specialists in Pediatric Nursing* 34 (2009): 1.

³³ Richard Louv, *Last Child in the Woods: Saving our Children from Nature-Deficit Disorder* (Chapel Hill, North Carolina: Algonquin Books of Chapel Hill, 2009), 34.

experience of television and other electronic media.”³⁴ As children were raised in close contact with nature in earlier times, efforts to connect children with nature were unnecessary—this is no longer the case, and efforts must now be made. Currently, children are more likely to recognize and recall names of television and video game characters while being unable to identify the plants and animals in their backyards. As a result of this decreased contact with nature, Richard Louv has coined the term “Nature Deficit Disorder” to describe the human costs of this alienation from nature. These costs include the diminished use of senses, attention difficulties, and more physical and emotional illnesses.³⁵

For the majority of human evolution, the natural world has been one of the most significant contexts that children have encountered during their critical years of development. It would not be too much of a stretch to assert that direct and indirect experience of nature is a critical component in the physical, emotional, intellectual, and moral maturation of humans.³⁶ There has been some evidence that the decline in direct experiences with healthy natural environments has aggravated conditions such as ADHD, depression, anxiety, low self-esteem as well as inhibits children’s’ ability to be creative, build community, and develop an ecological self.

³⁴ Richard Louv, *Last Child in the Woods: Saving our Children from Nature-Deficit Disorder* (Chapel Hill, North Carolina: Algonquin Books of Chapel Hill, 2009), 66.

³⁵ Richard Louv, *Last Child in the Woods: Saving our Children from Nature-Deficit Disorder* (Chapel Hill, North Carolina: Algonquin Books of Chapel Hill, 2009), 36.

³⁶ Peter H. Kahn and Stephen R. Kellert, *Children and Nature: Psychological, Sociocultural, and Evolutionary Investigations*, (Cambridge, Mass.: MIT Press, 2002), vii.

Exposure in Nature is Essential for Healthy Child Development

The nature deficit is growing and with it is coming a new field of scientific evidence that shows how experiencing nature directly is essential for the physical and emotional well-being of children. For instance, in recent studies, nature has proven to mollify the symptoms of Attention Deficit Hyperactivity Disorder (ADHD) as well as improve the cognitive abilities of children. Increased exposure to the natural world has also been shown to decrease children's susceptibility to negative stresses and depression.³⁷

First, let's examine the prevalence and degree of ADHD in relation to children's exposure with nature. If nature therapy has been shown to ameliorate the symptoms of ADHD, then the reverse may also hold true; the lack of exposure to nature may be aggravating the symptoms of ADHD in children.³⁸ In 2000, a study found that the closer children's homes are to natural settings, the more enhanced their cognitive abilities. Additionally, it was found that children's attention spans and abilities to focus increase with direct experience in nature. Furthermore, direct exposure to nature has also been shown to increase children's creativity, problem-solving abilities, self-discipline, and reduce their stress.³⁹ Other studies on ADHD have achieved similar findings. One found that the "greener" the natural setting, the greater the relief from ADHD symptoms, while indoor activities like watching television and outdoor play on pavement or "non-green"

³⁷ Richard Louv, *Last Child in the Woods: Saving our Children from Nature-Deficit Disorder* (Chapel Hill, North Carolina: Algonquin Books of Chapel Hill, 2009), 35.

³⁸ Richard Louv, *Last Child in the Woods: Saving our Children from Nature-Deficit Disorder* (Chapel Hill, North Carolina: Algonquin Books of Chapel Hill, 2009), 109.

³⁹ M. Driessnack, "Children and Nature-Deficit Disorder," *Journal for Specialists in Pediatric Nursing* 34 (2009): 73.

areas actually increase ADHD symptoms.⁴⁰ Furthermore, although medication benefits many children who suffer from mental illness and attention disorders, the use of nature as a supplemental or an alternative form of therapy is not often practiced even though new evidence suggests that the need for medication is intensified by children's disconnect from nature.⁴¹ Thus, it is evident that the diminishing amount of nature in children's lives is affecting their cognitive abilities and leading to an increase in children with ADHD.

While the lack of exposure to nature is affecting the attention spans of children, it is also limiting their sensory experiences and thus inhibiting their creative potentials. Richard Louv notes that children live through their senses, and these experiences contribute to the healthy development of the child's interior life.⁴² He also claims that most human learning comes about as a result of doing, making, and feeling with our hands.⁴³ Jean Piaget, a child development psychologist, similarly believed that children must be able to do their own experimenting, their own research; in order for children to truly understand something, they must construct it and reinvent it for themselves if in the future individuals are to be formed who are capable of creativity and not only repetition.⁴⁴ Similarly, in his *Childhood's Domain*, Robin Moore asserts that children need places to escape to:

⁴⁰ M. Driessnack, "Children and Nature-Deficit Disorder," *Journal for Specialists in Pediatric Nursing* 34 (2009): 73.

⁴¹ Richard Louv, *Last Child in the Woods: Saving our Children from Nature-Deficit Disorder* (Chapel Hill, North Carolina: Algonquin Books of Chapel Hill, 2009), 50.

⁴² Richard Louv, *Last Child in the Woods: Saving our Children from Nature-Deficit Disorder* (Chapel Hill, North Carolina: Algonquin Books of Chapel Hill, 2009), 66.

⁴³ Richard Louv, *Last Child in the Woods: Saving our Children from Nature-Deficit Disorder* (Chapel Hill, North Carolina: Algonquin Books of Chapel Hill, 2009), 67.

⁴⁴ Robin Moore, *Childhood's Domain: Play and Place in Child Development* (London: Croom Helm, 1986), 10.

Ways must be found to accommodate the necessity for children to physically manipulate the environment. Places are needed where stuff can be picked up, thrown about, gathered, jumped on, eaten, kicked, rolled on, climbed into, broken down, dug up, burnt and taken away, without causing offense.... If places where physical manipulation can legitimately occur continue to be removed, manipulation will happen in less appropriate places, where the resulting damage will not be so readily tolerated.⁴⁵

Therefore, children need access to a natural environment to learn from direct sensory experiences, foster their creativity, and manipulate without causing harm.

Decreased exposure to nature also lowers children's sense of worth and self-esteem. Gary Paul Nabhan, in his *The Geography of Childhood*, writes that "by forging connections with plants, animals, and land, by finding ways to experience some relationship to the Earth, individuals can gain a sense of worth."⁴⁶ He asserts that it is necessary for children to realize a "discontinuity"—an awareness that the child is unique and separate and has their own identity—as well as a "continuity"—the realization that the individual has a greater relationship with nature. Nabhan notes that this helps the child achieve a psychological balance. He goes on to say,

The natural world does not judge. It exists. One route to self-esteem, particularly for shy or undervalued children, lies in the out-of-doors. If, as psychologist Jean Baker Miller asserts, the model of seeking identity by 'developing all of one's self in increasingly complex ways, in increasingly complex relationships,' is desirable, nature is a wonderful place to seek them. The sun, the wind, the frogs, and the trees can reassure and strengthen and energize.⁴⁷

⁴⁵ Robin Moore, *Childhood's Domain: Play and Place in Child Development* (London: Croom Helm, 1986), 237.

⁴⁶ Gary Paul Nabhan and Stephen Trimble, *The Geography of Childhood: Why Children Need Wild Place* (Boston: Beacon Press, 1994), 22.

⁴⁷ Gary Paul Nabhan and Stephen Trimble, *The Geography of Childhood: Why Children Need Wild Place* (Boston: Beacon Press, 1994), 23.

Here we can see that nature is a positive setting for developing high self-esteem and achieving a sense of self-worth. Spending time in nature removes children from stressful societal pressures that lead to low self-esteem.

Evidently, direct experiences and exposure to natural settings is essential for healthy childhood development. Such experiences ameliorate ADHD symptoms, instill a sense of wonder and foster creativity, and give the child a sense of self-worth. As children are spending less time outdoors, there are increasing cases of ADHD, depression, anxiety, and low self-esteem. Thus, getting children back in touch with nature is important for the healthy development of human beings.

Decreased Exposure in Nature's effect on Biophilia

Appreciation and respect for the environment cannot be cultivated in children by simply telling them about current environmental issues; children need to experience the natural world for themselves in order to develop a love of the environment. Yet within the required curriculum, teachers find that there is little time to address environmental ethics except by emphasizing do's and don'ts when it comes to respecting the environment. Robin Moore notes that this low level of environmental education does not effectively transmit what Geoffrey Vickers termed "appreciation;" appreciation refers to the concept that in order to truly value the environment, an individual must develop his or her proper relationship and have his or her own experiences and understanding instead of simply listening to those of a teacher or parent.⁴⁸ Similarly, psychologists argue that in order for children to develop an empathy with nature, it is necessary for them to regularly

⁴⁸ Robin Moore, *Childhood's Domain: Play and Place in Child Development* (London: Croom Helm, 1986), 14.

play in a natural environment.⁴⁹ In doing so, children develop a biophilia, a love of nature, which will allow them to care about larger global issues of conservation. If this empathy is not experienced at an early age, these issues will be difficult to comprehend and relate to, and the children may develop a phobia about issues concerning the natural world.⁵⁰

In this vein, David Orr, in his *Earth in Mind: On Education, Environment, and the Human Prospect*, describes biophobia. He observes that biophobia is increasingly common among people that have been raised with television and video games and those who live amongst shopping malls and freeways in densely populated urban and suburban neighborhoods where nature merely serves as decoration. He goes on to say that people are becoming more uncomfortable with the natural world that lies beyond our control.⁵¹

Orr asserts that

Biophobia is not OK because it is the foundation for a politics of domination and exploitation. For our politics to work as they now do, a large number of people must not like any nature that cannot be repackaged and sold back to them. They must be ecologically illiterate and ecologically incompetent, and they must believe that this is not only inevitable but desirable. Furthermore, they must be ignorant of the basis of their dependency.⁵²

Perhaps the lack of direct exposure to nature that afflicts children these days is resulting in a biophobia, which has led to the current environmentally destructive practices today.

⁴⁹ Ann Watts, *Every Nursery Needs a Garden: A Step-By-Step Guide to Creating and Using a Garden with Young Children* (Abingdon, New York: Routledge, 2011), 4.

⁵⁰ Ann Watts, *Every Nursery Needs a Garden: A Step-By-Step Guide to Creating and Using a Garden with Young Children* (Abingdon, New York: Routledge, 2011), 4.

⁵¹ David W. Orr, *Earth in Mind: On Education, Environment, and the Human Prospect* (Washington, D.C.: Island Press, 1994), 131.

⁵² David W. Orr, *Earth in Mind: On Education, Environment, and the Human Prospect* (Washington, D.C.: Island Press, 1994), 136.

This destruction can be extended to the industrial food system and its negative environmental effects described in Chapter I.

In sum, exposure to nature is essential for healthy child development and ultimately a healthy society. Moreover, children must have direct experiences with the natural world in order to feel a connection with the environment and feel a need to conserve and protect it if we wish to sustain a healthy planet. School gardens provide an opportunity for children to experience nature first-hand as a means of addressing such issues.

At the very moment that the bond is breaking between the young and the natural world, a growing body of research links our mental, physical, and spiritual health directly to our association with nature—in positive ways. Several of these studies suggest that the thoughtful exposure of youngsters to nature can even be a powerful form of therapy for attention-deficit disorders and other maladies. As one scientist puts it, we can now assume that just as children need good nutrition and adequate sleep, they may very well need contact with nature. Reducing that deficit—healing the broken bond between our young and nature—is in our self-interest, not only because aesthetics or justice demands it, but also because our mental, physical, and spiritual health depends upon it. The health of the earth is at stake as well. How the young respond to nature, and how they raise their own children, will shape the configurations and conditions of our cities, homes—our daily lives.⁵³

⁵³ Richard Louv, *Last Child in the Woods: Saving our Children from Nature-Deficit Disorder* (Chapel Hill, North Carolina: Algonquin Books of Chapel Hill, 2009), 3.

Chapter III: School Gardens: The Remedy

We've looked at how distant humans are from our food sources nowadays and the environmental ramifications of this disconnect as well as how less exposure in nature is negatively affecting the healthy development of children. A solution to both of these issues can be found in the implementation of school gardens. In 1899, Friedrich Froebel was the first to recognize the importance of gardening for young children. He coined the word "kindergarten," which we still use today. When translated literally, this term means "children's garden." Froebel believed that, in working with plants, children come to understand the needs of others. He affirmed that children should be in union with nature; to him, working in the garden was an important daily activity in which children should participate.⁵⁴ Just as Froebel noted, exposing children to nature via gardening instills an environmental awareness and social ethic in children at an early age. Additionally, it provides children a connection with their food and allows for outdoor time, therefore increasing their experiences with nature.

Why in a school?

Why a *school* garden? As America is becoming increasingly urbanized, direct experiences in nature are becoming rarities for children. Yet a piece of land that children are quite familiar with is their school grounds.⁵⁵ Children attend school regularly and are comfortable in and familiar with their respective school grounds. If there were to be a garden on campus, children would be exposed to such a space five out of seven days a

⁵⁴ Ann Watts, *Every Nursery Needs a Garden: A Step-By-Step Guide to Creating and Using a Garden with Young Children* (Abingdon, New York: Routledge, 2011), 2.

⁵⁵ Tim Grant and Gail Littlejohn, *Greening School Grounds: Creating Habitats for Learning* (Niagara Falls, NY: New Society Publishers, 2001), 5.

week for about nine months of the year. Instead of having to bring children to an outdoor program that may cost a large sum of money, having a garden at school provides children proximal exposure to nature. Additionally, involving students in the project gives them a sense of responsibility and therefore a personal investment and commitment to the school garden. Through “designing, creating, caring for and using school nature areas, children stand to improve their academic performance and to develop the willingness and capacity to work for the good of the human and natural communities of which they are a part.”⁵⁶

When children are involved and participating in projects concerning natural areas of campus, they feel a responsibility to care for such areas, and also to care for the greater environment as well. Thus, having gardens on school campuses allows children continual and reliable exposure to nature.

Teachers are also realizing the importance of hands-on teaching and first-hand experiences in their pursuits of instilling knowledge and understanding in children. They are “gaining a newfound appreciation for pedagogical potential of school grounds projects that integrate disciplines, have tangible outcomes, and foster ties with the community at large.”⁵⁷ For students, the active participation in these projects gives their classroom learning a new dimension and provides purpose, meaning, and relevance to their learning.⁵⁸ Rather than simply speaking at children and conveying lessons in a unidirectional manner, it is important for teachers to incorporate projects that weave lessons together and demonstrate real-world applications of principles taught in the

⁵⁶ Tim Grant and Gail Littlejohn, *Greening School Grounds: Creating Habitats for Learning* (Niagara Falls, NY: New Society Publishers, 2001), 9.

⁵⁷ Tim Grant and Gail Littlejohn, *Greening School Grounds: Creating Habitats for Learning* (Niagara Falls, NY: New Society Publishers, 2001), 9.

⁵⁸ Tim Grant and Gail Littlejohn, *Greening School Grounds: Creating Habitats for Learning* (Niagara Falls, NY: New Society Publishers, 2001), 9.

classroom. Teachers aware of learning theory know that concepts cannot simply be transmitted to students in words. They know that individuals must form their own personal concepts in order to fully understand what is being taught. Students must have direct, tangible experience with their environments and use all of their senses in order to best understand a concept. The more direct access to environmental instructions that the student is provided, the more effective is their learning.⁵⁹ Having gardens as a teaching tool at schools provides the students with a means of experiencing the environment and applying lessons from the classroom in the real world, which helps to solidify knowledge.

Currently, America's educational institutions are not utilizing what is known about these learning principles in schools. Instead of giving students meaningful experiences and using real life problem solving or concrete learning experiences, education is typically limited to exercises of the intellect in the classroom.⁶⁰ Generally, when people think of school, it involves a classroom of desks facing the front of the classroom where the teacher stands conveying a lesson at the class through the use of a blackboard. There is little teaching that occurs outside the walls of the classroom. In order to truly instill a love of learning and a real world understanding of lessons, the implementation of a participatory outdoor classroom, aka. a school garden, is beneficial.

Such an outdoor classroom can be used in many ways and for many subjects across the required curriculum. Gardening programs are related to almost every area of the school curriculum, which I will exemplify with lesson plans in Chapter VI. These areas of study can be given life and made more meaningful through learning experiences

⁵⁹ Daniel L. Peterson, "Evaluation of a Teacher's Guide Integrating A School Garden with Curriculum" (M.S.Ed. thesis, California State University Hayward, 1978).

⁶⁰ Daniel L. Peterson, "Evaluation of a Teacher's Guide Integrating A School Garden with Curriculum" (M.S.Ed. thesis, California State University Hayward, 1978).

in a school garden.⁶¹ For example, the garden can be used as inspiration for poetry or creative writing stories as well as art projects. Gardens can also be used to grow traditional crops that can then be harvested for a replication feast of an event in history to convey a lesson in social studies. For biology, classes may conduct experiments like growing plants with differing amounts of water or in different areas of the garden and analyzing the results. Likewise, students can use the garden to do math by taking measurements of garden beds and calculating the area and perimeter of certain areas of the garden or of tracking the growth of plants and plotting the data on graphs. Nutrition and health education is also a field that can be addressed in the garden—children can sample fresh vegetables and learn how to eat healthy and take care of their bodies. Thus, the garden is a tool that can be used in essentially all subjects at the elementary and middle school levels and is therefore an asset to a schoolyard and an important supplement to a classroom.

Why a garden?

Why a school *garden*? While gardens are only one of the ways to develop an environmental ethic in children, they have a few advantages over other outdoor programs. Firstly, gardens are accessible. Teachers are not required to transport their students long distances in order to have direct experiences with nature. Rather, the garden can be found right on the school's property. Additionally, gardening allows for an ongoing, continuous relationship with nature. While wilderness experiences can be profound, most are temporary. They only last for a week or two, after which students and teachers return and do not have a clear means of maintaining their relationship with nature. School gardens

⁶¹ Daniel L. Peterson, "Evaluation of a Teacher's Guide Integrating A School Garden with Curriculum" (M.S.Ed. thesis, California State University Hayward, 1978).

enable that relationship to endure.⁶² School gardens therefore provide a constant natural space on campus for students to maintain exposure with the natural environment. As opposed to other temporary outdoor programs that require transportation and other fees, gardens are more permanent spaces that are within footsteps for the students.

School gardens are ideal settings for environmental education. As children dig in the soil, they may encounter an earthworm and learn how the worm adds nutrients to the soil, which helps their plants grow and flourish. In this way, the children learn a lesson in interdependence and understand the interconnectedness of the natural world. Perhaps while they tend to their plants, they may learn about the water cycle, the sun's role in photosynthesis, and food webs. In the classroom, environmental issues take on more significance as children come to understand how chemicals used on plants can seep into groundwater, which affects aquatic life and downstream water users. Learning these facts, though, does not turn children into environmentalists. Environmental problems today are not the result of a paucity of knowledge. Teachers have the ability to teach students how our actions affect natural systems, and instructors can teach them how to have a more "green" lifestyle. Yet unless the students feel an intimate connection with nature, their environmental behaviors will not last long. In order to instill an enduring, deeply valued environmental ethic, environmental education must address the separation of humans from the natural world; it must provide opportunities for students bond with

⁶² Tim Grant and Gail Littlejohn, *Greening School Grounds: Creating Habitats for Learning* (Niagara Falls, NY: New Society Publishers, 2001), 13-14.

nature and develop a deep appreciation and love of the land.⁶³ Gardens serve as a space to achieve such pursuits and instill a long-lasting environmental ethic in children.

Linking gardening with curriculum provides exactly what a teacher needs when trying to capture the attention of his or her students. Gardening also gives children the opportunity to develop socially and emotionally, individually, and as a member of the community. Additionally, the physical work associated with gardening helps children develop physically, nourishes all of their senses, and encourages them to slow down and observe the natural world carefully.⁶⁴ Rather than simply taking a class for an occasional adventure into the natural world, a garden gives children a place to continually work together and build community as well as develop their interpersonal skills. Moreover, gardening offers a unique opportunity for teachers to foster qualities in children like “curiosity, cooperativeness, respect for living things, persistence, and caring” that will serve children well throughout their lives.⁶⁵ Through working directly and repeatedly with plants and the soil, children will directly experience the wonders of the natural world and come in contact with organisms they may not have otherwise. In gardening, children also develop a sense of ownership and a responsibility to maintain a successful garden; they must work together to designate tasks such as watering and weeding in order to ensure that the plants flourish. In an interview with Audrey Borgmann’s 5th grade class at Redeemer Lutheran Christian School (Ontario, CA), a student mentioned that the garden has “helped us work together, in and out of the classroom;” another student

⁶³ Tim Grant and Gail Littlejohn, *Greening School Grounds: Creating Habitats for Learning* (Niagara Falls, NY: New Society Publishers, 2001), 12.

⁶⁴ Sarah Starbuck, *Hollyhocks and Honeybees: Garden Project for Young Children* (St. Paul, MN: Redleaf Press, 2002), 1.

⁶⁵ Sarah Starbuck, *Hollyhocks and Honeybees: Garden Project for Young Children* (St. Paul, MN: Redleaf Press, 2002), 1.

remarked that “it’s really cool because we just do this together and it’s a team.”⁶⁶ As students work in their school gardens, they learn how to work with one another as a team in order to accomplish tasks and keep the garden alive.

By gardening, children become fully aware of where food comes from. Gardens “give us an immediate and direct connection to our food source. When our food is grown in a faraway land, transported long distances, and sold to us wrapped in plastic in a grocery store, eating itself becomes an experience that alienates us from nature.”⁶⁷ Many children believe that food comes from the grocery store; they do not realize what it takes to produce the food that they consume. In an interview with David King of the Learning Garden (Venice, CA), he recounted a time when gardening led to a child’s realization that carrots come from the ground—“I love the one kid. The teacher was trying to clear carrots out so they could use it for something else, they were pulling carrots out of the ground, and the student goes—you’re trying to tell me this is where carrots come from?”⁶⁸ Evidently, gardening and cultivating food connects children to the land and helps them understand how their food is produced.

History of School Gardens

The importance of educational gardens in the United States has fluctuated over time for varying reasons. Since the late 1800s, there have been “several campaigns to transform North American school grounds.... Over the years, the school garden became an outdoor classroom providing spaces to teach math, banking, business practices,

⁶⁶ Borgmann, Audrey and her 5th grade class. Interviewed by Alyssa Boyle. Redeemer Lutheran Christian School, Ontario, CA, November 7, 2012. Transcript in Appendix 1.

⁶⁷ Tim Grant and Gail Littlejohn, *Greening School Grounds: Creating Habitats for Learning* (Niagara Falls, NY: New Society Publishers, 2001), 13.

⁶⁸ King, David. Interview by Alyssa Boyle. Venice, CA, September 29 2012. Appendix.

mechanical drawing, entomology, chemistry, botany, and physical geography.”⁶⁹ These gardens were believed to cultivate civic virtues: “the private care of public property, economy, honesty, application, concentration, self-discipline, civic pride, justice, the dignity of labor, and the love of nature.”⁷⁰ Essentially, school gardens contributed to the development of children into good citizens who would contribute to society. By 1915, “children’s school gardening was recognized by leading educators as a very important factor in the health of the whole education of the child and in making cities more beautiful and habitable.”⁷¹ During the period 1850-1915, school gardens were seen to improve the character of children and make them into ideal, well-rounded citizens with upstanding virtues as well as beautify cities.

With the onset of WWI and WWII, school gardens were seen as important sources of food production in order to support the nation during wartime. In 1918, the practical interest in gardens increased as every state in America promoted school gardens as a way to grow food for the war effort. During the wars, Victory Gardens thrived, but in the following decades, school gardens declined as the land that was previously used for gardening was taken over by athletic fields.⁷² While school gardens were developed during both WWI and WWII as a means of contributing food for the United States during the war, when the war was over, they were no longer necessary and were abandoned. The land was taken over by fields and trees to represent peace and an end of strife.

⁶⁹ Tim Grant and Gail Littlejohn, *Greening School Grounds: Creating Habitats for Learning* (Niagara Falls, NY: New Society Publishers, 2001), 3.

⁷⁰ Tim Grant and Gail Littlejohn, *Greening School Grounds: Creating Habitats for Learning* (Niagara Falls, NY: New Society Publishers, 2001), 3.

⁷¹ Tim Grant and Gail Littlejohn, *Greening School Grounds: Creating Habitats for Learning* (Niagara Falls, NY: New Society Publishers, 2001), 3.

⁷² Veronica Gayle, *Roots and Research in Urban School Gardens* (New York: Peter Lang, 2011), 21.

During the 1960s and 1970s, the popularity of school gardens increased again as a result of liberal social movements. Additionally, at this time, “pedagogical support for gardens emerged from developmental psychologists who encouraged experiential education, hands-on learning and creative expression in a child’s relationship with nature.”⁷³ As a part of the 60s liberal culture, school gardens were seen as a place for children to experience nature in a hands-on manner in order to bolster their development and education.

In the 1980s, however, school gardens became less prominent in North America as socioeconomic conservatism increased. Then in 1995, school gardens made a comeback, at least in California, with Delaine Eastin, state superintendent of schools, who instated a Garden in Every School policy that encouraged the implementation of school gardens across the state. Due to her own personal experiences, Eastin believed school gardens were transformational. Between 1995 and 2002, school gardens in California increased by 3000, and their numbers continue to increase.⁷⁴ The current rise in interest in school gardens and their educational importance is practical and necessary as a means of sustaining the planet.⁷⁵ Today, we have a compelling new goal for the old practice of gardening—that of educating children about the need to restore the Earth to

⁷³ Veronica Gayle, *Roots and Research in Urban School Gardens* (New York: Peter Lang, 2011), 21.

⁷⁴ Veronica Gayle, *Roots and Research in Urban School Gardens* (New York: Peter Lang, 2011), 21.

⁷⁵ Veronica Gayle, *Roots and Research in Urban School Gardens* (New York: Peter Lang, 2011), 21.

health and of reconnecting them with and teaching them to work in cooperation with the natural world.⁷⁶

Effective Means of Instilling an Environmental Ethic in Children

School gardens are effective tools that foster a deep value of the environment in children. As our world becomes increasingly urbanized, children are coming into contact with nature less and less. Because of this, many children possess little first-hand knowledge about the “life cycles, growth stages, and weather patterns” that make up their natural environment. Students do not fully comprehend to what extent personal and societal actions impact the environment and in turn, how environmental problems hurt society.⁷⁷ School gardens, however, enable children to explore nature in a safe, controlled setting. By providing a space to cultivate wonder of the natural world, school gardens are the perfect teachers of environmental literacy, which has become increasingly popular in education.⁷⁸ A school garden serves as a hands-on teaching tool that allows teachers of all subjects to introduce environmental education within their current curricula. School gardening provides a space for various activities in all academic subjects, and recent studies have shown that such activities increase the environmental awareness of the students involved.⁷⁹

Projects on school grounds that bring nature back into the daily lives of students are necessary for the long-term conservation, protection, and restoration of our natural

⁷⁶ Tim Grant and Gail Littlejohn, *Greening School Grounds: Creating Habitats for Learning* (Niagara Falls, NY: New Society Publishers, 2001), 3.

⁷⁷ Bonnie Mackey and Jennifer Mackey Stewart, *A Librarian's Guide to Cultivating an Elementary School Garden* (Columbus, OH: Linworth Pub., 2009), 12.

⁷⁸ Bonnie Mackey and Jennifer Mackey Stewart, *A Librarian's Guide to Cultivating an Elementary School Garden* (Columbus, OH: Linworth Pub., 2009), 12-13.

⁷⁹ Bonnie Mackey and Jennifer Mackey Stewart, *A Librarian's Guide to Cultivating an Elementary School Garden* (Columbus, OH: Linworth Pub., 2009), 13.

environment. Most youth never have the chance to experience wilderness directly, and many who inhabit urban areas have few opportunities to explore natural areas. As trips to outdoor education centers become difficult for financial reasons, the danger exists that lessons about the natural world will increasingly consist of printed and electronic materials. This method of teaching is ineffective in fostering a lifelong ecological consciousness, something that can only come about through experiences in natural settings throughout childhood. Nature is evidently, “our best teacher.”⁸⁰ A garden is an ideal location for environmental education to occur. Gardening with children provides a space for developing a connection to and an appreciation for the natural world, which will likely ultimately instill a long lasting environmental ethic at an early age.

Effective Means of Addressing Food System Issues

In gardening, children become connected to their food. They realize where food comes from and what goes into growing it. Additionally, when growing and eating the food they produce, they are instantly connected to the land and the environment. As populations grow and agricultural land shrinks, food security has become an urgent and complicated issue; with it, environmental education concerning food systems has become an important field.⁸¹ Furthermore, as the industrialized food system continues to detrimentally affect the environment, reconnecting children with their food is especially important at this time, and gardening is an effective activity to accomplish this goal.

The garden also provides a small-scale example of a sustainable food system. Such a system can be compared with the greater industrialized food system as a means of

⁸⁰ Tim Grant and Gail Littlejohn, *Greening School Grounds: Creating Habitats for Learning* (Niagara Falls, NY: New Society Publishers, 2001), 4.

⁸¹ Veronica Gayle, *Roots and Research in Urban School Gardens* (New York: Peter Lang, 2011), 2.

brining the children to an awareness of where the food they are likely eating comes from and what it undergoes in terms of production, processing, and distribution. In this way, the garden can be used in conjunction with lesson plans that address food system issues as a means of relating the students' education to the current state of affairs. Examples of these lesson plans can be found in Chapter VI.

Gardens are also an effective teaching tool when it comes to nutrition. As obesity is on the rise, nutrition education is highly important. The quality of children's diets is a major concern. According to a recent study, only 7% of children ages 2 to 11 consumed the recommended two servings of fruit and three servings of vegetables everyday.⁸² Another USDA study found that 16% of children failed to meet any of the recommendations based on the four-tiered food guide pyramid.⁸³ The Institute of Medicine states that nine million children over six years old are classified as obese, and obese children are at a greater risk to develop Type II diabetes, hypertension, and orthopedic problems than are children of average weight.⁸⁴ Since children consume about 40% of their food while at school, schools have an opportunity and a responsibility to educate about the importance of healthy diets.⁸⁵ School gardens are a practical, relatively inexpensive way of educating about nutrition in a hands-on manner. They provide easy accessibility to fruits and vegetables, and also serve as a continuous presence that visually reinforces nutritional lessons. Recent studies have shown that children who plant their

⁸² Bonnie Mackey and Jennifer Mackey Stewart, *A Librarian's Guide to Cultivating an Elementary School Garden* (Columbus, OH: Linworth Pub., 2009), 14.

⁸³ Bonnie Mackey and Jennifer Mackey Stewart, *A Librarian's Guide to Cultivating an Elementary School Garden* (Columbus, OH: Linworth Pub., 2009), 14.

⁸⁴ Bonnie Mackey and Jennifer Mackey Stewart, *A Librarian's Guide to Cultivating an Elementary School Garden* (Columbus, OH: Linworth Pub., 2009), 14.

⁸⁵ Bonnie Mackey and Jennifer Mackey Stewart, *A Librarian's Guide to Cultivating an Elementary School Garden* (Columbus, OH: Linworth Pub., 2009), 14.

own vegetables are more willing to taste, enjoy, and consume them.⁸⁶ In one specific study, students who grew vegetables in outdoor gardens in association with nutrition classes demonstrated an increase in nutrition knowledge and improved preference for vegetables.⁸⁷ Thus, having a school garden is an effective means of not only reconnecting children with the origins of their foods, but also educating them about healthy nutrition. As obesity and diabetes are more prevalent than ever among children, it is crucial to teach children how to eat healthy and take care of their bodies; having a school garden can help achieve such goals by serving as a visual reminder and providing accessible fresh fruits and vegetables.

Contributes to Healthy Child Development and Combats NDD

The exposure to nature and other skills learned through gardening will have a positive effect on the children's overall development. Gardening is beneficial for boosting children's self-esteem, as it is an activity in which successes are inherent with proper planting and maintenance. Studies have shown that self-esteem improves through gardening activities with specific populations of children, as they can participate in and experience successes from planting to harvest.⁸⁸ Additionally, horticulture may contribute to the healthy development of children's interpersonal relationships since the garden provides a safe space where children are able to interact with each other in an informal, welcoming setting that is rather different from a typical classroom setting. The garden

⁸⁶ Bonnie Mackey and Jennifer Mackey Stewart, *A Librarian's Guide to Cultivating an Elementary School Garden* (Columbus, OH: Linworth Pub., 2009), 14.

⁸⁷ Morris, J., A. Neustadter, and S. Zigenberg-Cherr. 2001. *First-grade gardeners more likely to taste vegetables*. California Agriculture 55(1):43-46.f

⁸⁸ Tina Marie Waliczek, "The Effect of School Gardens on Self-Esteem, Interpersonal Relationships, Attitude Toward School, and Environmental Attitude in Populations of Children" (PhD diss., Texas A&M University, 1997).

allows children to work one-on-one with each other or in small group settings where they may feel less inhibited, which may make them feel less self-conscious. Furthermore, studies have shown that outdoor environments influence children positively in the area of developing healthy interpersonal relationship.⁸⁹ Thus, gardens benefit children by guaranteeing successes and allowing intimate, relaxed interactions with other students, which will likely positively contribute to the growth and development of their self-esteem and confidence.

Gardens also provide a physical outlet for children as well as a space to teach them patience. Gardening requires the physical manipulation of soil and plants. Children must use their bodies and therefore develop motor skills as they dig, plant, weed, and prune. This area allows the children to explore the natural world up close and manipulate their environments in a nondestructive, beneficial way. Moreover, gardening requires a great deal of patience, as there is no instant gratification after planting a seed. The crops take a while to sprout and then a longer while to fruit and ripen. Thus, children are given a healthy physical outlet, while also developing a great deal of patience by waiting for the crops they have planted to come to fruition.

Lastly, school gardens are an effective means of treating Nature Deficit Disorder. They provide a direct connection to the earth and allow children to experience the natural processes of our planet first-hand. In gardening, children do not need to feel anxious, self-conscious, or depressed. It is a therapeutic activity that mollifies some of the symptoms of NDD, such as ADHD. Children are able to have a peaceful interaction with the earth in the practice of gardening, and must be patient. There is no over-stimulation,

⁸⁹ Veronica Gayle, *Roots and Research in Urban School Gardens* (New York: Peter Lang, 2011), 1.

2D fast-paced interaction, or instant gratification as in television and video games. In the garden, children can escape all of the technologies of the 21st century and spend time appreciating and communing in a natural setting with their fellow classmates in a healthy way.

Critiques against School Gardens

While there is a great deal of evidence in support of school gardens, there have been a few critiques made by parents. Some see gardening as simply hard dirty work, not as education. When utilizing gardens, schools are sometimes accused of “aiming to keep children tied to low-paid agricultural jobs.”⁹⁰ Additionally, “agriculture as an occupation and gardening as an activity may be seen as low-status, boring work.”⁹¹ While gardening is sometimes “hard dirty work,” it is also educational when linked to curriculum.

Furthermore, schools are not trying to limit children in their future careers and encourage them to pursue agriculture as an occupational field. These school gardens are used more as teaching tools that supplement classroom lessons and create an awareness about the origins of food than as farmer training tools. Moreover, the benefits of these teaching tools are many; as stated earlier, they connect children to their food, provide a hands-on teaching tool that bolsters classroom learning, and allow children to experience nature directly, which contributes to their healthy development. Though some may question why children are doing manual labor while they should be sitting in a classroom learning from a book, these outdoor experiences help to solidify their book knowledge by applying it to

⁹⁰ Food and Agriculture Organization of the United Nations, *Setting Up and Running a School Garden: A Manual for Teachers, Parents, and Communities* (Rome: Food and Agriculture Organization of the United Nations, 2005), 5.

⁹¹ Food and Agriculture Organization of the United Nations, *Setting Up and Running a School Garden: A Manual for Teachers, Parents, and Communities* (Rome: Food and Agriculture Organization of the United Nations, 2005), 22.

real world situations. Additionally, being outdoors helps to combat issues associated with NDD as well as contribute to better nutrition and instill an environmental ethic in children that is currently needed more than ever in order to improve the health of our environment.

By encouraging and supporting a garden in every school, we create opportunities for our children to discover fresh food, make healthier food choices, and become better nourished. Gardens offer dynamic, beautiful settings in which to integrate every discipline, including science, math, reading, environmental studies, nutrition, and health. Such interdisciplinary approaches cultivate the talents and skills of all students while enriching the students' capacities of observation and thinking. Young people can experience deeper understanding of natural systems and become better stewards of the Earth by designing, cultivating, and harvesting school gardens with their own hands. School garden projects nurture community spirit, common purpose, and cultural appreciation by building bridges among students, school staff, families, local business, and organizations.⁹²

⁹² "Mission and Vision," California School Garden Network, accessed December 2, 2012, <http://www.csgn.org/node/81>.

Chapter IV: Case Studies of Successful School Gardens

Through interviewing a variety of people (teachers, nutrition services staff, students, garden masters, school garden coordinators, parents from a variety of locations (Claremont, CA; Ontario, CA; Venice, CA) and schools (private, public, elementary, middle), I have accumulated a wealth of knowledge about school gardens. As Dessa D'Aquila, the garden coordinator for the Claremont Unified School District stated, "Every school has a completely different personality and different needs.... Everyone can use a school garden but just for different purposes. It's a totally different dynamic at every different school site."⁹³ Each school is unique and utilizes their school garden for different reasons in a variety of ways. This goes to show how flexible a school garden can be, and how it can accomplish a variety of goals.

Logistics

Firstly, I'll address the logistical particulars pertaining to implementing and maintaining a school garden. Many of the people I interviewed spoke about the importance of having support from the school's administration. Maleene Guida, who began the garden at Redeemer Lutheran Christian School (Ontario, CA), said, "I think if you have the right administration, and they have an open mind, they get the reasons, financially that they would want to take that on."⁹⁴ Likewise, Dessa D'Aquila can attest to how having administrative support affects the success and involvement in the garden. She stated, "El Roble, I've done a lot with just because everyone, like the principal,

⁹³ D'Aquila, Dessa. Interview by Alyssa Boyle. El Roble Intermediate School, November 1, 2012. Transcript in Appendix 1.

⁹⁴ Guida, Maleene. Interviewed by Alyssa Boyle. Redeemer Lutheran Christian School, Ontario, CA, October 12, 2012. Transcript in Appendix 1.

secretary, teachers, they have a lot of support here.”⁹⁵ She went on to say that at Vista Elementary (Claremont, CA), as the principals have changed, so has the interest in and use of the garden. She noted that,

It’s a very big outdoor school.... The principal two years ago had a huge passion and heart behind outdoor education, school gardens, and environmental education.... When he left, a new principal came in, and he didn’t really know anything about gardens.⁹⁶

A teacher at Vista Elementary, Jennifer Parker, spoke to the shift in principals as well:

Unfortunately, our old principal was very nature oriented. Our new principal is very athletically oriented. He wants to keep the garden because it’s amazing. But it’s not his main area of emphasis. And so we don’t emphasize it as much now either because it’s a subtle shift.... When our old principal was here, you’d always see him in the garden with kids. And our new principal, it’s not that he doesn’t appreciate it, but it’s not his area of interest, so you’ll see him running the track with the kids, and so the kids will go there.⁹⁷

With the shift in principals and thus the shift in educational values, the interest in the garden has weakened and the support for athletics has increased at Vista Elementary.

Thus, having administrative support, especially from the principal ensures that there will be a strong interest and appreciation for the garden.

In terms of support, involving community members and maintenance workers in the construction of the garden is beneficial. Adam Long, a senior at Pomona College with experience at many school gardens, namely El Roble Intermediate School (Claremont, CA), described a particular workday:

⁹⁵ D’Aquila, Dessa. Interviewed by Alyssa Boyle. El Roble Intermediate School, Claremont, CA, November 1, 2012. Transcript in Appendix 1.

⁹⁶ D’Aquila, Dessa. Interviewed by Alyssa Boyle. El Roble Intermediate School, Claremont, CA, November 1, 2012. Transcript in Appendix 1.

⁹⁷ Parker, Jennifer. Interviewed by Alyssa Boyle. Vista Elementary School, Claremont, CA, October 4, 2012. Transcript in Appendix 1.

We had a... workday with college kids and locals and the principal of the school came and started building beds and the guy who does maintenance for the Claremont school district has been really involved in installing the irrigation system and he's incredibly handy with all of those kinds of things and has been really personally motivated to set up the irrigation system and the timer system and the fencing and all of that.⁹⁸

Involving the surrounding community and inviting all school staff members to be involved in the school garden development process ensures a widespread support network, a variety of work experience, and a strong work force to build a successful school garden. An especially important person to involve is the maintenance staff employee, who likely has a wealth of knowledge about tool use, irrigation, and other important skills needed to construct a garden.

Another logistical aspect that must be addressed is funding. Rick Cota of the Claremont Unified School District's Central Kitchen, reported that "in each case, the seed money, to say, has been from a donation or a grant."⁹⁹ He goes on to say that aside from initial funding, the El Roble garden has not been kept up by school funds, but has "basically been kept alive by families and friends and some organizations like Sustainable Claremont."¹⁰⁰ Thus, while the school itself is unable to fund the garden, outside organizations and donors keep it alive. The garden at Redeemer Lutheran Christian School also began with a grant (from the *A Garden in Every School* program in

⁹⁸ Long, Adam. Interviewed by Alyssa Boyle. Pomona College, Claremont, CA, November 1, 2012. Transcript in Appendix 1.

⁹⁹ Cota, Rick. Interviewed by Alyssa Boyle. The Central Kitchen, Claremont, CA, October 1, 2012. Transcript in Appendix 1.

¹⁰⁰ Cota, Rick. Interviewed by Alyssa Boyle. The Central Kitchen, Claremont, CA, October 1, 2012. Transcript in Appendix 1.

California under Assembly Bill 1535).¹⁰¹ Maleene Guida noted that “Wilson Nursery [also] donated all of the fruit trees” to the garden at Redeemer Lutheran.¹⁰² She went on to explain how the garden was built even before they received the grant, since “people just came out and started sponsoring” raised beds in the garden.¹⁰³ They were then able to use the rest of the grant money to create an orchard of fruit trees. In response to the funding question, David King of the Learning Garden (Venice, CA), said, “we beg, we do fundraisers, grant money, money has always been an issue, in fact, money is the issue.”¹⁰⁴ While most people can agree that funding is an issue, Adam Long reported that funding is definitely a difficult part, but that a lot of funding is available from organizations, such as Annie’s mac n cheese, who provides grants for school gardens.¹⁰⁵ Therefore, although schools themselves are generally unable to fund such projects, there are many grants and fundraising opportunities available to support the creation and maintenance of school gardens.

Maintenance is the final large logistical issue that must be addressed. In order to stay alive, the garden has to be taken care of by the students, a garden master, or volunteers. Rick Cota stated that in order to maintain the garden, “we have classes, kids, volunteers,” and that he will “have some students from clubs that will help maintain it

¹⁰¹ “A Healthy Nutrition Environment: Linking Education, Activity, and Food through School Gardens,” California Department of Education, accessed December 2, 2012, <http://www.cde.ca.gov/ls/nu/he/gardenoverview.asp>.

¹⁰² Guida, Maleene. Interviewed by Alyssa Boyle. Redeemer Lutheran Christian School, Ontario, CA, October 12, 2012. Transcript in Appendix 1.

¹⁰³ Guida, Maleene. Interviewed by Alyssa Boyle. Redeemer Lutheran Christian School, Ontario, CA, October 12, 2012. Transcript in Appendix 1.

¹⁰⁴ King, David. Interview by Alyssa Boyle. The Learning Garden, Venice, CA, September 29, 2012. Transcript in Appendix 1.

¹⁰⁵ Long, Adam. Interviewed by Alyssa Boyle. Pomona College, Claremont, CA, November 1, 2012. Transcript in Appendix 1.

and use it in their classrooms.”¹⁰⁶ When asked who does the upkeep at Redeemer Lutheran Christian School, Maleene Guida responded, “Me. You need one backbone. And I have a stake in it because it has become part of my company. And that’s ok. It’s going to take someone who has an emotional tie to it. And mine is that it’s a part of my lunch program and my kids go here.”¹⁰⁷ Adam Long provides insight into various means of upkeep as well:

One is having a parent at the school who’s a point person and that parent organizes volunteer groups. But once the kid in that school moves on, that poses a problem. So the other solution is have a teacher be the point person. But that requires that the teacher, one, has the time, energy, effort, and also just the interest. And you can’t ensure that. It’s very hard to find a teacher that can really devote that kind of energy. So that’s where something like Dessa’s position [a hired garden coordinator] is just invaluable. If these things are going to be maintained and workdays are going to be organized and kids are going to be in the garden and making productive use of the garden and learning, you have to have someone who is employed to oversee that.

Thus, as Maleene Guida and Adam Long state, a backbone, or one head person, is essential for maintaining a healthy garden. In the case of Claremont Unified School District, Dessa D’Aquila is currently that backbone.

How the Gardens are Used

The gardens are primarily used as a supplement to classroom lessons, in conjunction with physical education, science, math, and social studies classes. Rick Cota notes that the garden is “something that is used for demonstration, much like an extra

¹⁰⁶ Cota, Rick. Interviewed by Alyssa Boyle. The Central Kitchen, Claremont, CA, October 1, 2012. Transcript in Appendix 1.

¹⁰⁷ Guida, Maleene. Interviewed by Alyssa Boyle. Redeemer Lutheran Christian School, Ontario, CA, October 12, 2012. Transcript in Appendix 1.

book.”¹⁰⁸ He goes on to say that, “the garden’s essentially a tool, not only for the PE classes, but for science and math and others. They can all tie into it.”¹⁰⁹

Let’s first look at how the different schools are using the garden to supplement physical education. Rick Cota said, “With PE, you have a link to health and fitness, so seeing and interacting with the food in the garden [gives] the kids a sense of what is a healthy food to eat instead of other alternatives.”¹¹⁰ When working with the PE classes at El Roble, Adam recounted talking about rainbow nutrition with the students; he taught them about how the nutrient qualities of food correspond with their color. He also noted that they did calorie comparisons between fast food and fresh fruits and vegetables; for example, they compared the caloric content of an apple with a hamburger and had the children run an equivalent number of laps to burn the calories of the food they chose.¹¹¹ In this way, using the garden as a tool can convey healthy eating habits to the students.

Almost every interviewee also mentioned the use of the garden in association with science classes. Rick Cota mentioned that at El Roble, the students are doing experiments in the garden like planting cherry tomatoes in four different beds under four different conditions and then measuring the outcomes.¹¹² Likewise, at Redeemer Lutheran Christian School, Maleene Guida mentioned how the 5th and 6th grade science classes planted seeds while the rest of the garden was planted from seedlings. These classes are

¹⁰⁸ Cota, Rick. Interviewed by Alyssa Boyle. The Central Kitchen, Claremont, CA, October 1, 2012. Transcript in Appendix 1.

¹⁰⁹ Cota, Rick. Interviewed by Alyssa Boyle. The Central Kitchen, Claremont, CA, October 1, 2012. Transcript in Appendix 1.

¹¹⁰ Cota, Rick. Interviewed by Alyssa Boyle. The Central Kitchen, Claremont, CA, October 1, 2012. Transcript in Appendix 1.

¹¹¹ Long, Adam. Interviewed by Alyssa Boyle. Pomona College, Claremont, CA, November 1, 2012. Transcript in Appendix 1.

¹¹² Cota, Rick. Interviewed by Alyssa Boyle. The Central Kitchen, Claremont, CA, October 1, 2012. Transcript in Appendix 1.

keeping a journal to record the growth of the plants in order to learn about the plant cycle and compare their progress with the plants planted as seedlings.¹¹³ Evidently, the garden can be used for many life science experiments in conjunction with science curriculum.

Math and Social Studies are also subjects utilized by teachers in the garden. Rick Cota explained that in conjunction with the experiment mentioned above- planting four different raised beds under various conditions- the students can do calculations according to the different outputs of the plants in their math classes.¹¹⁴ In terms of social studies classes, Dessa D'Aquila noted that at Condit Elementary (Claremont, CA), "they have a whole section on California natives, so [the teacher] wants to do natives on the outside of the box and California mission crops on the inside."¹¹⁵ Audrey Borgmann also utilized the garden to demonstrate native growing practices:

Last year, for history, we had talked about how the Indians had grown their food. And that they had grown three crops together, and so we were actually growing a couple of those things at the same time, so we were able to, we weren't growing them together the way that the Native Americans had done, but we were able to see how those things would have affected each other and how they could have grown together. So that was really cool to talk about something from a book and then be able to go see it and look at the way the things were growing.¹¹⁶

School gardens can be implemented as teaching tools for a variety of subjects across the curriculum as a means of supplementing and bringing to life classroom lessons. Having a

¹¹³ Guida, Maleene. Interviewed by Alyssa Boyle. Redeemer Lutheran Christian School, Ontario, CA, October 12, 2012. Transcript in Appendix 1.

¹¹⁴ Cota, Rick. Interviewed by Alyssa Boyle. The Central Kitchen, Claremont, CA, October 1, 2012. Transcript in Appendix 1.

¹¹⁵ D'Aquila, Dessa. Interviewed by Alyssa Boyle. El Roble Intermediate School, Claremont, CA, November 1, 2012. Transcript in Appendix 1.

¹¹⁶ Borgmann, Audrey and her 5th grade class. Interviewed by Alyssa Boyle. Redeemer Lutheran Christian School, Ontario, CA, November 7, 2012. Transcript in Appendix 1.

real world demonstration for concepts learned in a classroom gives students a greater appreciation and a deeper understanding of what they are being taught.

Aside from supplementing the required curriculum, school gardens also provide an avenue to discuss food system issues and reconnect children with their food sources. This is especially exemplified at El Roble; Rick Cota states that the garden is utilized as a means for the students to understand

How a tomato grows, what it takes to grow it, what it's supposed to look and feel and taste like. And a lot of kids are amazed because... we'll grow a cucumber, and it won't look all shiny and green like [the ones] you see in the stores. So then we let them know, well, the reason it doesn't look all shiny and green is because the one you get in the stores is coated with wax and is essentially buffed just like an apple is. And so when you look at an organic item right off the vine, it doesn't look as pretty as say a processed one that has chemicals.... That's one of the reasons we use gardens... a lot of them have never seen a carrot and that it grows in the dirt. [Giving them] something tangible that they can touch, feel, eat right off of it is invaluable.¹¹⁷

By introducing children to what food looks and tastes like fresh from the garden creates an awareness as to how much the industrial food system alters produce. Additionally, children feel more connected to what they are eating as they come to realize how different fruits and vegetables are grown and can eat them right off of the plant. In this way, school gardens can effectively address food system issues directly.

The Observed Effects on Children

School gardens have a few observed effects. Firstly, they excite learning in students with hands-on activities that apply classroom lessons to real life settings. Secondly, school gardens have been seen to better the nutrition of children and change their palates to enjoy fruits and vegetables. Additionally, the gardens are an effective

¹¹⁷ Cota, Rick. Interviewed by Alyssa Boyle. The Central Kitchen, Claremont, CA, October 1, 2012. Transcript in Appendix 1.

means of instilling a love of the natural world in children. Finally, school gardens provide an alternative to regular classroom learning and in this way benefit Special Education students and those with ADD.

The school garden provides a space to bring classroom lessons to life. Rick Cota explains that “the kids like it because it gives them a... break from having their heads buried in a textbook,” and furthermore, when talking about plant life cycles in a science class, “it’s really nice that they can physically tie that into the textbook by physically putting the seed in the ground, by physically seeing it grow.”¹¹⁸ Likewise, Audrey Borgmann noted that, “When we get to talking about photosynthesis... they’ll understand better because they’ve felt it and seen it and touched it. And that just helps to understand anything.”¹¹⁹ As the students are able to experience what they are learning about in tangible ways, they will better understand the concepts being explained. Additionally, one of Audrey Borgmann’s students remarked, “It’s fun to just not be in a classroom but be outside.”¹²⁰ Making learning fun and enjoyable as well as providing opportunities to experience classroom lessons in the real world helps students understand and appreciate the concepts they are being taught.

In addition to giving classroom lessons meaning, school gardens have also effectively improved the nutrition of the students. Maleene Guida proclaimed that she has

¹¹⁸ Cota, Rick. Interviewed by Alyssa Boyle. The Central Kitchen, Claremont, CA, October 1, 2012. Transcript in Appendix 1.

¹¹⁹ Borgmann, Audrey and her 5th grade class. Interviewed by Alyssa Boyle. Redeemer Lutheran Christian School, Ontario, CA, November 7, 2012. Transcript in Appendix 1.

¹²⁰ Borgmann, Audrey and her 5th grade class. Interviewed by Alyssa Boyle. Redeemer Lutheran Christian School, Ontario, CA, November 7, 2012. Transcript in Appendix 1.

“noticed their palates completely changing.”¹²¹ She noted a few students that would cry and throw a fit instead of eating a leaf of salad, but now, with the establishment of the garden, they are open to trying and eating healthy foods. David King emphasizes this point; he notes that, “It’s very interesting because you can get a student to eat a turnip green if they grew the turnip, whereas they might not eat the turnip green if it just showed up.”¹²² This exemplifies the fact that the more exposure children have to fresh fruits and vegetables, especially if they have grown them themselves, the more likely they are to eat them and incorporate them into their diets. As students at Redeemer Lutheran School noted, the garden has encouraged them to try vegetables that they hadn’t before.¹²³ In this way, the presence of school gardens has bettered the nutrition of the students who are continually exposed to fresh fruits and vegetables.

The gardens also provide a space for children to interact with the natural world and develop a respect and appreciation for the environment. Maleene Guida recounted how she explained to the children that “worms poop and that’s how they nourish the soil.” She remembers their reaction of disgust: “Oh my god, worm poop!” Yet, she goes on to say, “Now when they dig, they find their worms and they’re like, ‘Hey wormy! Go back in there, do some more poop.’”¹²⁴ The children at Redeemer Lutheran School have learned how beneficial earthworms are for soil and have thus developed an appreciation of such organisms and natural processes. Adam Long also notes the importance of

¹²¹ Guida, Maleene. Interviewed by Alyssa Boyle. Redeemer Lutheran Christian School, Ontario, CA, October 12, 2012. Transcript in Appendix 1.

¹²² King, David. Interview by Alyssa Boyle. The Learning Garden, Venice, CA, September 29, 2012. Transcript in Appendix 1.

¹²³ Borgmann, Audrey and her 5th grade class. Interviewed by Alyssa Boyle. Redeemer Lutheran Christian School, Ontario, CA, November 7, 2012. Transcript in Appendix 1.

¹²⁴ Guida, Maleene. Interviewed by Alyssa Boyle. Redeemer Lutheran Christian School, Ontario, CA, October 12, 2012. Transcript in Appendix 1.

gardens in providing “creative spaces for kids to interact with dirt and with sticks and rocks and plants.”¹²⁵ He remembers seeing children at Vista Elementary playing around in the dirt of the garden and remarks how important it is for children to come in contact with nature in order to develop a respect for the natural world.

Lastly, school gardens provide alternatives to classroom learning, a factor that is especially beneficial to Special Education children and those with attention difficulties. Dessa D’Aquila remembered one time when she took a class into the garden, the teacher later told her that the students “were so well behaved and she said, ‘These are usually my ADD kids, I have a lot of ADD kids in this class. They can hardly sit still, but they were very attentive, they were listening, they were interactive.’”¹²⁶ She goes on to say that she “noticed that also with [her] Special Ed kids. Being able to touch and smell things... and being able to measure things and integrate math, it just seems to stick a lot better and they’re able to recall these things.”¹²⁷ Similarly, Maleene Guida noted that at Redeemer Lutheran Christian School, “We have a few autistic children in this school and gardening is known to be very therapeutic for autistic children. And the orchard is a quiet place for those children to go to because sometimes there’s too much stimulation.”¹²⁸ Thus, the garden provides a hands-on space for children with attention difficulties to thrive as well as a quiet space for autistic children to find solace.

¹²⁵ Long, Adam. Interviewed by Alyssa Boyle. Pomona College, Claremont, CA, November 1, 2012. Transcript in Appendix 1.

¹²⁶ D’Aquila, Dessa. Interviewed by Alyssa Boyle. El Roble Intermediate School, Claremont, CA, November 1, 2012. Transcript in Appendix 1.

¹²⁷ D’Aquila, Dessa. Interviewed by Alyssa Boyle. El Roble Intermediate School, Claremont, CA, November 1, 2012. Transcript in Appendix 1.

¹²⁸ Guida, Maleene. Interviewed by Alyssa Boyle. Redeemer Lutheran Christian School, Ontario, CA, October 12, 2012. Transcript in Appendix 1.

Critiques against School Gardens and Obstacles

The main obstacles associated with school gardens are funding, support, and upkeep. Dessa D'Aquila stated that "the biggest obstacle... would be funding," likewise, when asked what the hardest part has been, David King replied "Money."¹²⁹ Yet they note that there are ways to achieve funding; Dessa D'Aquila said that one of her goals is to set up a produce stand to sell the produce grown in the garden as a fundraiser.¹³⁰ Aside from funding, Maleene Guida noted that the hardest part is "trying to get the administration behind [the garden] because it is one more thing" for them to take care of.¹³¹ Lastly, there is the issue of maintenance. Maleene Guida also stated that this is an issue as it is important to make sure that the "upkeep is really there and the support is really there because if it starts looking disheveled and it's in the middle of the campus, you're going to have people barking."¹³² Thus, these are the most difficult issues to address when maintaining a school garden. Yet many of those I interviewed stated that there has been little opposition to the gardens and a great amount of support.

I think it's just a really great thing to have at a school, when you walk on to campus, you have this just beautiful, peaceful place in the middle of campus where kids can just go play and touch and pull weeds and learn to understand how our food comes to us. And that if we can just make our own food, it's so much healthier for us because nobody is adding anything, we know what it is. And that is just something that is so great for the kids.¹³³

¹²⁹ D'Aquila, Dessa. Interviewed by Alyssa Boyle. El Roble Intermediate School, Claremont, CA, November 1, 2012. Transcript in Appendix 1.
King, David. Interview by Alyssa Boyle. The Learning Garden, Venice, CA, September 29, 2012. Transcript in Appendix 1.

¹³⁰ D'Aquila, Dessa. Interviewed by Alyssa Boyle. El Roble Intermediate School, Claremont, CA, November 1, 2012. Transcript in Appendix 1.

¹³¹ Guida, Maleene. Interviewed by Alyssa Boyle. Redeemer Lutheran Christian School, Ontario, CA, October 12, 2012. Transcript in Appendix 1.

¹³² Guida, Maleene. Interviewed by Alyssa Boyle. Redeemer Lutheran Christian School, Ontario, CA, October 12, 2012. Transcript in Appendix 1.

¹³³ Borgmann, Audrey and her 5th grade class. Interviewed by Alyssa Boyle. Redeemer Lutheran Christian School, Ontario, CA, November 7, 2012. Transcript in Appendix 1.

Chapter V: How to Initiate and Maintain a School Garden Project

Having addressed how important school gardens are in connecting children to the Earth as well as addressing food system issues and having seen how such teaching tools can be implemented successfully, I will now provide a general step-by-step how to guide for creating and maintaining a successful school garden. There are a few key elements that guarantee a successful school garden project. The most important is to involve the children in the planning process from the very beginning.¹³⁴ This ensures that the children will feel ultimately connected and included in the garden, which is ultimately intended for their benefit. Once support from the students is obtained, it is then key to acquire support from the principal, other teachers, parents, and the community. After a strong network is established, motivation must be maintained by establishing clear objectives that are shared by all, giving rewards and prizes as incentives to children and teachers who help out in the garden, and publicizing successes in the garden. Next, it is crucial that the garden has a high educational value. The space should be recognized as a learning tool, and the work done in the garden should be matched in the classroom. Lastly, in order to be sure that the garden will be sustainable, it is important to start small and expand later, establish early on a good water supply and fencing system, know how it will be funded, and use organic approaches as well as crops that are suited to local conditions in order to ensure successful growth and soil quality maintenance.¹³⁵ With

¹³⁴ Ann Watts, *Every Nursery Needs a Garden: A Step-By-Step Guide to Creating and Using a Garden with Young Children* (Abingdon, New York: Routledge, 2011), 7.

¹³⁵ Food and Agriculture Organization of the United Nations, *Setting Up and Running a School Garden: A Manual for Teachers, Parents, and Communities* (Rome: Food and Agriculture Organization of the United Nations, 2005), 5-6.

these keys to success in mind, I will now elaborate on each essential step in the school garden establishment process.

Administrative Approval

The first step is to plant the seed for the project in the school community's heads. Share your interest in developing a school garden with other staff members.¹³⁶ Once you have a sense of how supportive other staff members are of this project, the next step is to have a brainstorming session with the interested faculty members. This meeting should result in a general plan and outline of the project to present to the principal in order to gain his or her approval. The outline should include how it will be incorporated into the standards-based curriculum, how the garden will benefit the students and the community, as well as a list of potential supporters and a tentative plan of action.¹³⁷ As a supplement to the project plan, include literature (like this) that will supply the administration with information pertaining to school gardens.

Involvement and Creating a Garden Network

Once approval has been attained, it is important to establish a "garden club" in order to maintain support for and interest in keeping up the garden. People that will be assets to this club include teachers, maintenance staff, food service staff, students, parents, and community volunteers.

Certain individuals in the school community will be crucial to involve in the garden planning and construction process. Important staff members include the

¹³⁶ Daniel L. Peterson, "Evaluation of a Teacher's Guide Integrating A School Garden with Curriculum" (M.S.Ed. thesis, California State University Hayward, 1978).

¹³⁷ California School Garden Network, *Gardens for Learning: Creating and Sustaining Your School Garden* (Irvine, CA: California School Garden Network, 2006), 13.

custodians and groundsmen. These members of the school community have knowledge about, experience with, and access to the tools on campus. Thus, they can lend a hand during the construction of the garden and explain tool safety to the children participating in the process as well. Additionally, maintenance staff members know where storage closets and water sources are located on campus, which will be essential when setting up irrigation. They also often work year round and can assist with maintenance of the garden over vacations.¹³⁸ Thus, involving the custodians in the process is highly beneficial.

Teachers should also be involved in the garden club, as they will be incorporating the space into their lesson plans. They are a valuable resource since they know the students very well and are familiar with curricular goals. Furthermore, they have access to school facilities and supplies. Lastly, involving multiple teachers in the group will take the burden off of one educator to keep the garden alive.¹³⁹

Food service staff should also be a part of the process. They can teach lessons in nutrition and food preparation. Additionally, vegetable scraps from the cafeteria can be used in the garden's compost.

Most importantly, students should be involved in the club. If they are involved in all stages of the process, they will feel more invested in the project. Moreover, by valuing the opinions of the students and encouraging them to participate in decision-making, educators cultivate motivated, confident, and collaborative learners.¹⁴⁰

¹³⁸ California School Garden Network, *Gardens for Learning: Creating and Sustaining Your School Garden* (Irvine, CA: California School Garden Network, 2006), 15.

¹³⁹ California School Garden Network, *Gardens for Learning: Creating and Sustaining Your School Garden* (Irvine, CA: California School Garden Network, 2006), 15.

¹⁴⁰ California School Garden Network, *Gardens for Learning: Creating and Sustaining Your School Garden* (Irvine, CA: California School Garden Network, 2006), 15.

Parents are also important people to inform and include in the garden planning process. They can be helpful in supervision and sharing their gardening experience with the children. Additionally, including parents increases the possibility of access to local resources for the garden, like extra gardening equipment that might be lying around the house.¹⁴¹ Furthermore, parents should be supportive of and involved in a program that will provide additional learning experiences for their children.

Community volunteers will also be helpful in the garden program and should be included in the garden club. These community volunteers may include local garden club members, nurserymen in the area, college students studying plant science, botanic garden staff, or other groups concerned with the environment.¹⁴² They likely have garden experience and ties to the horticultural industry. These volunteers may therefore have ties to garden supplies or be able to lead special garden activities or workshops.

Once a solid garden club is established, it is important to maintain communication among all members and establish clear goals and a mission statement that encompasses the visions of all involved with the students being the first in mind. The group can establish regular work parties and meetings in order to maintain the success of the garden.

Defining Goals and Mission Statement and Linking to Curriculum

Establishing common goals and a clear mission statement will help those involved maintain a focus as well as inform potential supporters about the ideas behind the garden project. Common goals for school gardens include improving children's health and

¹⁴¹ Daniel L. Peterson, "Evaluation of a Teacher's Guide Integrating A School Garden with Curriculum" (M.S.Ed. thesis, California State University Hayward, 1978).

¹⁴² California School Garden Network, *Gardens for Learning: Creating and Sustaining Your School Garden* (Irvine, CA: California School Garden Network, 2006), 16.

education, improving the environment, promoting life skills, and involving families and communities. The goals should tie in with the current curriculum, as the garden should be a tool to help teachers accomplish their learning objectives, not simply another task to add to their workload. Some questions to ask when establishing goals include: “What topics do you want to teach through the garden? What plants do you want to grow? Do you want to use the garden once a year for an in-depth special study or incorporate it into a yearlong interdisciplinary curriculum? Do you want to develop the garden around a central theme or create small garden areas with multiple themes? Which classes will be involved in the garden? Do they want their own gardening space?”¹⁴³ Once these goals are agreed upon, they should be condensed into a summary document and distributed to all participants. These plans should also be shared with the rest of the school community, as it will help spread awareness and excitement about the new project.

There are many ways to link the garden to the current curriculum. The garden can most obviously be used as a teaching tool for Science, but can also be used to teach Mathematics, History and Social Sciences, English and Language Arts, Visual and Performing Arts, and Health and Nutrition. Here is a list of activities that can be used as lesson plans for each of these subjects. (In Chapter VI, I will provide a few detailed sample lesson plans for each subject as well as a few activities pertaining to the food system.) These lesson plan ideas are geared toward elementary and middle school students. They are inspired by the California School Garden Network’s book *Gardens for Learning*.

Science

¹⁴³ California School Garden Network, *Gardens for Learning: Creating and Sustaining Your School Garden* (Irvine, CA: California School Garden Network, 2006), 18.

- Life Science
 - Analyze the differences between living and nonliving things. How are humans and plants alike and different?
 - How does a plant grow? Observe the life cycle of a plant.
 - What do plants need to grow? Do they all need the same things? Conduct experiments with plants exposed to different amounts of light, water, air, space, and nutrients.
 - What are the functions of different plant structures? (Cotyledons, roots, stems, leaves, flowers, fruits, and seeds)
 - How do they reproduce? How do their seeds work? Dissect flowers and seeds. Do experiments to investigate how light, heat, and moisture affect germination.
 - How do plants use the energy from the sun to make food? Discuss photosynthesis.
 - How do plants adapt for survival? What are some adaptations of seeds for dispersal and adaptations of flowers for attracting pollinators? Observe pollinators in the garden.
 - Study the wildlife and insects that are present in the garden.
 - Investigate food chains and webs.
- Earth Science
 - Create a garden weather station and keep a daily record. Compare the weather with plant growth.
 - Analyze the different properties of different soils—density, air spaces, presence of living organisms, composition, texture, smell, and appearance.
 - Simulate soil erosion in the garden by spraying water on planted areas and areas that are not planted.
- Physical Science
 - What is pH? How does it affect plants? Test pH levels of soils. How do plants respond to different soil pH levels?
 - Talk about the water cycle and observe it by covering plants with a clear plastic dome—observe transpiration, evaporation, and condensation.

- What are the properties of different types of light? Screen out different colors of lights and observe how this affects plant growth.

Mathematics

- Measure the growth rate of plants and display this data in different types of graphs. Make predictions for future plant growth.
- Host a bean race—plant beans at the bottom of a trellis and track their growth on a chart. Determine the rate of growth and award the winner a blue ribbon.
- Plan backward from a desired harvest date to determine when each crop should be planted.
- Measure the garden parameters. Calculate the area and make a map to scale of the garden.
- Calculate the amounts of fertilizer to use per quart and per liter of water.
- Chart temperatures of the air and soil in the garden in Fahrenheit and Celsius.
- Determine the volume of soil in the raised beds.
- Investigate vegetable prices in the supermarket. Track the amount of produce harvested in the garden and use the market prices to determine the value of the harvest.
- Count the number of seeds planted and the number of seeds that sprout. Calculate the germination rate.
- Measure the height of a group of plants and determine the mean, median, and mode.
- Make a recipe that uses fruits and vegetables from the garden and requires various measuring techniques.

History and Social Sciences

- Research and report on cultural or ethnic differences in food consumption and gardening practices.
- Research agricultural history and create a timeline of important events.
- Visit some local farms and interview farmers about their crop choices, growing practices, marketing, and farm history.
- Study the contribution of Native American foods and other cultures' foods to our history and diet. Grow samples of these crops in the garden.

- Create a garden map noting important features and including a north arrow.

English and Language Arts

- Keep a daily garden journal documenting observations, weather conditions, and classroom activities.
- Write letters to local merchants explaining the school gardening project and asking for donations.
- Write thank you notes to volunteers and garden sponsors.
- Write, illustrate, and publish a collection of garden stories and poems.
- Brainstorm different adjectives to describe each plant in your garden.
- Publish a class newsletter with student articles about the garden and distribute it to other classrooms and parents.
- Write step-by-step instructions for common garden activities.
- Follow written instructions to perform a garden task like planting seeds.
- Read books and stories about plants and gardens.
- Write a research paper on a favorite plant.
- Prepare and deliver a presentation about the garden for other students.
- Research the nutritional value of one of your favorite garden vegetables and write a script for a 60 second advertisement designed to get more people to grow and eat it.

Visual and Performing Arts

- Create paintings and drawings of garden plants.
- Paint a class garden mural to hang in the hallway.
- Make a seed mosaic.
- Create a color wheel collage using pictures from old seed catalogs.
- Make musical instruments from gourds.
- Make prints using paint and stamps made from plant parts.
- Create and perform a garden-inspired dance expressing the growth of a seed or the opening of a flower bud.
- Learn a collection of songs that relate to food, gardens, and the environment.
- Draw your dream garden.
- Listen to the music of composers inspired by nature.

- Build clay or tissue paper models of flowers.
- Use leaves to make crayon rubbings or fossils.

Health and Nutrition

- Study the nutritional value of various crops in the garden.
- Discuss the difference in nutritional value of different plant parts.
- Do a blindfolded taste test between garden produce and supermarket produce.
- Experiment with different food preservation techniques—drying, freezing, and canning.
- Grow a salad garden and have a salad harvest party.
- Plan a day's menu based on a balanced diet.
- Do a cooking lesson with a local chef.
- Create a classroom recipe book.
- Compare the nutritional content of different colored vegetables.

Select a Site and Design the Garden

Now that the garden has a clear set of goals and a logical tie with the curriculum, it is time to choose the location of the garden. The site must have access to water, receive a minimum of six hours of sunlight a day, and have ample soil drainage. The most water and time efficient method of irrigation is water conserving sprinklers or drip irrigation.¹⁴⁴ Additionally, it is wise to start small and expand slowly in order to ensure initial success. This is a large project to take on that requires quite a bit of maintenance; if it is too big initially, it may be too overwhelming. It is also a good idea to know a bit about the history of the land that is being used—has it been sprayed with herbicides? In this case, plants would not grow very well if planted in the treated soil. The site chosen should also be in a prominent area, as this will increase awareness about and involvement in the garden. Furthermore, the garden should be wheelchair accessible, with paths 4-6 feet

¹⁴⁴ California School Garden Network, *Gardens for Learning: Creating and Sustaining Your School Garden* (Irvine, CA: California School Garden Network, 2006), 43.

wide. Fences or other barricading types of living fences, like berry bushes, are a good idea in order to create a secure and safe space. Along the lines of security, it is also a good idea to have the garden in a location that is visible by classrooms. Lastly, it is important to consider what the future uses of the space are—does administration intend to construct another building or sports field in that space? After considering these factors and choosing a secure site on campus, the next step is to create a design of the garden.

The most successful school gardens utilize raised beds. These 1-2 foot tall frames can be made out of recycled plastic lumber, rot-resistant wood (cedar or redwood), or concrete blocks.¹⁴⁵ The advantages of such a design include the ability to choose your own soil and not worry about its toxicity or initial quality, have fewer problems with weeds and drainage, and lastly, the beds are high enough for wheelchair access.¹⁴⁶

In the garden, there should be garden beds, paths, irrigation, gathering places, a storage area or toolshed, and a compost area. The paths can be covered in mulch and should be clearly defined in order to avoid trampling plants. Gathering places may consist of a table or a bench in a shady part of the garden; hay bales and logs are also fun additions to a garden and make for good outside seating. The compost areas should be structures with openings for air circulation in which the old garden clippings and vegetable matter from the cafeteria can decompose and become a nutritious addition to your soil. The children should be involved in the design process, perhaps submitting potential layouts in a contest or brainstorming and designing as a class or garden club group.

¹⁴⁵ California School Garden Network, *Gardens for Learning: Creating and Sustaining Your School Garden* (Irvine, CA: California School Garden Network, 2006), 44.

¹⁴⁶ California School Garden Network, *Gardens for Learning: Creating and Sustaining Your School Garden* (Irvine, CA: California School Garden Network, 2006), 44.

Identifying and Obtaining Funding and Supply Needs

After creating a definitive design and plan of action for implementing the project, the next step is to make a list of all supplies that will be needed in the garden as well as a plan for obtaining funding for these supplies. Supplies that you will need include plants (seeds or seedlings), curriculum books and resources, soil and compost, irrigation supplies, child-sized garden tools and gloves, fertilizer, garden stakes and row markers, and mulch.¹⁴⁷ Other highly recommended tools include a wheelbarrow, several hoes, rakes, trowels, a long handled shovel, and a garden hose.¹⁴⁸

Ideas for obtaining such funding include asking for donations (as noted earlier under English and Language Arts, an assignment can involve writing letters describing the garden and its needs and asking for donations from local merchants and community members), grants, and fundraising. There are many grants available for school garden projects that can be found on the California School Garden Network Website, www.csgn.org.¹⁴⁹ Fundraising is also an effective way to raise money—you can sell seedlings grown from seeds in the garden, make potpourri from flowers in the garden, make pressed flower stationary, sell flowers and plotted plants, or make a preserve such as salsa or jelly from fruits and vegetables in the garden.¹⁵⁰ Some schools are also implementing farm stands, like a mini farmer's market, for the school community to

¹⁴⁷ California School Garden Network, *Gardens for Learning: Creating and Sustaining Your School Garden* (Irvine, CA: California School Garden Network, 2006), 49-50.

¹⁴⁸ Daniel L. Peterson, "Evaluation of a Teacher's Guide Integrating A School Garden with Curriculum" (M.S. Ed. thesis, California State University Hayward, 1978).

¹⁴⁹ California School Garden Network, *Gardens for Learning: Creating and Sustaining Your School Garden* (Irvine, CA: California School Garden Network, 2006), 52.

¹⁵⁰ California School Garden Network, *Gardens for Learning: Creating and Sustaining Your School Garden* (Irvine, CA: California School Garden Network, 2006), 53-54.

purchase the fresh produce grown in the market. (The sales and numerical data from this stand and other fundraising activities can also be used in math classes.)

Planting

Vegetables with high success rates include beans, beets, radishes, carrots, corn, cucumbers, onions, peas, eggplant, lettuce, tomatoes, spinach, squash, pumpkins, strawberries, and broccoli.¹⁵¹ These crops are highly recommended for use in school gardens as children will be more likely to see positive results for their efforts.

Additionally, companion planting will help ensure successful growth in the garden. This involves planting certain plants next to each other that release root diffusates that provide beneficial nutrients for neighboring plants. Here is a list of companion planting from

Ruth Kantor Lopez's *Gardens for Growing People: A Guide to Gardening with Children*:

- Beans with corn, carrots, cucumbers and radishes, but not with onions or sunflowers
- Parsley with onions, carrots, corn or tomatoes
- Carrots with lettuce, radishes, peas, cucumbers, or beans
- Corn with beans, peas, pumpkins, cucumbers, melons or squash
- Cucumbers with corn, lettuce, beans, or radishes
- Lettuce with onions or radishes
- Peppers with tomatoes, eggplant, or onions
- Radishes with pole beans or lettuce
- Basil with lettuce
- Onions, chives, and shallots with carrots or tomatoes
- Peas with mint, but not with onions¹⁵²

Before planting day, have a few preliminary gardening basics lessons in the classroom. These may involve firstly discussing the reasons for having a school garden so that the students will feel motivated to start. Next, students should become aware of plants' needs and be able to identify particular plants. Soil is also an important topic to

¹⁵¹ Ruth Kantor Lopez, *Gardens for Growing People: A Guide to Gardening with Children* (Point Reyes, CA: Gardens for Growing People, 1990), 16.

¹⁵² Ruth Kantor Lopez, *Gardens for Growing People: A Guide to Gardening with Children* (Point Reyes, CA: Gardens for Growing People, 1990), 18-19.

cover—students should learn to distinguish between topsoil and subsoil and become familiar with the components of soil and its structure. An activity that can be done to demonstrate the different components of soil (clay, silt, sand, and organic matter) is to place the soil in a jar, add water, shake, and let settle (a mudshake)—the different layers will settle out due to the different sizes and weights of the soil components. The top layer will be water, then clay, silt, and sand. Students should then understand the nature of seeds and how they germinate. Next, it is important to explain the life cycle of plants to the children. Finally, students should learn how to improve conditions for plants by using natural methods and organic gardening techniques.¹⁵³ Once students have a good grasp on the basics of how plants grow and understand essential organic gardening techniques, they will be ready for planting day.

On planting day, be sure to invite all members of the garden club/ network and have a good number of students and volunteers. The day should start with explaining rules and safety as well as demonstrating how to properly use tools. It is important also to go over the design of the garden and ensure that everyone understands how the garden is intended to be set up. It is recommended to lay out the beds prior to planting day and perhaps include this activity as a math lesson in the classroom for the students.¹⁵⁴ Next, demonstrate how to plant and water properly, and explain the plants that are going to be planted. Divide the students into small groups with an adult volunteer supervising and directing each group, ensuring that all students have a chance to participate. Make sure to

¹⁵³ Food and Agriculture Organization of the United Nations, *Setting Up and Running a School Garden: A Manual for Teachers, Parents, and Communities* (Rome: Food and Agriculture Organization of the United Nations, 2005), 23.

¹⁵⁴ California School Garden Network, *Gardens for Learning: Creating and Sustaining Your School Garden* (Irvine, CA: California School Garden Network, 2006), 64.

have a first-aid kit and water available, take pictures and document the process, and enjoy the workday with the students.

Maintenance

While it may be hard to maintain the excitement of planting day, there are tasks that must be completed regularly in order to ensure continued success of the garden. These tasks include watering, thinning, weeding, mulching, fertilizing, composting, and if needed, pest control.

Watering: During active growth, plants typically require about an inch of water per week.¹⁵⁵ Plants wilt when there is either not enough or an excessive amount of water. Water if the soil is feeling moist but not wet and is dry about an inch below the top layer of soil. When watering, only spray the base of the plant, avoiding the leaves. Plants absorb water through their roots and water on the plants' leaves may result in disease. Watering can be done with gardening hoses or watering cans, but these methods are rather time consuming. Other methods involve sprinklers or a drip irrigation system, which, while more expensive, saves time and uses water more efficiently.

Thinning: Typically, more seeds are planted in a certain space than are able to grow to maturity. Students should thin these crops by taking out some of the seedlings that are growing too close together. If there are too many plants close together in one space, they will deprive each other of necessary nutrients and not grow to their full potentials.¹⁵⁶ When thinning, leave the healthiest seedlings and cut the tops off of the unwanted seedlings—as pulling them out may disturb the roots of the desired plants.

¹⁵⁵ California School Garden Network, *Gardens for Learning: Creating and Sustaining Your School Garden* (Irvine, CA: California School Garden Network, 2006), 70.

¹⁵⁶ California School Garden Network, *Gardens for Learning: Creating and Sustaining Your School Garden* (Irvine, CA: California School Garden Network, 2006), 70.

Some of these sprouts may be edible and contain a lot of nutrients, which can then be incorporated into a nutrition lesson. Otherwise, these discarded tops may be thrown into the compost.

Weeding: Weeds are undesired plants competing with your crops for space, light, and water. These weeds should be pulled by hand, and their entire root system should be removed from the soil. It is best to weed when the unwanted plants are still small and manageable. Applying a layer of mulch to the soil is a simple solution to prevent weed problems.¹⁵⁷

Mulching: A layer of 2-3 inches of mulch on top of a garden's soil is beneficial. This layer of mulch slows the evaporation of water, moderates soil temperatures, decreases soil erosion, and reduces the spread of soil borne diseases.¹⁵⁸ Many different materials can be used as mulch—wood, leaves, straw, plastic, and newspaper. Different types of mulch affect the garden in different ways; organic mulch breaks down and provides the soil with nutrients and plastic mulch increases soil temperature. The type of mulch used should be determined by the needs of the plants and the availability of the material.¹⁵⁹

Fertilizing: Plants need three nutrients in particular for healthy growth—nitrogen, phosphorous, and potassium. Nitrogen is important for stem and leaf growth and in photosynthesis; phosphorous promotes the growth of roots and helps in flowering and fruiting; and potassium contributes to root development, the growth of the plant, and

¹⁵⁷ California School Garden Network, *Gardens for Learning: Creating and Sustaining Your School Garden* (Irvine, CA: California School Garden Network, 2006), 71.

¹⁵⁸ California School Garden Network, *Gardens for Learning: Creating and Sustaining Your School Garden* (Irvine, CA: California School Garden Network, 2006), 71.

¹⁵⁹ California School Garden Network, *Gardens for Learning: Creating and Sustaining Your School Garden* (Irvine, CA: California School Garden Network, 2006), 71.

disease resistance.¹⁶⁰ Thus, to support healthy plant growth, it is beneficial to add fertilizer that contains these three nutrients. Make sure to apply only the amount needed, as excess fertilizer may contribute to plant diseases and runoff of the extra nutrients. As plants grow, they deplete the soil's nutrients, so fertilizer should be applied repeatedly as needed.¹⁶¹

Composting: Compost piles simulate the decomposition of the natural world whereby earthworms, slugs, mushrooms, and bacteria break down dead plants and animals, releasing nutrients back into the soil. These piles contain garden waste and other organic matter high in carbon and nitrogen (plant material from the cafeteria). Compost can be made in freestanding piles or contained in special bins as long as it is kept properly moist to attract decomposers and has air spaces. The compost ratio should be 1 Nitrogen: 3 Carbon. Nitrogen materials include garden waste, coffee grounds and filters, kitchen vegetables scraps, and grass clippings. Carbon components can be dried leaves, sawdust, wood chips, shredded newspaper, cardboard, corn stalks, shredded brown paper grocery bags, and pine needles.¹⁶² Once the materials are broken down, the compost can be added to the soil to increase its nutrient content.

Pest Control: It is typically not a good idea to mix pesticides with children, as they are dangerous chemicals. In fact, having pests in the garden may be a boon as it is a chance to learn about different organisms—what kind of bug is it, what does it eat, what

¹⁶⁰ California School Garden Network, *Gardens for Learning: Creating and Sustaining Your School Garden* (Irvine, CA: California School Garden Network, 2006), 71.

¹⁶¹ California School Garden Network, *Gardens for Learning: Creating and Sustaining Your School Garden* (Irvine, CA: California School Garden Network, 2006), 72.

¹⁶² “2 Easy Compost Recipes to Get Your Organic Garden Growing,” Organic Authority, accessed 26 November 2012, <http://www.organicauthority.com/organic-gardening/organic-gardening/a-simple-organic-compost-recipe.html>.

eats it as well as perhaps tie this lesson in with symbiosis, predation, and parasitism. If unwanted pests do arise in the garden, there are a few options to take care of the problem. One may be hand removal—children may enjoy looking for snails, caterpillars, and other creatures. Children should also become aware that not all bugs are harmful to the garden—ladybugs are welcome as they eat aphids, praying mantises and lacewings also feed on other pests, as do spiders and ground beetles. These beneficial insects can be purchased at nurseries or through websites that specialize in beneficial insects. Additionally, practicing crop rotation (pests and diseases build up in the soil if the same crop is grown in a certain bed every year) and companion planting (as noted under the section “Planting”) will help ward off unwanted pests.¹⁶³ Choosing disease resistant varieties when possible will also help ensure that the plants will remain healthy. Lastly, simply maintaining upkeep of the garden by watering, thinning, and weeding will keep the crops in good condition and decrease insect and disease infestations.

¹⁶³ Ruther Kantor Lopez, *Gardens for Growing People: A Guide to Gardening with Children* (Point Reyes, CA: Gardens for Growing People, 1990), 47-51.

Chapter VI: How to Effectively Utilize a School Garden as a Teaching Tool

The garden is intended to be a hands-on teaching tool to supplement the required curriculum. Here I will demonstrate a few sample lesson plans from each subject as a means of demonstrating how the garden can be incorporated into classroom lessons. Additionally, I will provide lessons that expand the students' understanding of the current food system as a means of instilling an awareness about issues involved in industrialized food production to open a dialogue for how such a system can be ameliorated. Children are the future, and most of them are currently unaware of what they are eating and what environmental ramifications such products have. Educating children about the current state of the food system is especially important at this time, as it is something not typically addressed in schools and is a means of relating the students' education to their real lives.

Science

Soil Quality Analysis¹⁶⁴

- Learning Objectives: Students understand the components and structure of soil and what makes up good quality soil.
- Materials: Water, soil, table salt, laundry detergent.
- Lesson:
 - Bring students outside and dig up some soil, preferably good soil. Show them what loam is- rich and dark, moist, crumbly and firm, fertile, full of life and organic matter. Talk about what different components make up soil (air, water, organic matter, plant roots, insects, etc.).

¹⁶⁴ Food and Agriculture Organization of the United Nations, *Setting Up and Running a School Garden- Toolkit* (Rome, Italy: FAO, 2009), Lessons SET A 4- First Things First.

- Show the students Figure 1 in Appendix 2. Discuss the roles of all of the elements observed in the soil.
 - What opens up the soil, makes space for air, water, roots?
 - Worms, organic matter, roots
 - What contributes to the soft soil surface?
 - Organic matter, water, cultivation, nobody walking on it
 - What holds the plants firm so they don't wash away or fall over?
 - Roots, soil
 - What allows animals and bacteria to live and breathe?
 - Water, air, organic matter
 - What traps the water so it does not drain away too fast?
 - Organic matter, clay
 - What helps the water drain away?
 - Organic matter, sand, worm holes
 - What holds the soil in place?
 - Roots, organic matter, mulch, rocks
 - What dissolves the nutrients so the roots can drink them?
 - Water, worm excrements
- Have the students rub a bit of soil and water between their fingers.
 - Is it gritty? Then it's sand, big grains.
 - Is it smooth like flour? Then it's silt, medium grains.
 - Is it sticky? Then it's clay, small grains.
- Have the students try to roll the soil into a worm-like shape with a little water.
 - Does it fall apart? It's sand.
 - Does it stick together? It's clay.
 - Is the soil mostly clay, silt, or sand? Will water run through it easily?
- Conduct a mudshake experiment.
 - Fill a glass jar one-third full with soil. Add a tablespoon of table salt and one of laundry detergent, and then fill the jar with water. Seal it well and shake it vigorously for 5-10 minutes, passing it around to the students to shake. Then leave it to settle for 2 days. The composition

of the soil will settle out into layers—sand and gravel at the bottom, silt above that, and clay at the top with organic matter floating on top of the water. The ideal proportion for good soil is 40% clay, 40% silt, 20% sand and 5% organic matter on top.

Germination Experiment¹⁶⁵

- Learning Objectives: Students should understand how seeds work, know how they germinate, and then produce and enjoy edible sprouts.
- Materials: Seeds of food plants, seeds for sprouting (alfalfa, barely, broccoli, celery, lentils, beans, pumpkin, sunflower, wheat), a glass jar, a thin piece of cloth to cover the jar, and a rubber band to secure it, clean water.
- Lesson:
 - The day before the lesson, have the students soak the seeds that are to be sprouted in water. Talk about the parts of the seed and their functions. (Figure 4 Appendix 2)
 - Show the students some common food plant seeds and ask them to guess which crops they will become. Ask them to define what a seed is.
 - In order to set up the experiment, the students will pour off the water that the seeds have been soaking in and place the seeds in a glass jar to be covered with a cloth. The seeds will be kept damp, warm, and dim (mimicking soil conditions). Have the students find a place to store their jars and lay them on their sides.
 - Ask the students what they think will happen and have them write down their predictions.
 - Twice a day, have the students rinse the seeds with cool water and drain it through the cloth.
 - Have them describe and write down their observations each day and compare them with their predictions. Show them Figure 3 in Appendix 2 and have them keep a similar log tracking the progress of their sprouting seeds.

¹⁶⁵ Food and Agriculture Organization of the United Nations, *Setting Up and Running a School Garden- Toolkit* (Rome, Italy: FAO, 2009), Lessons SET A 5- First Things First.

- When the seeds sprout after a couple of days, have the students move them to the light for a few days. The shoots will turn green and develop vitamins (C and B).
- Wash the sprouts and then cook them. Enjoy!

Plant Life Cycle¹⁶⁶

- Learning Objectives: Students will become aware of how plants grow and develop.
- Materials: Seeds, a seedling, a young plant, a flowering plant, a fruit, and a seed head, Figure 5 in Appendix 2, pieces of paper, and tape.
- Lesson:
 - Show the students some seeds and tell them what plants they are from. Ask the students to describe the steps that the seed will go through. Ask the students to match the images in Figure 5 with the displayed plants (seeds, seedling, young plant, flowering plant, fruit, and seed head).
 - Students plant seeds in the garden and keep a journal of the plants' progress. They will observe the plant through its various stages.
 - To better understand the various stages that plants go through, students can do a “garden tour” and identify seeds, seedlings, young plants, flowering plants, and seed heads that are present in the garden or around campus.

Math

Charting Plant Growth

- Learning Objectives: Students will practice how to display information in different types of graphs.
- Materials: Plants in the garden that grow upright, paper, ruler or measuring tape.
- Lesson:
 - Have the students each choose their own plant in the garden to record the growth of.
 - The students will measure the height of the plant weekly and record this data in a notebook.

¹⁶⁶ Food and Agriculture Organization of the United Nations, *Setting Up and Running a School Garden- Toolkit* (Rome, Italy: FAO, 2009), Lessons SET A 6 – First Things First.

- After recording enough data points (about 10 weeks), gather all of the records of the plant's growth and have the students make a bar graph and a scatter plot to display this information.

Area, Perimeter, and Volume

- Learning Objectives: The students will understand how to determine area, perimeter, and volume.
- Materials: Raised beds and garden plots, measuring tape.
- Lesson:
 - Explain to the students that area is the space inside the boundaries of the flat garden plot. In order to find the area, they must measure two adjacent sides and multiply them.
 - Next, explain that in order to find the perimeter, which is defined as the distance around the area, the students should add the lengths of the four sides of the garden plot.
 - Have the class find the area and perimeter for each separate plot.
 - To add another level, teach the class about volume. Volume is the three-dimensional space that is enclosed by a boundary, aka. the amount of soil that each raised bed can hold. In order to calculate the volume of the raised beds, have the students measure the length, width, and height of each bed and multiply these three measurements.

Mean, Median, and Mode

- Learning Objectives: Students should understand how to calculate mean, median, and mode.
- Materials: A garden plot with one type of crop growing.
- Lesson:
 - Have the students measure all of the same crops in a plot. Make sure that they are all measuring the same features of the plant (aka. the height) in the same unit of measurement (aka. centimeters).
 - Record all of these numbers and write them on whiteboard in front of the classroom.

- Define mean, median, and mode and explain how to find each of them.
Demonstrate this with the measurements obtained.
- Put the numbers in numerical order to find the median (the middle measurement) and the mode (the most common measurement).
- Then add up all of the numbers and divide this sum by the total number of plants measured. This will give you the mean, or the average height of the crop planted.
- Have the students go back out to the garden and pick a new garden plot of a certain crop to measure. Have the students find the mean, median, and mode on their own for this plant.

Language Arts

Garden Journal

- Learning Objectives: Students will have a time each week to record the happenings in the garden and learn how to write creative stories or poems. Only spelling and grammar will be corrected, creativity should be encouraged.
- Materials: Notebooks.
- Lesson:
 - Have a set time each week for the class to go out into the garden.
 - Ask the students to observe their surroundings and write a creative story, a poem, or any other piece of writing inspired by the garden.
 - Correct their spelling and grammar mistakes, but encourage their creativity.

Writing Letters to Community Members

- Learning Objectives: Students will understand how to properly address and compose a letter.
- Materials: Paper, stamps, envelopes.
- Lesson:
 - Gather a list of community members and their addresses (such as nurseries, garden club members, local college students, hardware stores, etc.) to whom the students will be writing letters.

- Demonstrate to the students how to compose a letter- begin with Dear Name and end with Sincerely, Your Name. Indent the body of the message.
- Explain to the students how to address an envelope- where to put the stamp, return address, and destination address.
- In the body of their letters, have the students explain the garden project and kindly ask for a donation or assistance of some kind- whatever is needed at the moment. Also invite the community members to come see the garden or join the next workday.

Social Studies

Plant Like the Natives

- Learning Objectives: Students will understand how the Iroquois Native Americans cultivated crops.
- Materials: Corn, bean, and squash seeds.
- Lesson:
 - Give the students a brief history of how Native Americans gardened- how they planted gardens before settlers came and how they showed settlers what crops to plant (like corn, beans, and squash), which saved them from starvation.
 - The Iroquois believed that corn, beans, and squash are three inseparable sisters who grow and thrive together. Planting the three sisters in the same mounds was a widespread tradition among Native American farming societies; it is a sustainable system that provided long-term soil fertility and a healthy diet. Corn, beans and squash were some of the first crops domesticated by ancient Mesoamerican societies.
 - Have students research, plant, and raise a Native American “three sisters” garden- planting corn, bean, and squash seeds together in mounds in the same plot.
 - Ask the students if they know how these plants compliment each other and help each other grow?

- Answer
 - Corn serves as a natural pole for the bean vines to climb.
 - The beans fix nitrogen on their roots, improving the overall quality of the soil by providing nitrogen to the next year's crop. Bean vines also help secure the corn plants, making them less vulnerable to blowing over in the wind.
 - Shallow-rooted squash vines become a living mulch. They shade emerging weeds and prevent soil moisture from evaporating, thereby contributing to the crops' success in dry years. The spines of the squash plants also discourage predators from approaching the corn and beans.
 - Corn, beans and squash also complement each other nutritionally. Corn provides carbohydrates; beans are rich in protein and balance the lack of necessary amino acids in corn. Squash contains both vitamins from the fruit and healthy oil from the seeds.¹⁶⁷

Create a Map of the Garden

- Learning Objects: Students will learn the art of cartography. They will learn the elements of a map- legend, key, symbols, and area.
- Materials: Example maps, paper, measuring tools.
- Lesson:
 - Ask the students what a map is, if they have ever used a map, why they are important, and how to read them. Explain to the students what a legend, key, symbols, and area are on the map.
 - Then, have the students map out the garden, identifying where certain plants are and planning out where to plant more crops. The students will come up

¹⁶⁷ "Celebrate the Three Sisters: Corn, Beans, and Squash," Renee's Garden, accessed 26 November 2012, <http://www.reneesgarden.com/articles/3sisters.html>.

with symbols and locations for each of the plants on the map. Make sure that they include a North arrow on their map.¹⁶⁸

Art

Drawing the Development of a Plant

- Learning Objectives: Students will develop their drawing and observational skills as well as become more familiar with the life cycle of plants.
- Materials: Paper and pencils.
- Lesson:
 - Every week, students will go into the garden, observe their specific plant and draw it in a notebook, from seedling, to flowering, to bearing fruit, to withering. They will observe what changes happen over time while also developing their drawing skills.

Paint a Class Mural to Hang in the Garden

- Learning Objectives: Students will work together to compose a large painting inspired by the garden.
- Materials: A large wall in the garden or a large piece of canvas to hang in the garden, paint, paintbrushes.
- Lesson:
 - Have students decide how they would like to organize their mural- what they would like it to convey, how big they'd like it to be, how they will approach it.
 - The students will then work together to paint and compose the garden mural.

Health and Nutrition

How Many Calories are in that?

- Learning Objectives: Students will understand the nutritional differences between fast food/ processed foods and fresh fruits and vegetables from the garden.

¹⁶⁸ “This Mapping lesson involves Mapping a Garden,” Hotchalk Lesson Plan Pages, accessed 26 November 2012, <http://lessonplanspage.com/ssmapagarden-mapping2-htm/>.

- Materials: Pictures and nutritional content of various fast food items and garden produce.
- Lesson:
 - This lesson should be done in conjunction with a PE class.
 - Have children first choose which item of food they would like to “consume.” Discuss the nutritional content of this item and then have the students run a corresponding amount of laps to burn off what they just “consumed.” Have the children then do the same with the other food items.
 - In doing so, children will realize how much more effort it takes to use the calories of calorie-dense fast food than to burn off the calories in fresh produce.
 - After the children have completed their exercise, discuss what a healthy diet is and how one might achieve a healthy diet.
 - Have the students break into groups and plan out a day’s meal plan according to the healthy diet guidelines discussed. In these meals, include produce being grown in the garden. Share these meals with rest of the class.

Rainbow Nutrition

- Learning Objectives: Students will understand how vegetables and fruits of different colors contain different nutritional qualities. They will understand how eating a variety of colors is important for complete nutrition.
- Materials: Fruits and vegetables of all different colors (red, orange, yellow, green, blue/purple, white) from the garden.
- Lesson:
 - Have the children taste a certain fruit/ vegetable at the time that its color is being described. For example, when explaining what nutritional qualities orange produce contains, have the children taste a carrot from the garden.
 - The nutrition information by color is as follows:
 - Red
 - Lycopene, ellagic acid, quercetin, and hesperidin.

- Reduces the risk of cancer, heart, and lung disease, lower blood pressure, reduces tumor growth, and reduces cholesterol levels, scavenges harmful free-radicals, and supports joint tissue in cases of arthritis.
- Orange
 - Beta-carotene, zeaxanthin, flavonoids, lycopene, potassium, and vitamin C.
 - Reduces age-related macular degeneration (aka. maintains healthy eyes) and the risk of cancer, lower cholesterol and blood pressure, promotes collagen formation and healthy joints, fights harmful free radicals, encourages alkaline balance, and repairs damaged DNA.
- Yellow
 - Beta-cryptoxanthin and the carotenoids lutein and zeaxanthin.
 - Supports intercellular communication, prevents heart disease, reduces the risk of cataracts and aged-related macular degeneration.
- Green
 - Chlorophyll, fiber, lutein, zeaxanthin, magnesium, calcium, folate, vitamin C, sulforaphane, isocyanate, indoles, and beta-carotenes.
 - Inhibits the action of carcinogens and promotes healthy bodily function.
- Blue and Purple
 - Phytochemicals such as anthocyanin and phenolic, which are powerful antioxidants.
 - Reduces the risk of diseases such as cancer, heart disease, and Alzheimer's, improves memory and cell communication, and slows the process of aging.
- White

- Beta-glucans, EGCG, ESG, flavonoids, allicin, quercetin, and kaempferol.
 - Activates natural killer B and T cells, antitumor properties, supports immunity, and balances hormone levels.¹⁶⁹
 - As the children enjoy the fresh garden produce, they will learn what each color does to help maintain the health of their bodies. Students will also come to realize that it is important to eat a variety of fresh fruits and vegetables everyday in order to protect against cancer and other diseases as well as keep their bodies vital and healthy.

Food System Issues

Trace the French Fry: An Introduction to the Food System¹⁷⁰

- Learning Objectives: Students will explore how their food is grown, processed, and distributed. They will compare the conventional system of food production with alternative sustainable models of food production and understand where their food comes from. They will comprehend what impacts these different systems have on the environment, people, and the economy.
- Materials: Trace the French Fry Quote Sheets A and B (Appendix 2), Energy Used in Producing Food (Appendix 2), a conventional fruit or vegetable and one (the same type of fruit/ vegetable) harvested from your garden, Food System Map materials (Appendix 2), Food System Structure (Appendix 2), Trace the French Fry Background Sheets (Appendix 2), markers and tape to attach cards to maps.
- Lesson:
 - Hold up the two fruits or vegetables and ask if the students notice any differences. Create a list of what the group notes as you pass them around.

¹⁶⁹ “The Color of Nutrition: Fruits and Vegetables,” New York Times, accessed 26 November 2012, <http://www.nytimes.com/2002/05/14/health/personal-health-the-color-of-nutrition-fruits-and-vegetables.html?pagewanted=2&src=pm>.

¹⁷⁰ Sara Coblyn, *French Fries and the Food System* (Massachusetts: The Food Project, Inc. 2008), 44-46.

Have also a few sliced up so the class can taste the two and note differences in taste as well as look.

- Provide the students with information of where you purchased or harvested the fruits or vegetables. Ask the group to list more differences from this new information.
- Tell the students that they come from two different food systems—the one that was grown locally represents a sustainable food system, the other that came from far away represents the global, conventional food system.
- Define what a food system is with the students. Ask the students to list the different steps of the food system.
 - The steps- production, processing, distribution, marketing, waste.
 - A simple way to engage students in this question is to have them draw the path that their breakfast took to get to their table.
- Divide the students into two groups and hand out the materials for making the food system map. Give one group the sustainable pieces and the other the conventional as well as the corresponding Trace the French Fry quote sheets.
- The two teams must then develop a map of their designated food system by matching the quotes and names on the handout with their role in the food system. Once a team has arranged all of their cards in the correct order, they are finished.
- Have each team then present their system to the others.
- Connect this activity to the two distinct fruits or vegetables presented earlier. Ask the class which system produced which fruit/ vegetable and why.
- Hand out copies of the Energy Used in Producing Food sheet to each student. Explain the maps and allow the students time to read them. Discuss the differences and similarities between these maps and the ones they just assembled.
- Define the term “impact” with the class.
- Discuss the impacts involved in the different food systems (impacts on the environment, community, economy).

The Pesticide Banquet ¹⁷¹

- Learning Objectives: Students will understand the health risks of pesticide use to the producer, the consumer, and the environment.
- Materials: Pesticide Banquet Food Cards (Appendix 2), Pesticide Residue Worksheet (Appendix 2), The Pesticide Cycle Sheet (Appendix 2), pens.
- Lesson:
 - Before the lesson, make copies of and cut out the Pesticide Banquet Food Cards. Before the game, arrange the cards on a table—sorted into similar types of groupings as they would be found in a grocery store.
 - Tell the students that they must prepare a meal for 10 guests and go shopping to get all of the food they need. Each card represents one item of produce, so they may need to pick up multiple of the same card.
 - After they are done shopping, have them share their menus.
 - Hand out the Pesticide Residue Worksheets and have the students look for the items on the list that they purchased in the store. Have them multiply the quantity (number of each item they bought) with the item's residue. Add up the numbers to come up with a grand total of pesticide residue.
 - The person with the fewest pesticide residue points wins!
 - Explain to the students that this number represents the total number of pesticide residues each of them and their guests ate during the meal. Explain to the students what a pesticide is and what a residue is.

¹⁷¹ Sara Coblyn, *French Fries and the Food System* (Massachusetts: The Food Project, Inc. 2008), 116-118.

Conclusion

School gardens are an effective means of reconnecting children with nature and their food as well as give meaning to lessons learned in the classroom. They allow children to have direct experiences with nature in positive, beneficial ways that contribute to healthy development and better nutrition. Having direct and positive experiences with the earth will likely instill a sense of biophilia in the students as well, which they will carry with them throughout their lives. Additionally, children come to realize how food is grown and what goes into the production, processing, and distribution of their foods which will enable them to make better, more informed choices when they are able to choose the products they eat. They will also, hopefully, carry the love of gardening and producing their own fresh fruits and vegetables with them throughout their lives and pass this passion on to future generations. With the implementation of school gardens, the environmentally destructive practices of the current food system will wane, children will develop into healthy members of society, and they will carry with them a love of the environment and a deeper understanding of academic lessons demonstrated with the garden.

Thank you.

The urban school garden represents a cultural, pedagogical and practical shift in priorities towards the earth. As a small-scale response to contemporary environmental issues now facing the planet, the widespread rise in urban gardens is also a highly visible sustainable practice that not only includes local schools, but the communities, regions and histories that surround them. As a form of urban agriculture, the tangible cultivation of local place offers a source of food and a connection to the earth that inspires new ways to think, learn and live and invites new connections between school and community. In cities, such places are urgently needed. As cities now attempt to address the growing food crisis, school gardens provide an opportunity to address, in small and effective ways.¹⁷²

¹⁷² Veronica Gayle, *Roots and Research in Urban School Gardens* (New York: Peter Lang, 2011), 1.

Appendix 1: Interviews

Interviews

David King (Learning Garden, Venice, CA)- 9/29/12

Rick Cota (Central Kitchen CUSD)- 10/1/12

Jennifer Parker (Vista Elementary CUSD)- 10/4/12

Maleene Guida (Redeemer Lutheran Christian School, Ontario, CA)- 10/12/12

Dessa D'Aquila (CUSD Garden Master, El Roble)- 11/1/12

Adam Long (Garden Expert)- 11/1/12

Audrey Borgmann and 5th grade Class (Redeemer Lutheran Christian School, Ontario, CA)- 11/7/12

David King

Me: First of all, how did you get involved in this, the Learning Garden?

David: It was an accident. Um, I was teaching botany for Yo San University, which is a school of Chinese medicine. And, um, they had gotten involved because they had wanted to grow Chinese herbs, and that was the impetus behind starting this garden. There's always been a space here as a garden. In 2001, it was not being utilized for anything but a few students. A group of people, of different herbalists, got together and petitioned to the school and asked to be able to lease this property from the school. Yo San was one of those people. And after a short time, the dean came to me and said "David, would you be our representative to this garden on the board because you're the only one in the faculty that grows plants?" So I started coming over and just doing classes and teaching the students how to grow the herbs from seed. I realized this was more akin to my life's goals than what I was doing, and so I was able to come over here. I just started showing up. I put a lock on that shed. I put a sign that said Garden Master's office. And after about two months, one of the board of director's came up to me and said "You're doing a great job, let me figure out how to pay you."

Me: Wow, that's great. Was it students at the high school that you were teaching or students at Yo San?

David: I was teaching Yo San students. Me teaching high school we've often said is a good cause for gun control. As a matter of fact, right now, I have a group in the horticultural classes, I teach a special, what we call seed to sale. We're teaching the students that want to learn how to start things from seed, how to grow everything up.

Me: So you were here when the garden was started?

David: I was here shortly after.

Me: So are you familiar with how the garden got started funding wise?

David: Yeah! At the time, there was a nutrition teacher here who applied for a grant and got a considerable amount of money over two years, uh, to facilitate using the garden as a tool to teach nutrition, and so she would have her classes come out here, and they were playing in one part of the garden. The gardening classes were playing in another part of the garden. And that set us off for the first two years.

Me: And then continuing from that, where has funding come from?

David: We beg, we do fundraisers, grant money, money has always been an issue, in fact, money is the issue.

Me: Does the school support you at all?

David: No.

Me: Is it affiliated with the school?

David: We are affiliated with the school in the sense that we have still have to get a contract with the school, the unified school district. And then the high school has classes here. We move to support the classes, I work with the high school instructor to support her, whatever I can do to help her to facilitate her classes.

Me: Do you know how the garden got approved by the school?

David: Initially, well first of all, all of the older schools in California have an ag area because agriculture is such a major part of the economy of our state. So this ag area has been here since time immemorial. It's just a matter of the space being used. I think back in the 70s it stopped being used. And in the late 90s, the principal here hired a teacher to teach a gardening class. And so there were 20 students here who were coming out to do gardening in a small portion of this when the garden was founded. And the Learning Garden came out here and immediately the gardening classes expanded up to about 150 students. So they occupy the center of the garden. And then the volunteers and I have a contract with the school, it's a 5 year lease. The principal when I first came here was very supportive. Without Jan Davis's help, this would not have happened. She was an experienced principal. She knew what she could do. She knew how to do it. She knew how to grease the wheels of bureaucracy. And she did it. And since then, it has not been too easy.

Me: But it still looks great!

David: We have our moments.

Me: What would you say the time frame was of creating this?

David: Well, when we first started here, they just had one small section. About the size of this patio. That's all they were using out there. To put the whole thing, well, at that time, my first introduction to the garden, was weeds up to my nose. And I thought, well, any soil that can grow weeds this good is good soil. So y'know I was very happy, very excited about it. Y'know it ebbs and it wanes, I think that's the same thing, it ebbs and it flows. Sometimes it looks better than others. We don't have the whole thing under cultivation, but then again, I have a high tolerance for the wildness of life, because I don't think that we see a lot of that in the world today. We're not completely in control yet, and I don't think we ever will be. It's kind of like trying to get a hair off of a balloon, y'know you push down on this side, it pops up on the other side. But I would say, in the first five years was bringing into a sort of a stasis, we clear an area, and the high school teacher goes—"Oh I'm so glad you cleared that area because we really need it!" "Oh well... we made that for ourselves but ok you can have it." And we clear another area, and she does the same thing, and it's like when's this gunna end, yknow? Now, we've reached a status, y'know, there's plenty of space for the high school, plenty of space for, um, the herb area, and plenty of space for the UC extension.

Me: What are the different groups?

David: Yo San University and Emperor's College are the two Chinese medicine people. There's an ayurvedic school, they're thinking about coming out. UCLA extension has two classes taught out here. And then the high school.

Me: That's very communal!

David: Well and we have churches that come out and do work days here. We have businesses that come out and do work days here. And some other foundations. And we have colleges. Santa Monica college sends out students for volunteers. We're working out a deal with Loyola Marymount to send people out here. So all of these different, we need all of it. We need all of it.

Me: What specific classes with the high school are taught here?

David: The gardening classes are here almost every day. Art classes come out. In fact, the drama class comes out. We've had math classes, especially geometry, y'know figuring out volume. Biology classes come out, we have a specific section for California habitat, um, they do, uh, biology experiments on our pond. They get pond water, and look at our pond scum. And, uh, the worm bin, y'know supplies some entertainment, or education, I'm not sure which. And we used to grow fava beans out here for science experiments. So yeah, a lot of different things.

Me: And do you, I mean you weren't really with the high school before, but do you think this has changed the students in any way?

David: Well, you can see the change in students. I mean, some kids come out, and it's always about their white tennis, and they're not going to do anything different than that. But other students, I love the one kid. The teacher was trying to clear carrots out so they could use it for something else, they were pulling carrots out of the ground, and the student goes—you're trying to tell me this is where carrots come from? And sometimes you see the light bulb go on. So I think it has, I really do. I think just having all this green space here has added a lot to the school.

Me: Do you think they're more environmentally aware?

David: No. Some are. I mean, I wouldn't make a sweeping statement like that. There's parts of the school, y'know, I don't think are aware period. But that's a problem with teenagers, right?

Me: Who eats, who harvests? Do they use any of it in the cafeteria?

David: No, insurance. We might be killing them. The person who grows it gets first choice. So if it's a student or a volunteer, they get first choice. If they don't want it, then we offer it up to other students and volunteers, and if it still is around, then we donate it to a food bank. I'm not really qualified to teach business, so I'm not really interested in teaching business, but I am qualified to teach social awareness, so. At one point, we had a volunteer who came over every Thursday, picked up all the excess produce and took it off to the food bank. And so we used to have these slips where we had so many pounds, and so at the end of the month, we could go to the classes and say look, we gave this many pounds, y'know, and they were very proud of that.

Me: I'm surprised that you can't serve it in the cafeterias.

David: I'm not. You know, the students that grow it, we can serve it to them. And so we have tasting days. The high school teacher and some of her students will create food from the garden. And it's very interesting because you can get a student to eat a turnip green if they grew the turnip, whereas they might not eat the turnip green if it just showed up. And that's always an interesting day because I'll have students who say, y'know, "I won't eat anything unless it's from McDonald's." Or I have some students who say, "I'm not going to eat that, it's been in the dirt." And I say, "Oh really? Tell me, this is your

new diet plan.” But there’s a lot of insurance controlling what the school does and does not do.

Me: Do you think the kids that have worked in the garden, their nutrition is better than it used to be?

David: Some. It’s always a tad discouraging to find candy wrappers on the ground. Venice High School was the first high school in LAUSD to ban soft drinks on campus. That was the same nutrition teacher that got us our first grant. She was hot.

Me: Do you know what the grant was?

David: No, I’m afraid I can’t remember.

Me: What are the main obstacles that you’ve run into?

David: Money. Mind you, the one thing that we’ve had that has I think contributed greatly to our success is the fact that we’ve had a person on scene everyday with a vague sense of the issue of the vision of the place. And with that in mind, I think that has been, that someone was here, and I think that that someone is essential to make that project last. Up at Mark Twain, they have a someone. She’s a retired woman. She doesn’t need an income, and she’s there every week. And her sense of the vision is what guides that garden. And that’s what makes it work. There are 8 grade schools around us that have gardens, and Mark Twain middle school has a garden, and these schools feed to Venice High School. We were here first. And almost every one of those gardens is either one of my students or volunteered here. So we’ve had a profound influence on sort of the gardening culture that’s around here.

Rick Cota

Me: So you're in charge of not only El Roble, but other schools as well?

Rick: Yeah, our department oversees every school site, but we do have partnerships with outside entities, which y'know, essentially now take care of all of the gardens themselves. But we have to take care of that because we oversee the methods, y'know, they have to be organic, we have to make sure things are done in a safe manner, and so forth.

Me: So can you tell me about who you are and what your role is?

Rick: Yeah, I'm the executive director of the department of nutrition services. Felipe is my coordinator. And we're basically in charge of ensuring that the nutrition is provided to the kids and that we meet all of the standards. So basically, we have to make sure that they have a complete meal, which is regulated by the state and federal government, and we have to make sure that all of the components and everything are sufficient for the requirements. And that changes, we just had major changes here in July that haven't happened in 15 years. So, we've had a lot going on.

Me: And so do you use the food that's produced?

Rick: What we'll do, it's used in a couple manners. One, uh, for the classes to make recipes and get more knowledge, y'know of how a tomato grows, what it takes to grow it, what it's supposed to look and feel and taste like. And y'know a lot of kids are amazed because well we'll grow a cucumber, and it won't look all shiny and green like you see in the stores. So then we let them know, well, the reason it doesn't look all shiny and green is because the one you get in the stores is coated with wax and is essentially buffed just like an apple is. And so when you look at an organic item right off the vine, it doesn't look as pretty as say a processed one that y'know has chemicals. And so that's, uh, one of the reasons we use gardens is kind of work in an example of, uh, y'know a lot of them have never seen a carrot and that it grows in the dirt or a corn. So, uh, getting them y'know something tangible that they can touch, feel, eat right off of it is a valuable. And so, we don't use it in our lunch program, but it's used as an educational tool for everybody.

Me: Do you ever see it being used in the lunch program?

Rick: The only way that we'd ever get to that point is if we'd have sufficient acreage to grow, uh, in reasonable bulk. So, we've thought about, uh, y'know we have an abandoned school site up in the northern part of Claremont that ideally if we decide to keep it, I'd love to make it like a working farm. That'd be a good opportunity to have not only kids learn about that, y'know, the aspect of farming, but also produce something that can be consumed by the kids. And there's some regulations when it comes to that as well, y'know, you can only serve food that is from a certified source, so we'd have to become that'd have to be kind of it's own entity like a certified farm in which y'know, the health authorities get involved and it's done in a safe manner.

Me: Um, so are you familiar with how the specific gardens got started, like where funding came from and the logistics of that?

Rick: Yeah, actually the one at San Antonio, um, for the most part started with the Claremont Colleges. They had a grant that they wrote and they were able to do some things there. The one with El Roble started with a grant as well, we got a local \$500 grant and from there had volunteers donate money, and so that kind of paid for y'know what

you see there now. Same thing at the high school, they had a garden club, and they got a couple grants from a couple nurseries, and so in each case, the seed money, to say, has been from a donation/ grant.

Me: And do you find that the schools help support that at all? Do they fund any of the garden or is it completely from outside sources?

Rick: No, we have to kind of do it that way because the garden's not an official fundable item from our end. Now, if I were to say for example, uh, cherry tomatoes, if we were going to use them for our program, I could buy seeds and grow the cherry tomatoes. But since that's not where we're at with it right now, it's basically been kept alive by families and friends and some organizations like Sustainable Claremont, uh, that are involved. So that's where the funding is.

Me: And who kind of does the upkeep?

Rick: Well, we have classes, kids, volunteers. For example, this past Saturday at the high school, 25 people showed up for a big day of planting and weeding basically the fall harvest, winter harvest items. So that's how it basically goes. Now, I'll have some students from clubs that will help maintain it and use it in their classrooms.

Me: When the garden was getting approved, how did it have to go through administration, do you know that process?

Rick: Each uh, y'know, each, gardens have been around for a while in the district. Some, like a teacher, will have a little garden right outside their classroom. There hasn't really been an official, um, process for the School Board or anything like that because these gardens are strictly instructional, slash, y'know they're not only structural, but uh something that is used for demonstration, so it's much like an extra book, it's not on the approved textbook for the class, but the teacher may get a book that will assist him/ her in their goal at the end of the year, well the garden's essentially a tool, not only for the PE classes, but for science and math and others. They can all tie into it.

Felipe: I think at some of the sites, it was started by the principal or the teacher.

Rick: Yeah, Vista was that way.

Felipe: And there hasn't really been a formal process to start the garden, but the teacher says well we have some space back here, can I start something? And the principal says yeah, sure, go for it. So um, it started like that and it grew to where it is now. And I don't think it's sort of an official board approval who can start a garden.

Me: So that's not a necessary part of it?

Rick: No, it would be required to get approval by the board if it became a source of food for the kids because there's restrictions in place, which, um, and basically one of the restrictions that's in place in the first place is that the meals themselves are, um, what we call a reimbursable meal, meaning the lunch we serve the kids has to meet all the standards and conditions, which the state of California via the Department of Agriculture put in place. Meaning it has to have, um, y'know a product from a certified source like I've mentioned before. So, um, having the Board involved would mean that I was trying to put in place something that was going to supplant something else, which was already approved. So, um, for the safety of the district and families, something like that I would go through the Board, and say, "look, we're going to grow cantaloupes, and I intend to give this as the fruit of the day for the kids." There'd be a lot of steps that would have to take place for that to happen, so that would be an example of why I would have to go to the Board in the future.

Me: Do you recall any obstacles or anything in creating the garden?

Rick: Well, funding is always an obstacle. Um, ensuring that we have enough volunteer hours is always an obstacle. Um, maintaining. It's real easy to plant the seeds; it's real hard to make sure that you continue. The hardest thing, there's been gardens within the district that have started with the best intentions, and then the teacher left, or somebody that put it together left, and the garden turned into a big mass of weeds. So that's always a challenge, it's a challenge right now. Y'know even though I had that group here at the high school on Saturday, I'm trying to get the same activity here at El Roble. So those are the main obstacles.

Felipe: And I think another obstacle is just time. For instance, schools finish in June, and then they don't come back until December, and so everything grows during that time anyways, and so you have that challenge of well, who's going to keep it up when everybody's gone and how's it going to be when everybody comes back.

Me: So who keeps it up usually?

Felipe: Volunteers and some of the kids actually come on their own.

Rick: So long it's actually been up to me to make sure I have somebody there, including myself. There's certain times of the year that I'll go up there and half the work day will just be a return back to the earth day. So that's just kind of a "pull up my sleeves and smell the fresh air" day. So that kind of gives me a perspective to the other groups of what I see and where we're going.

Me: You were kind of speaking to this earlier, but how is the garden used by classes?

Rick: Well, Cynthia Gonzalez's food class was a primary. Each one of the PE teachers uses it as well. With PE, you have a link to health and fitness, so seeing and interacting with the food in the garden gave the kids a sense of what is a healthy food to eat instead of other alternatives. So it's an opportunity for a PE teacher who may, as a part of their lesson, be trying to communicate healthy eating habits. They could go to the garden with their class and the kids could see first hand what they're trying to do. And then the math and science, we're doing classes, like for example, they'll plant cherry tomatoes in 4 different beds and they had four different conditions, like one had twice as much water as another or one had different soil, and then they can measure the output and see what, and do calculations and so forth. So those are the main examples.

Me: And so then who eats?

Rick: That would be students, teachers, adults. And it's again the primary reason for the garden is to educate and be of some sense of demonstration as opposed to being a meal for the day.

Me: Have you seen, or have you noticed any effect on the students?

Rick: Yeah, there's a definite sense of ownership, the pride factor there. Uh, they, the kids like it because it gives them a kind of a break from having their head buried in a textbook. And let's say you're talking to a science class and they're talking about y'know, the cycle of a plant. It's really nice that they can physically tie that into the textbook by physically putting the seed in the ground, by physically seeing it grow. So the kids enjoy that. And then it's an opportunity to mingle with, um, parent volunteers, and it's an opportunity to say, well, this is what a carrot's supposed to taste like—taste it. It gives them, y'know, that extra sense, because again one of the examples, we don't grow them in the garden, but we brought them in, um, apples. If the parents didn't know this or the kids didn't know this, oftentimes the apples we find in the stores, have sat in a

warehouse for 9 months, they gas 'em. They basically treat 'em so that they look red and bright 9 months later. Well, the apples we pulled for our district come from Yucaipa. And so they're picked the day before they come to us. And so we give examples, y'know we say here look, here's the apple, one of them's from the store and one of them's from the tree. Which one's from the tree? Well everyone assumes the shiny red apple is. And well no, so we'll say ok, blind taste test. And we'll say, ok, taste them and which one tastes the best. And they'll find that the taste of the fresh one is superior. They come to basically realize why it's important to these things.

Me: Do you ever discuss environmental issues or anything about the food system with these kids?

Rick: Yeah we do, at San Antonio, one of the focuses there is um, uh, I guess food politics. So basically why, yknow poor people have...

Felipe: Called Food Justice, I think.

Rick: Yeah, Food Justice. Y'know, it's like why a lot of poor people don't have access to fresh produce, y'know, vegetables, fruits, y'know inner city people. So there's kind of that, we stress the, y'know what you can do with just a little swatch of land, and y'know how everybody could and should have access and part of the access is communicating why it's important in the first place. And so, we definitely try to tie that in, y'know, to educate them and to say that it's real important that everyone has access and to understand why.

Me: Those are most of my questions, do you have anything to add?

Felipe: I think at San Antonio for instance, we have people from Pomona College that work with the kids. Parents come over, it creates this whole different environment for kids. It creates an environment of working with college students, which give the students an idea, oh this is what college should be like, and creates that relationship and it creates that environment that is out of the classroom. It just gives them a different venue to do the science, to do the math, to do what they do. And again, the kid's interaction with people outside. They get an interaction with another adult that isn't their teacher, because the only interaction they get is with their teacher. That's it.

Me: That's great, thank you!

Jennifer Parker

Me: So can you tell me just a little bit about yourself and how you're involved in the garden?

Jennifer: I'm the 5th and 6th grade teacher at Vista. I teach primarily math and then science in the afternoons. For the garden, unfortunately, the upper grades don't do a lot with the garden. We go to the Bernard Field Station and do experiments there with nature and everything. But the garden, I know the primary classes use it a lot. The way the upper grade students help out with the garden is at lunchtime—they pick out the weeds, put dirt on, do maintenance to the garden. We have a garden club that would work on the garden at lunchtime.

Me: Do you know specifically how the garden is tied in with the lower grade classes?

Jennifer: I know they do life sciences because they also have small gardens behind their classrooms. So for the life cycle, they will plant things and watch it grow. So I know they use it for science. And one of our older teachers, who retired last year, would use the garden as a reward for students, at like recess time. For social studies standards, she had a whole bunch of towns set up in the garden- it kept the kids engaged and that would be like a reward. That was two years ago, and you used to see kids in the garden all the time. So science and social studies, mostly, honestly, it's extra curricular right now, outside of the classroom.

Me: So except for life cycles, the teachers don't use the garden in their classroom?

Jennifer: Yeah, it's more of a fun thing now. Before the emphasis on tests, I know it was used more. We have lots of plants and fruit trees around the entire school. That was our old principal—was just to get the idea of nutrition. So we could say, oh look there's an apricot- you can eat that instead of your hot Cheetos. Or when the grapes come in, the kids love all of the grapes. And so I know part of it was a push towards helping them make healthier food choices as well. As opposed to just the life sciences.

Me: Is that done in a subtle way or are there structured nutrition sessions with the kids?

Jennifer: It's more informal. We don't let them pick things off the tree without permission because then they just go crazy.

Me: Do you usually grow edible plants?

Jennifer: We grow sunflowers. We grew pumpkins last year, pumpkins so big they won first place at the LA County Fair. There are peppers over there, tomatoes.

Me: Who harvests and eats it?

Jennifer: I know Juliana's dad used to take care of it and Ina, the third grade teacher who used to be here. Unfortunately, our old principal was very nature oriented. Our new principal is very athletically oriented. He wants to keep the garden because it's amazing. But it's not his main area of emphasis. And so we don't emphasize it as much now either because it's a subtle shift. Well, when our old principal was here, you'd always see him in the garden with kids. And our new principal, it's not that he doesn't appreciate it, but it's not his area of interest, so you'll see him running the track with the kids, and so the kids will go there. He's just not that type of person. So I think the garden was used, a lot, we have a lot of behavior problems here, so the garden was really used to help build connections with the staff and just build a safe place for them to be able to talk as they're gardening. Because I know our old principal used it a lot for that.

Me: How many of the students would you say are involved in the garden and what effect has it had on them?

Jennifer: Um, I know it makes them more conscientious of throwing their trash away. Because they eat right next to the garden, so if the garden gets dirty, they're aware of it. And so they make sure to clean up after themselves and making healthier choices because you can see it. About 15-20 of the upper graders participates, but it's on their own time, so it's pretty significant out of 120 students. And of the primary, I'd say about 60 because the teachers take them to the garden and it's a group activity. Um, for how we use it, we've also used it for writing. Where they'll go and take different pictures of the flowers and then they'll write a descriptive write up of the flowers.

Me: Do you think the garden has influenced the kids about knowing where their food comes from?

Jennifer: I can guarantee you that it influences that because it's amazing what they do and don't know. I know that being out there and working with the plants and gardening and taking care of it has built an appreciation for just plants in general and their environment as well as being aware of where things come from. It doesn't just appear out of nowhere. You actually have to grow it, harvest it, take care of it.

Me: Have there been any critiques or negative comments about the garden?

Jennifer: No we're actually known for the garden and how beautiful it is. One of the biggest compliments we get is how inviting our campus is, it's not just buildings and concrete. Everyone comes on campus and they walk by and they say how beautiful and nice it is that the school still has the garden as a resource for the kids. And they really appreciate it, it really builds the character of the school, and I think it helps kids be proud of Vista and just take care of it. Because when it's just concrete, if there's nothing to make the kids want to take care of the school and have a responsibility to make sure it stays beautiful. And they can see if they're not doing a good job, things start to die. So they have that kind of ability to make sure they're following the right steps and staying accountable for their actions.

Me: Have there been any obstacles with the garden?

Jennifer: Just continuing the care. I know that that's always been difficult. And finding adults that are willing to give up the time to work with the kids. Because you obviously can't just let the kids run around the garden. I think that's our biggest obstacle—just keeping adults around for the weekends.

Maleene Guida

Me: Can you give me a little background of who you are and how you're associated with the garden?

Maleene: Well let's see, 7 years ago we moved down here from Monterey, CA to take over my husband's father's restaurant, which was Graziano's Italian Restaurant in the city of Upland. When we moved down here from Northern California to take over the restaurant, Francesca, who's now in 5th grade here, was just going into kindergarten. She had been going to a co-op preschool up in Northern California. When she came down here, the school lunch program didn't even enter my mind as an issue. I mean, I just thought it would be a good, wholesome school lunch program because y'know it's a good school. And when I saw what they were serving, I was so mortified. So I never ordered school lunches for her. But in the back of my head, I thought to myself, I want to try and change this. I didn't understand how people could be sending their children to quality schools and yet the schools were serving them basically just processed junk. So it just made no sense to me. So pretty soon, obviously the school knew Graziano's. And everyone who knows Graziano's knows that their pizza pies are homemade. So I offered to do the school pizzas instead of Domino's. They were so overjoyed, they didn't think we would do that because they were getting their pizzas so cheap from Domino's and so I said, no worries, we'll match the price and that'll be that. So we started doing that and before you know it, they were asking us to do spaghetti because you know, all our sauce is completely homemade. So we started doing that. And little by little, I started thinking, this could really be something for me because I was just finding so much joy in helping children make good choices and seeing them really enjoy homemade quality food. So three years ago, I decided to launch the company that's called Progressive Catering and School Gardens. At the time, it was just called Progressive Catering and I decided I was just going to do one school and see how it went. This was the smallest school, and I decided to choose this school as my first school to launch. Before you knew it, someone knew a reporter at the Daily Bulletin. They came calling because they found it refreshing that a mom was starting a company like this. So they came and they interviewed me and it turned into this full-blown colored front-page article. Then Pitzer College called because they saw the article and wanted to interview me. So we started talking, she said this area right here was just all grass with a huge big tree in the middle. She said, have you ever thought about organic gardening? Oh my gosh, that would be my dream to have a garden because you know, once the children plant their own vegetables and fruits, it brings the program full circle. And ironically, it was interesting to me that out of all the schools that I interviewed, this was the school that needed me the most. So out of that interview with Pitzer College, we had a collaboration to write a grant to the Inland Empire Utilities Company, who has a grant called A Garden in Every School. So we applied for the grant, and we got it. But it was amazing to me because when I started talking to the school about it, and they came and did a site survey of where the garden should be, they said this is the spot that we have to cut down the tree. And I thought, well there goes that, this school will never cut down this tree, but when I came back after the weekend it was gone. This school just ran with it. And then Pitzer College had the idea to use the stump of the tree as a table. So before you knew it, we had our garden. And the

grant also supplies the school with textbooks for Art and Math and Science. And so that's like we did our first art project with those signs and we did a rally. That's how we kick off the year every year, with the garden to get them excited. For Science for 5th and 6th grade, they're keeping now a journal and watching the progress of the garden and how the seedlings, how, well, all of them were planted with seedlings except for 5th and 6th, they planted seeds. So they're kind of doing a compare and contrast in that way. So then we also decided to do a fruit orchard on this side of the school. Wilson Nursery donated all of the fruit trees that we have here. This was just completely an eyesore, it was just so ugly and it didn't have any of these bricks. So now we've created an orchard and we're going to put benches and make this a lot more colorful and shady for them to come out here and do their reading and quiet time here. This area has olive and fig trees, so it's more of a biblical garden. So they can come out here and do their religious studies. So it's just, and there's our composting bins, and they compost all of their fruit rinds and all of our vegetable clippings go in there. And that's part of our science also because we started that last year, and now it's starting to break down and create a nice compost that we'll use for our summer crop. But anyway, so my company is, it has gardens in the program, but it mainly is a hot lunch food program. It's not vegan, it's not really even organic, although we do use organic products, though it really is homemade, it's home-style. I really want to bring the basics back so there's no processed junk in their foods. All of our fruits are fresh, all of our vegetables are fresh. We never use any canned or frozen products, and even though I say we're not vegan, organic, or vegetarian, we have 20 schools now from all word of mouth, no marketing. And we now have our first public school, up at Mt. Baldy. That says a whole lot to us because they have a lot of free and reduced lunches for their children over there. Through Upland Unified School District, they used to get reimbursed but they're eating that right now because they did not... they're trying to figure out all of the funding, but they just feel so strongly about the fact that their kids deserve more quality food and Upland Unified just wasn't providing it. I will say out of all the school catering companies, we're very fair in our pricing—basically a lunch is \$4 and it's all you can eat. So it's really just a very simple program in that way. I'd rather focus on the quality of the food, the temperature, and the kids themselves. And it's proven to be successful—now in 3 years, we're up to 20 schools with not even a website. I don't even want to do a webpage because I'm afraid. I'm really vowing to only add 1-2 schools a year. We had to sell our restaurant because the kitchen wasn't big enough. We have now 2 industrial kitchens. It's just amazing to me, and I mean, I'm not saying this at all to boast at all, I'm just saying this to show how much of a need there is for this. I think what makes it so desirable is that it is so simple. I think moms and dads just really want their kids to be eating from nature, you know what I mean? I just think that in today's world, kids are so used to prepackaged stuff that it makes it so hard for the moms to cook a homemade meal and put it down on the table and have people enjoying a family meal. And this has really proven to be so impactful because when I come back to school on a Monday, the kids come running up to me, and they're like—I made a good choice this weekend. I just really try to talk to them about the fact that there's so many choices out there. And they can make good choices like drinking fresh water or fresh milk instead of flavored milk. The kids know when they are being served good quality food, I think subconsciously and internally, they know they're being loved, and I think that's powerful. Nourishment in so many ways. Let me tell you

something, the kids that grow up with gardens—we're building another garden up at Carden Arbor View. They're going to remember that experience and their kids will garden. I grew up with a grandmother that gardened and that stayed with me, look what happened. That's why I feel so honored and so excited when students like yourself come calling because to me, that's just part of it, we're all in this together, raising good human beings, raising awareness, and I have such an affinity for the Claremont Colleges because you guys are just really out there.

Me: So when you were building this garden, did the kids contribute to the process?

Maleene: Yes, well basically it got built before we even got the grant. Isn't that amazing? The church and the school just came together, and the garden consortium, Generations, that I'm a part of, came out here and showed us how to build raised beds. One member sponsored two of the plots. People just came out and started sponsoring. The first thing the kids saw was the tree cut down. I said, it's for the good, because we need sun, and this is the best place for it to be, so the tree is I'm sure happy to lend a hand in that. And we're not going to have the tree go to waste, we're going to make a table out of it. So that tree will always have a place in our garden. So then we dug up the grass and brought in the soil. And then the kids started taking over and they brought in all the seeds. Tomato seeds were really popular, so we had so many tomatoes! Which was really cool because we had these big, y'know, tomatoes grow so big. And we had beefsteak tomatoes, cherry tomatoes, all types of tomatoes! It was really cool to go in and harvest. We just did it together. We journeyed through it together. This is our second year with the garden. And this year, we're like ok, we're going to have something different in every plot. We're not going to have a sea of tomatoes this year. And so every year just seems like it's getting more advanced and we're getting more advanced and learning more. But it's their garden, it's a working garden, it's their garden. This year, when we did the first rally, I told them this year, you guys are really getting in there. I'm not going to be weeding this year, you guys will be now. And they're doing it. They harvested mint about an hour ago, and they made mint tea.

Me: Who usually harvests the vegetables?

Maleene: I usually do because I use a lot of it in the hot lunch program, but obviously there's not enough for 20 schools. So I used, like kale, I tossed kale with olive oil and put it on a cooking tray and made kale chips for our first rally. So I show them that they have choices, they can eat kale chips instead of Fritos. Oh my gosh, and the fact that it's their stuff that they're growing. You just see their faces, especially the little ones. And we started out planting with seeds and we called them babies.

Me: Do the classes do activities with the gardens?

Maleene: Yes, each class designates, well they all did the art project- they put their hearts and souls into those signs. Um, 5th and 6th made their mint tea and they're keeping a journal. 1st and 2nd, I don't know what their science project is right now. 7th and 8th are doing contrast between seedlings and planting from seeds. But as we go, they come up with other different projects. For Halloween, they're all going to bring in a mini pumpkin and decorate it and decorate the garden with them. So it's all about creating and loving and nurturing the garden because that's truly what makes it grow. That's really, it's about putting your arms around and loving it. It's not really like decorating pumpkins is scientific, but it is a way for them to take ownership. And it's very important for them to connect and feel ownership of the garden. It's important to me that each class is a part of

it. And it's very interesting because we have a few autistic children in this school and gardening is known to be very therapeutic for autistic children. And the orchard is a quiet place for those children to go to because sometimes there's too much stimulation, so you see those children gravitating toward the orchard. Which is interesting.

Me: When was the orchard built again?

Maleene: Last year.

Me: What was the time frame of the garden?

Maleene: It was built in a weekend. That's actually why we got the orchard. When we got granted the grant, they came over and saw that the garden was already built, and were like, "Well!" And so they were looking around and all that was weeds and an eyesore, and I had to go in and serve the kids, when I came back out, the person in charge of the grant and a church member, who was completely a workhorse for the garden. They were over there looking at the side of the building, and they were like since you already built the garden and you have this 5,000 dollars, let us build you an orchard. So that's how that happened. So, I'd say in a school year, everything was built.

Me: Have there been any critiques? Is there anyone that's not happy with it?

Maleene: The thing about school gardens, and this is something to do with the grant- is that you have to show the support for it. Because the last thing they want is to pour \$5,000 into a project and come back in a year and have the whole thing dried up. Which happens quite a bit. So it doesn't seem like a garden would be that much work, but it is. I really needed help with the garden when Progressive Catering blew up. And it's hard to find people that are really committed, who say I'll come and do it and then actually come and do it. So when it starts to look disheveled, the church side will come. So that's the hardest part—making sure that the upkeep is really there and the support is really there because if it starts looking disheveled and it's in the middle of the campus, you're going to have people barking. So y'know, I'd say that's the biggest thing. But other than that, I don't see how anyone can be against it. I think a lot of schools don't have them because it's just one more thing for the administration to do. And when the teachers found out that we were building the garden, they were already working double without double the pay because the school is strapped. But I think as it's come along, and we have seen the pluses versus the y'know, they've come along. I'd say some teachers more than others. But that's the hard part- is trying to get the administration behind it because it is one more thing.

Me: So who does maintain this garden?

Maleene: Me. You need one backbone. And I have a stake in it because it has become part of my company. And that's ok. It's going to take someone who has an emotional tie to it. And mine is that it's a part of my lunch program and my kids go here.

Me: So have you noticed any effects on the children from garden? Are they more environmentally aware or nutritionally aware?

Maleene: Yes, I do. I'm pretty faithful and so I don't think that anything just happens by chance. I mean, I have a few other schools interested in my company when I was launching my company. But I chose this school even though this school wasn't the most financially attractive for the hot lunch program. I just ended up choosing it because my heart told me to. And it proved that I was right in choosing this school because so many kids here, I have a really hard time here getting them to eat salad. And so I have noticed, it's taken about two year, but this year is the first year that I have noticed their palates

completely changing. When I say that, there's two kids that come to my mind. That I could never even get them- they would sit there and cry, I mean, they just would not eat a leaf to save their life, y'know. And now they finish up everything. Granted, I make incentives. But you know what, their palates are also becoming opened up. I always say, if you put junk in front of them, they will eat, if you put fruits and vegetables in front of them, they will eat it eventually. But now's the time that they're developing that palate. And also it's created a kind of common ground for all of them. It's a very small school, and I see them passing the garden and talking about it- it's very cool to see that. I mean it's theirs. Also, from the very beginning, when we were gardening, they complained about the dirt, and now I don't let them use shovels. Because I tell them the best tools in cooking are your hands and the best tools in gardening are your hands. And now I don't give them shovels anymore, they just dig with their hands, and it's great to get in there. And now, because we had worms, we had a worm bin. I told them how the worms poop and that's how they nourish the soil, and they were just like- oh my god, worm poop! Now, when they dig, they find their worms and they're like "Hey wormy! Go back in there, do some more poop." It's amazing! So those are some big drastic changes.

Me: Those are my main questions, is there anything you'd like to add?

Maleene: I think that's it, now, what's the title of your thesis?

Me: Right now, it's just- school gardens, why and how?

Maleene: I'd say the biggest why for gardens is it takes children full circle in the spectrum of their eating habits. And to combat obesity, we have to change how they're eating. We just have to. So I'd say for me, that's that biggest why. For the how, right now with Michelle Obama at the forefront of school lunches and school gardens, there's so many grants out there. So right now, we're at a place where it's very easy for schools to get involved with school gardening. And you know what, I don't know why to me, in open houses, when you're looking at a private school to pay tuition, you want to see what makes it that much more special. To me, when people come in here and see that we have a working garden, I think it's a very powerful marketing tool for prospective parents. That's part of a "how" too. And that was a big way to sell the school and the church on having a garden. And that was a big plus. Carden Arbor View, which happens to be second to the most expensive school in our area, they see it, and they get it. I think if you have the right administration, and they have an open mind, they get the reasons, financially that they would want to take that on

Dessa D'Aquila

Dessa: So basically at El Roble, we have all of these main garden boxes. And out of them, we teach garden club, which is Wednesdays during lunch time. And then we teach, there's this new thing they started—called Opportunity Time or Tutorial Period. Basically, kids get to do fun, extra curricular classes if they're not struggling in a class. So it's about 20-30 minutes long, 2 days a week, and we offer gardening as a class. So it's kind of cool, the kids get to come out and learn about composting, get to learn how to plant. Most of these kids have never done this before. Being in Claremont, we have some that are garden novices and they know everything. But it's great. So you get a range of kids. And they get to get out here and get their hands dirty. When we had the chickens, we would also get to talk about chickens. So we teach them about a bunch of things. Over here, we have a couple of garden beds that we cut down and we use them for special ed. The principal put in a pathway so we can get wheelchairs in. They made these little nametags; each kid had a certain vegetable they got to grow. So they get to see what they planted grow. And they come out here and look at them and talk about them. We looked at other plants too and tried forage flowers and other weird things they'd never tried before. And they took me out here and showed me what they planted and they totally recalled all of it, which was really cool. One of the beds we converted into a compost pit slash greenhouse. We have the compost on the bottom, these plastic trays that go on top, and the plastic sheet that goes over. The heat from the compost kind of heats it up and helps things grow faster, and it worked really well. It was a really cool concept. So that's what we do with our green waste. So that's the El Roble garden.

Me: What other schools are you working with?

Dessa: El Roble I've done a lot with, just because everyone, like the principal, secretary, teachers, they have a lot of support here. It's also located right next to the central kitchen, so last year when I was working more with nutritional services, we were taking a lot of the produce and walking it over to the kitchen and using it in salad bar. And hopefully we'll do that again this year, but we're kind of still playing with that. And Vista, they have a huge garden too. They had pumpkins in the pumpkin contest that was featured in the fair. I think they're still doing a pumpkin raffle. They have 3 different fruit orchards and a native area near the kindergarten. It's a very big outdoor school, um, the principal two years ago had a huge passion and heart behind outdoor education, school gardens, and environmental education. Um, when he left, a new principal came in, and he didn't really know anything about gardens, but he was very passionate about it and saw how excited the kids were about it. And I think it was like two Saturdays ago, we had this workday at Vista, and he brought his whole church youth group out. So there was like 30 people. So for a guy that doesn't know a lot about gardening. And I think he's like an old track star, like almost went pro, super big into sports, but still supports it and has a huge heart for it. So that's kind of where Vista's at, but the wonderful thing that we did last year and that I think we're going to continue this year. We have a partnership with a nutrition professor at Cal Poly and we're working on making an environmental curriculum. So she broke up her students and partnered them with teachers. And they took a normal lesson the teachers had to teach and transformed it into a lesson in the garden. And what we're hoping to do is over the course of 4 years, keep compiling all of

this research and lesson plans and create a binder and pass it on to all the teachers coming in. So that now they have their own kind of their own core curriculum specific to Vista and pass it on and use it for environmental science. And we're doing that for all of our schools on some level. We've been putting together curriculum/ garden lesson plans/ basic what to grow this time of year charts and sheets, and we're leaving them with the principals and the librarians so teachers can check them out. Eventually we want to have a filing cabinet with seeds in it to help to get them started. So Vista has a lot going on. We have Sycamore, which is a big outdoor school. They have garden beds scattered throughout the campus and different teachers use them at different times of the year. And I'll come and bring seedlings and they'll disappear but other than that, it's kind of like- if we need anything, we'll contact you. San Antonio High School has a huge gardening program. They have a huge food justice program afterschool. They've done a dinner fundraiser where they take all of the food in their garden and have a chef come in and prepare it. And they have music and show everyone around the garden. And the students are also learning about food policy because they're in high school. And at the other high school, Claremont High, we just at the end of last year finished and completed our garden. We have chickens and we allow them just to kind of like roam all over. But we just planted our new crops. And someone didn't realize that they would eat them in two seconds. So we're restructuring that. But it's kind of a cool enclosed area. It's about the size of El Roble but a little longer. We have a couple of fruit trees planted. A big area just to plant produce. They're working on a Shakespeare garden with their English class. There's a nice shed. They have a little tree sitting area. One of the teachers is really crafty, so he built the chicken coop himself and also made a little paved pathway with brick. And one of the ceramics classes was talking about making a mural for the garden. And when we first started the garden, one of the math teachers of a lower division math class was trying to engage them and he figured out that he could have them do square foot gardening. So he had them take all the measurements of the garden, plot everything out, looked at planting charts to see what could be planted that time of year and like designed the whole garden for us. So yah, a lot of like fun little projects going on. The Botanic Gardens are right across the way and did workshops with them and planted natives and helped them out, so we're trying to get something to go on with the environmental class where they can come in and do workshops for the students. We also have Mountain View where we have a bunch of garden beds that were kind of abandoned, so we came in and tried to get them fixed up and got the teachers involved. I know that about half of them are being used right now. But the upper grade teachers are having a blast with them. They've made like stuffed zucchini flowers for the kids. They had garden club last year where some Pitzer students came out and helped with that. Condit Elementary has some garden beds that have been abandoned and they want to start up with that. There's a teacher and they have a whole section on California natives, so she wants to do natives on the outside of the box and California mission crops on the inside of the box. And they already have fruit trees, like the whole things set up. I think every school for the most part has a garden except for Sumner. Everyone, on some level, whether it's a couple boxes or a full garden, they have them and they use them, and all for different things which is kind of fun. Every school has a completely different personality and different needs and wants a different- like everyone can use a school

garden but just for different purposes. It's a totally different dynamic at every different school site.

Me: Can you speak to maybe the effect that the garden has had on students?

Dessa: Last year, the head of PE at El Roble- I kind of sent out an email to say, hey if you want to use the garden for your class, I can help you out. So I got a response back from the PE teacher, and what we did was we met with each of her PE classes 4 times and taught a section on calories and we had them out here doing different exercises to burn off certain amounts of calories—like a hamburger or a carrot, so we kind of talked about that and did a very proactive visual aid. I had them come through and identify herbs. At the very end of the year, they're project was to take 4 things that were growing in the garden and I gave them a huge list, and they had to integrate it into one dish. And then we would choose one to serve in the cafeteria, so we served that at lunch. And one of the first things I noticed as we were sitting on these tree stumps out in the garden, was that, well I had some classes that were very well behaved and I had other classes that were fidgety because it was the middle of the day. But the best behaved ones, actually, was the kids that had learning disabilities, which I did not know until the end of the class. The teacher was just like they were so well behaved and she said these are usually my ADD kids, I have a lot of ADD kids in this class. They hardly can stand still, but they were very attentive, they were listening, they were very interactive, but not overly interactive. She said, I don't know, it must have been that it's a different teaching style in the garden. When you're in the garden, you're constantly running around to different beds, and you're talking about things, and the kids are touching different things and touching the soil, and you're harvesting the veggies. And you're learning as you're going. And for me, I learn that way too. There were times for me when I was having trouble in a traditional classroom setting, but once I was out in a garden, or doing something with my hands or doing science experiments or something that was more applicable to what we're doing, it just came a lot quicker to me. And I was able to memorize it easier too. And a lot of my kids that are typically a little rowdy at the beginning of the class, recall things a lot better. I think it's because we're touching it, we're smelling it, it's a multisensory experience. So that was one thing I noticed that really helped from a different angle. And I noticed that also with my special ed kids. Being able to touch and smell things, and I think they're doing measurements too and being able to measure things and integrate math and, it just seems to stick a lot better and they're able to recall these things. I have a lot of kids that are afraid to get their hands dirty at first. They're like—can we have gloves? But we don't have enough gloves because we don't have money. But I'm like, well you can wash your hands after, see look I'm doing it, and they tend to pay more attention. I have kids that seem to be a little more rebellious. And they look at me like this young girl who looks like she just came out of college, what do I know, and I had one girl who came in with a group of guys and just rolled her eyes at everything I said. And I was like- hey do you guys know about vermicomposting? And she's like what's that? And I grabbed a handful of worms out of the bin, and she was like “woahhhh, cool!!” I instantly earned her respect. I think it's a good way to reach everyone on a very personal level, being in the garden. You can kind of find like a different way and a different approach that might be a little more difficult to find in a classroom setting. And you can kind of get everyone's attention no matter what their background is, who they are, what they're learning.

Me: Have you run into any critiques or obstacles from admin?

Dessa: I think because I'm in Claremont, I've had a lot of support. The biggest obstacle I guess would be funding, I mean it's everyone's biggest obstacle right now. But like something I'm going through is finding funding for my position and figuring out if I can stay even just for part time. Because everyone looks at gardening and they say, well that's really cute but does it work, like is it just one of those programs we're throwing money away for. We don't have money right now just to throw into programs. Um, so I guess until you've actually seen it and experienced it and seen your kids come home and recall different lessons and things, you might think that it's kind of a silly thing. I'm really lucky, I think, I would say 9/10 of my school sites totally support it. We only have one principal right now that isn't really, just doesn't really seem to care, like he has bigger things to worry about than the garden. But he doesn't really, he hasn't really given us any problems as much as he just doesn't support it. But my other principals, are like, oh what's going on! Or, oh I'll walk you out to the garden, what are you doing. They're very proud of it. And I think from a political admin perspective, the cool thing about gardens is it's a visual reminder of education, like, it's something that you can take your parents to and say look at what we're doing. So they're a great educational program, and makes your school look a lot nicer. It's something you can show. Test scores are one thing, and they're definitely important, and you can definitely use gardening as a resource to accomplishing higher and better test scores but like you can't show them, you can show them the numbers, but it's not as big of an impact as looking at this- this is what we're doing, it's tangible. I would love to have a produce stand and sell our produce. That was one of my goals this year for sustaining the garden, but there's quarantine right now. It's totally just legal to sell on your school site, you just can't take it off and sell it. So we don't need a permit or anything. So it would be a lot of fun, and I think it would give the kids nice ownership too.

Adam Long

Adam: I've worked with a lot of gardens. I've worked briefly with the gardens at Sycamore. I've worked at the Vista Elementary Garden for a while. Last semester, I worked 6 hours a week at the garden at El Roble with Dessa and with PE teachers, and we worked with PE classes, and we also worked with students who just came into the garden out of their own free will during this 20 minute period where they could choose what they want to do. And then, I've also done a lot of work with local school groups and other groups at the Farm. And, in a week, we're going to have a natural parenting group come through. We've had multiple age classes come through. We've had groups from Cal Poly come to the farm. That's been a great space for people of all ages. So let's see, El Roble's probably where I have the most experience.

Me: Can you speak to kind of the activities you've done with the kids in the garden and what effect that's had on them you think?

Adam: So, there's a lot of things to say about this. The way that we primarily did things was just sort of figure it out as you go, you know, we only had 20 minutes and sometimes we had 1 kid and sometimes we had 15 and sometimes they were really calm and sometimes they were really rowdy. So we couldn't really have a regular group and a regular schedule because there's just different kids and different things that needed to be done. But before the period, we'd plan- yeah we should plant this bed and weed this bed and have the kids do that. The way that I like to work with kids in the garden personally is just going around with everyone individually and there's so many opportunities in the garden to use as teaching moments. I mean you have to be creative, but if one kid has a question about one thing, tie it in with some, y'know, ask them questions to help them find the answer, and tie it in with other things. So that's how we've been doing it. But there's also just huge huge huge amounts of garden curriculum literature out there. I don't have my hands on it personally, but I work with a group- a subgroup of sustainable Claremont- it's called the school's action group, but a big priority is school gardens actually. And there's people at Cal Poly who are working on curriculum. There's Na'ama who's also worked on curriculum at Vista. And if there is ever the potential for a more regular group of students or a more regular class to be done in the garden, the curriculum is there. And all the curriculum is tied in with California standards. I don't think there are many opportunities in California schools for that curriculum to be used just because there's, it's hard to justify saying an hour a week every single week will be spent in the garden doing gardening lessons. So with the PE classes, that was a little more structured. It was also kind of insane because we worked with 3 different PE classes and each class had 50 students. And we did I think 4 different lessons with each group. And there was one or two PE teachers, me, and Dessa, and 50 children, y'know, many of which had no interest whatsoever in what we were doing. But a lot of them got a lot out of it. And so the lessons we did with them, when we did eating the rainbow and sort of talked about how the nutrient qualities of food somewhat correspond with their color and that's interesting for kids. And so they walked around and we said write down as many different veggies as you can find. And then we also did different things to tie in the nutrition with exercise. So we compared the caloric content with a hamburger and a bag of chips with an apple or an orange or something and then, I can't remember exactly how

we made this work. We somehow had them run an equivalent number of laps to the food they chose. I don't know if that was the most successful, but that's the kind of stuff we did with the PE classes, which was very cool.

Me: Have you seen an effect on the students? Do you think they've bettered their nutrition or care more about the environment?

Adam: Those things are hard to say because the problem with those short interactions with the PE classes and the huge number of kids is that I have no personal contact with any of them. The group of students who choose to come to the garden everyday. Y'know, most of them have gardens at home and their parents are involved. There's other reasons why they're involved in that already. But there are also some random kids that just show up. But well, I can't speak to the long term effects. I can definitely tell, even with the PE class kids, who I don't know personally, just walking around and answering their questions about the garden. A lot of them were really excited about it and really interested. I don't know if that will have an effect on them. But they at least enjoy being in the garden.

Me: And then, logistically, you were kind of involved in starting the garden, right? So can you speak to kind of the technicalities of starting the garden?

Adam: The logistics of gardens is just a nightmare. The hardest part is the long-term maintenance. I'll speak to that later. So in the beginning, I don't know where the funding initially came from, but the school was building a new bicycle parking structure. So they blasted out the concrete in their old bicycle parking structure. And we had a group of people from the colleges come spread cardboard down and a layer of mulch in the area and another workday with college kids and locals and the principal of the school came and started building beds and the guy who does maintenance for the Claremont school district has been really involved in installing the irrigation system and he's incredibly handy with all of those kinds of things and has been really personally motivated to set up the irrigation system and the timer system and the fencing and all of that. He's one person who has to maintain the facilities of every single Claremont school. And we're just very lucky that he has enough personal interest to devote that time to the garden. Funding, like I said, for materials, I don't know. I know that Dessa gets a budget but it's very very very small. But there's organizations- like she got a bunch of seeds donated I believe. And we've worked with different garden groups to get compost donated and that's, it works sometimes, it doesn't work other times. And then, maintenance. So there have been a couple different strategies that we've talked about at the Claremont school action group so that the gardens get properly maintained. One is having a parent at the school who's a point person and that parent organizes volunteer groups. But once the kid in that school moves on, that poses a problem. So the other solution is have a teacher be the point person. But that requires that the teacher, one, has the time, energy, effort, and also just the interest. And you can't ensure that. It's very hard to find a teacher that can really devote that kind of energy. So that's where something like Dessa's position is just invaluable. If these things are going to be maintained and workdays are going to be organized and kids are going to be in the garden and making productive use of the garden and learning, you have to have someone who is employed to oversee that. And even only working part time and spreading part time over all the gardens, Dessa, even just that small amount of time is enough to keep everything running. And even when she stopped working for the period of the few months, everyone was very quick to realize that things

get out of hand really quickly. I sort of filled in in her absence for a few hours a week, just at the El Roble garden. And it took me 3-4 weeks of working 4-5 hours a week just to cut back everything that had grown over the summer. It was a nightmare. Um, and you know just to make sure I was harvesting things and to give them to the kids, but the kids weren't in the garden anymore because the kids weren't there. So, having her position is very helpful for long-term maintenance of school gardens. In summary, while there are other strategies for ensuring long-term maintenance, I think it's very very difficult if not impossible unless you have someone who is either employed or for some other reason can have a commitment to organizing things. Because you have to have that commitment to organize stuff, you can have the kids do a lot of work, and the focus is obviously on the kids learning, but you have to have someone to facilitate that. That's the hard part.

Me: Are you aware of any obstacles or critiques or anything against gardens or school gardens?

Adam: I mean, I know they exist. A common critique that I think I've already dealt with is the sort of status quo of school systems is that standardized tests dictate everything. Obviously that's a problem for other things that need to be addressed. But because that's the status quo right now, a big part of the argument is that school gardens take time away that could otherwise be spent doing more focused or more specific learning for a standardized test. The counter argument is that there is curriculum that ties in with all points of California's standardized testing. What other critiques? Funding for Dessa's position, funding for materials. Perhaps the money required to educational value achieved by students ratio is rather high, um, but it's hard to tell if it was a more entrenched part of the school system and more kids were involved and interested, then perhaps the education value could make financial sense given the expenses required. It's definitely, funding's definitely a hard part, but there's also a lot of funding out there from all sorts of organizations. Y'know, Annie's mac n cheese has all sorts of grants for school gardens. So if you know where to look, you can find grants outside of the school system to help fund those kinds of things.

Me: Would you like to add anything about your involvement with school gardens?

Adam: Another thing that's unrelated, but a different benefit that school gardens provide that was more evident to me at Vista was that it provided a space for children to interact with the outside world. A lot of kids at Vista could care less about the vegetables that were growing, but they really liked this patch of dirt in the corner and they made like dirt pancakes and set up a little café and so these gardens can provide creative spaces for kids to interact with dirt and with sticks and rocks and plants even if it's not related to vegetable gardening. In a more general sense, it's a way to get kids outside, which is very important for various reasons.

Audrey Borgmann and her 5th grade class:

Me: So does someone want to tell me what work you've been doing in the garden?

Kid 1: A lot of planting and weeding.

Me: What have you been planting?

Kid 1: Radishes!

Me: And the mint, did you guys plant that too?

Kid 1: Mhm.

Me: Have you harvested at all?

Kid 1: Yes, we used some of it to make tea.

Me: Did you guys like the tea?

Kids: Yah.

Me: Had you ever tried that kind of tea before?

Kids: No.

Me: What have you learned from working in the garden?

Kid 2: Um, that it's um, really good to, um, plant vegetables. And um, so like we can have like all kinds of good veggies and stuff.

Me: Do you guys like vegetables?

Kids: Yah, kind of.

Me: Would you say you liked vegetables before you started working in the garden?

Kids: Yah.

Me: Do you like some vegetables more now than before?

Kid 2: Kind of, it's encouraged us to try it.

Me: Have you guys talked about nutrition and health at all with the garden?

Kid 3: Vegetables, like some of it, helps us, and it has protein for us.

Me: What have been your favorite experiences in the garden?

Kid 1: Harvesting the vegetables.

Kid 3: Pulling the weeds.

Kid 4: Planting.

Me: What do you guys like about these things?

Kid 2: Um, that you could really actually do, um, really good, um, things for people and stuff.

Kid 5: You get dirty.

Kid 3: You experience how, um, you get to work in a garden. And that really helped me with my garden at home, um, because I don't get to take care of it because I'm so busy. And it helped me, I just like to do it with my friends.

Kid 1: It's nice to um eat the veggies you grow.

Me: And, so, do you guys like the aspect of going outside and putting your hands in the dirt as opposed to sitting in desks all day?

Kids: Yah.

Kid 2: It's much funner.

Kid 3: It's fun to not just be in a classroom but be outside.

Me: And do you feel like that's helped you in the classroom as well?

Kid 6: It's also helped us work together, in and out of the classroom.

Me: Does anyone have a fun story about the garden?

Kid 3: It helped me because I feel like that, um, like, I'm like somewhere else but I'm just surrounded with plants. I just feel like I'm at home with my grandmother but like my friends are there, and it's just fun.

Kid 2: I feel really great in the garden because um, it makes me feel like I'm surrounded by plants but I'm at home.

Kid 6: I just like, the garden has made me like plants more. Like whenever I see a huge place filled with plants, I just want to go like sniff the flowers and stuff. It's just more, it makes me feel better when I'm around plants.

Kid 3: I'm really proud that our, um, radishes are growing bigger since we first planted them. And, um, my mom's really proud of us because, um, she knows how great this is for our environment, and um it's really cool because we just do this together and it's a team.

Me: So everyone participates together? How do you maintain the garden?

Kid 1: We just, like, work together with it, not really assigned.

Kid 3: On Mondays after PE, sometimes if we have time, we go in the garden and we like pull weeds and make sure it's like clean.

Me: That's wonderful! I'm very proud of you guys, I'm glad that you guys go into the garden and love it and eat vegetables, that's wonderful to hear!

Me: Do you maybe want to introduce yourself and talk about how you guys use the garden?

Audrey: My name is Audrey Borgmann, and I am the 5th and 6th grade homeroom teacher at Redeemer Lutheran School. As well as I teach 5th-8th grade science and history, so I team teach with another teacher for that. We use the garden on Mondays after PE because they're already in PE uniforms. We go and weed. There's one of the plots, the sprinkler is broken, so we make sure that that gets water. Clean up leaves and other debris that might have fallen that could affect gardening. And then, um, we, um, there's a lot of grass that's growing between the plots, so we pull up that and just try to make it look clean, look good. So that's on Mondays. And sometimes Fridays, depending on our PE schedule. And then during science, we use the garden to, let's see we had a cold day a few weeks ago, so we made mint tea and talked about what was happening, and drank that- it was delicious. And today, in fact, we were trying to make iced tea, but we don't have a jar to do that, so maybe tomorrow. Oh, we write down observations. A few weeks ago, we went out, and they observed a couple of plots, and today we went back and observed what's happened since then. So we'll talk about how tall they've grown. And we'll talk about what plants are ready to be eaten or when they think they'll be ready. We saw the radishes today, talked about why we think they're ready to pull or not ready to pull. So we pulled one up to see if it was ready, and they were not ready- too small. You know, a few more weeks probably. But it's been awesome to watch because a lot of the plots were planted with seedlings, but we planted ours from seed. And so, we did that the 2nd or 3rd week of school and we've already got radishes almost ready to eat.

Me: Were you teaching science before the garden was here too?

Audrey: No, I came when they were putting in the garden. This is the first year I've really used it in the classroom.

Me: And have you noticed that that's helped?

Audrey: Yah, well especially when we talk about plants and science, the students will all have hands on experience with that. And so when we get to talking about photosynthesis or anything else, they'll understand better because they've felt it and seen it and touched it. And that just helps to understand anything.

Me: Have you guys talked about food production at all or is it mostly geared toward science?

Audrey: It's mostly geared toward science. I'll be teaching PE in January, and we will be doing health during that time. So during that time, we're going to be having a nutrition, um, class for a few weeks and we'll definitely talk about the vegetables and fruit and soda, and how much sugar is in that opposed to what the vegetables can do for your body.

Me: Do other classes use the garden for other subjects?

Audrey: I think mainly it's used for science, but it may be used for some math as well.

Me: Awesome, well thank you, is there anything else you want to add about the garden, it's effect on the students?

Audrey: I think it's just a really great thing to have at a school, when you walk on to campus, you have this just beautiful, peaceful place in the middle of campus that kids can just go play and touch and pull weeds and learn to understand how our food comes to us. And that if we can just make our own food, it's so much healthier for us because nobody is adding anything, we know what it is. And that is just something that is so great for the kids.

Me: Do you maybe want to describe a sample lesson where you've used the garden?

Audrey: Let's see, I know, actually last year, for history, we had talked about how the Indians had grown their food. And that they had grown three crops together, and so we were actually growing a couple of those things at the same time, so we were able to, we weren't growing them together the way that the Native Americans had done, but we were able to see how those things would have affected each other and how they could have grown together. So that was really cool to talk about something from a book and then be able to go see it and look at the way the things were growing. So that was cool, and then also, we haven't—we've been doing astronomy for science, so next quarter we'll be going in to plant life next quarter, so I haven't quite used it for that, but next quarter we will. But it's been nice to observe and to see what's happening in the garden and to record observations throughout this whole school year. By the end of the year, they'll better understand what happens and that it's not fast, it takes a long time.

Me: Well, thank you!

Appendix 2: Lesson Plan Worksheets

The Structure of Soil

| | |
|---|---|
| Air | Essential for roots, for animal life, for bacteria, and for keeping the soil open |
| Organic Matter (bits of plants and animals, dead bacteria) | Opens up the soil, makes space for air, traps water, provides essential nutrients |
| Roots | Cultivate the soil, take up the nutrients, hold the soil in place |
| Animal Life (earthworms, beetles, etc.) | Opens up the soil for air and water, digests organic matter |
| Bacteria and Fungi | Break down organic matter, release nutrients |
| Water | Essential for growth of plants, dissolving nutrients and bacterial activity; needs to get into the soil, but also needs to run away so that the soil is not waterlogged (flooded) |
| Clay Soil | Helps to trap water, holds plants in place |
| Sandy Soil | Helps water to drain away |

Figure 1¹⁷³

¹⁷³ Food and Agriculture Organization of the United Nations, *Setting Up and Running a School Garden- Toolkit* (Rome, Italy: FAO, 2009), Lessons SET A 4 Guide A.

Soil is Sand, Silt, and Clay

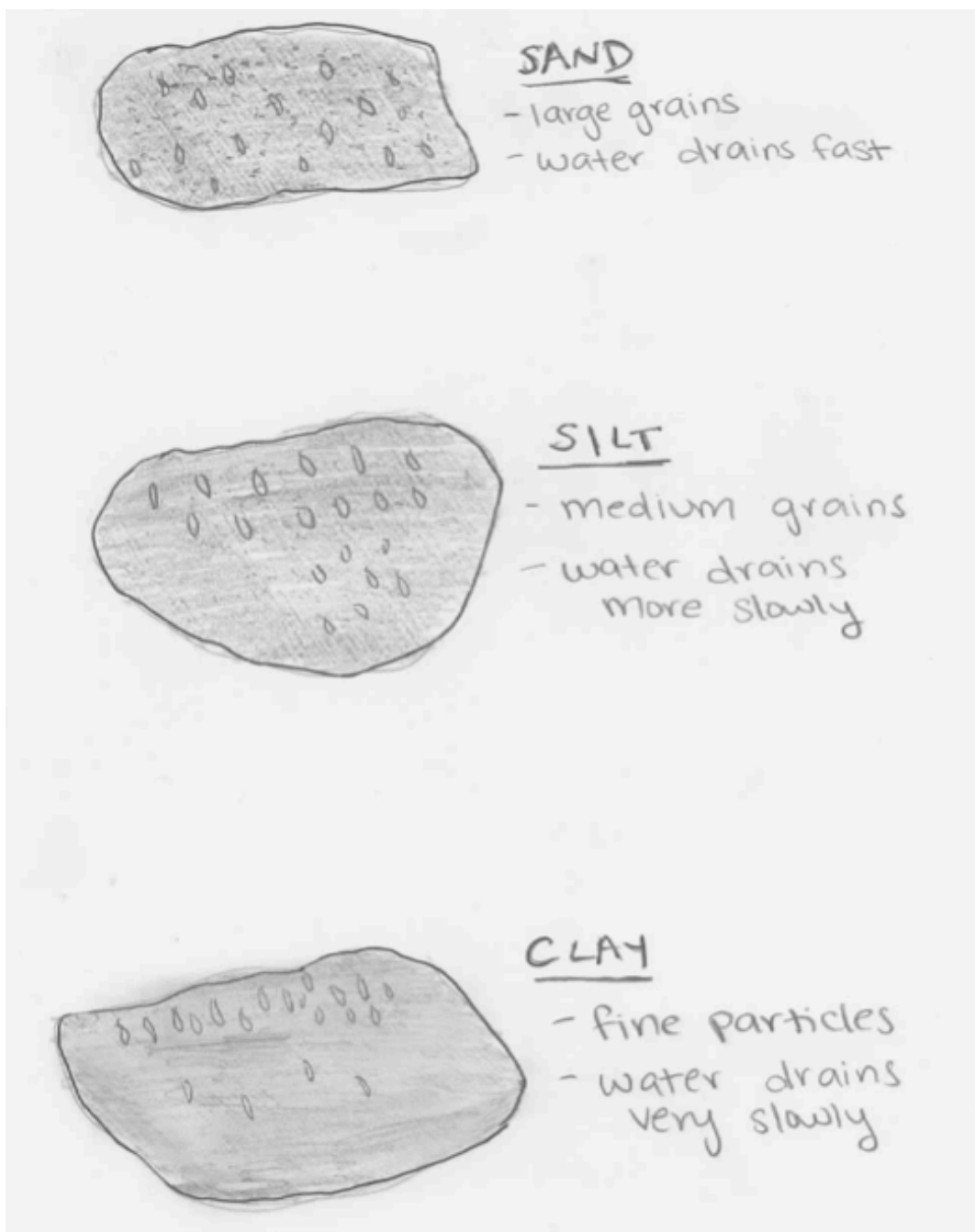
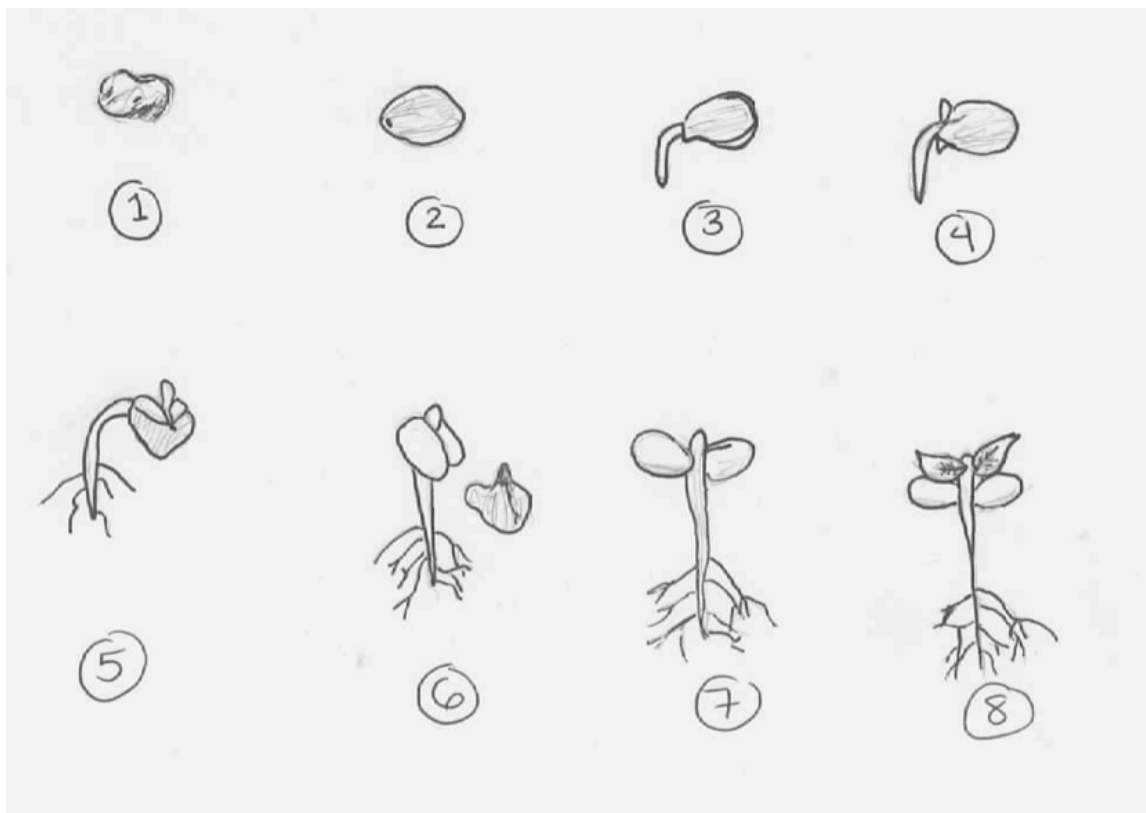


Figure 2¹⁷⁴

¹⁷⁴ Food and Agriculture Organization of the United Nations, *Setting Up and Running a School Garden- Toolkit* (Rome, Italy: FAO, 2009), Lessons SET A 4 Guide B.

Germination

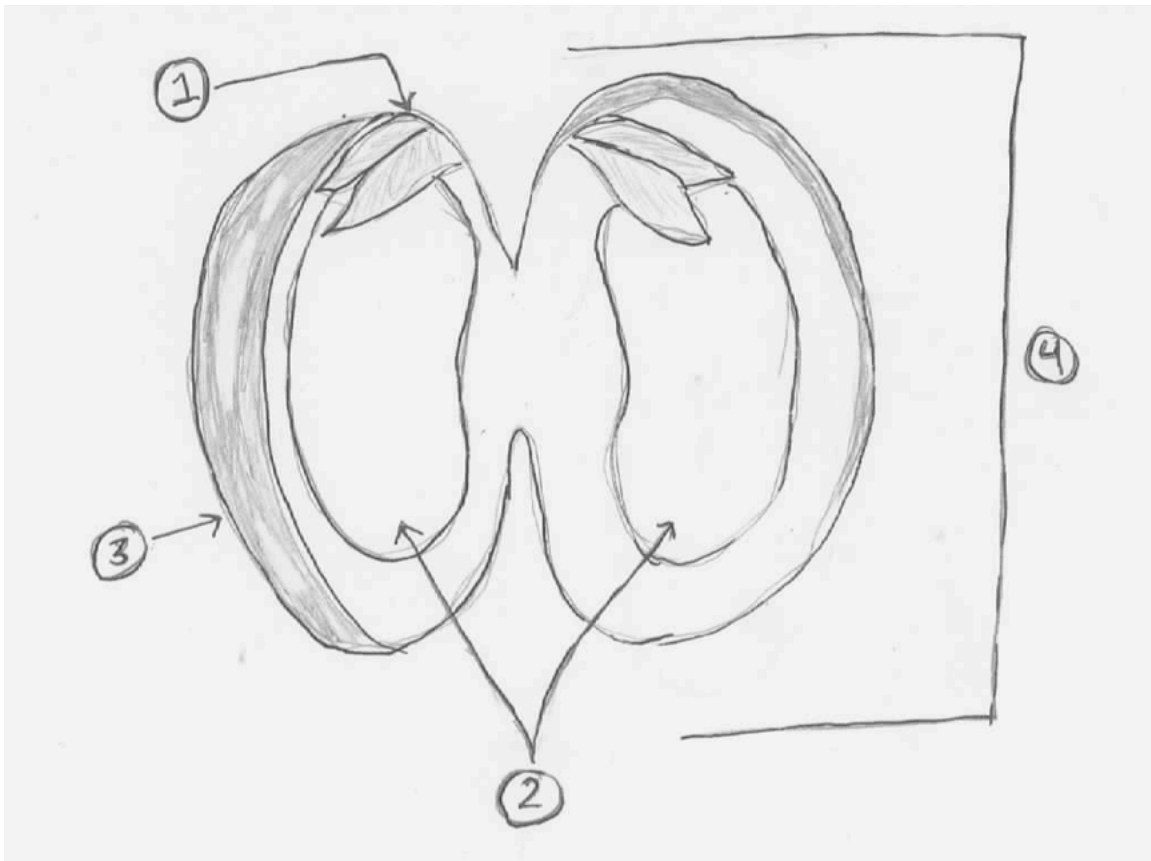


1. The seed is damp.
2. It absorbs water and swells.
3. A root begins to grow.
4. The stem begins to come out.
5. The stem lifts up the seed. Side roots grow.
6. The seed coat slips off. Root and stem grow.
7. The seed leaves come out (cotyledons). They open to catch the light.
8. Real leaves appear.

Figure 3¹⁷⁵

¹⁷⁵ Food and Agriculture Organization of the United Nations, *Setting Up and Running a School Garden- Toolkit* (Rome, Italy: FAO, 2009), Lessons SET A 5 Guide B.

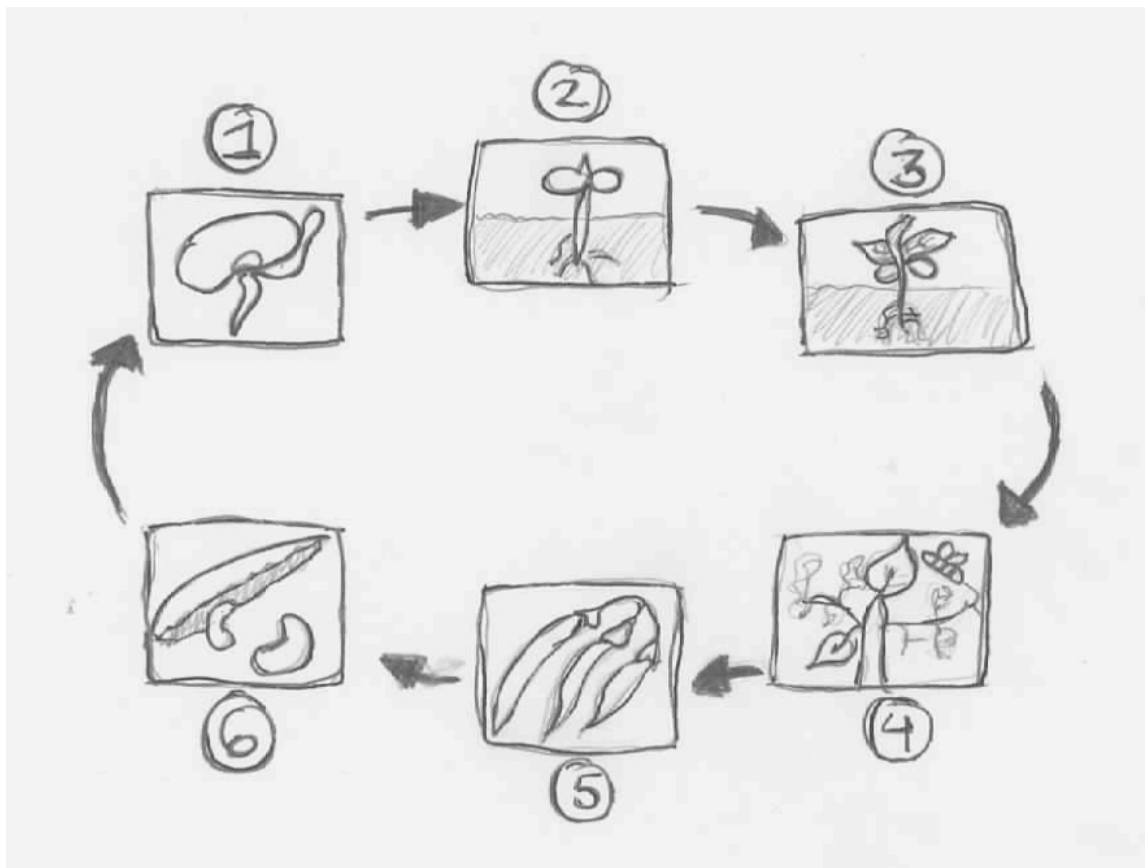
The Parts of a Seed



1. Epicotyl
2. Two cotyledons
3. Seed Coat
4. Embryo

Figure 4

Plant Life Cycle



1. The seed germinates
2. The seedling emerges
3. The plant grows deeper roots, more leaves
4. The plant has flowers
5. Fruit forms
6. Seeds grow and fall

Figure 5¹⁷⁶

¹⁷⁶ Food and Agriculture Organization of the United Nations, *Setting Up and Running a School Garden- Toolkit* (Rome, Italy: FAO, 2009), Lessons SET A 6 Guide A.

Trace the French Fry Quote Sheets—A

Use these quotes to develop your food system map by deciding what role each of these people plays in the food system.

Betty Fryface

"I love the Silver Arches' french fries! They taste great, they're cheap and I can super-size it for a quarter."

Jose Cuttemup, Chief Food Engineer, Silver Arches' St. Louis Facility

"Because we control our product all the way through, from raw potatoes to french fries, we can be more profitable. We pay very little for our potatoes and monitor each step along the way from soil to french fry to make sure our fries are perfect and bruise-free. That way, we can charge less to the consumer and still make a profit."

Isabelle McDiesel, Head Trucker, Silver Arches, Trucking Fleet

"It may sound crazy to buy potatoes from Idaho to sell in Boston; but it works. One company produces all of our potatoes; and, that way, we can control the product. We can't have any bruises or imperfections on the potatoes, or else our french fries won't be absolutely perfect. Heck, we're the largest buyer of beef and potatoes in the United States! We gotta buy from the big guys, and for cheap!"

Gene Maker, President of the new Life Sciences Company

"With our new, genetically engineered potatoes, farmers will spray less pesticide and will be able to produce more food to feed the growing world population."

Joe Teenager, Cashier, Boston, MA

"Welcome to the Silver Arches. May I take your order?"

Danny Forsyth, conventional Idaho potato farmer

"None of us would use [agricultural chemicals] if we had any choice. Monitor [an organophosphate used to control aphids, which transmit a virus causing necrosis, a cosmetic defect causing black spotting] is a deadly chemical. I won't go into a field for four or five days after it's been sprayed—even to fix a broken pivot."¹⁷⁷

¹⁷⁷ Sara Coblyn, *French Fries and the Food System* (Massachusetts: The Food Project, Inc. 2008), 154. Copyrighted material of The Food Project. Used with permission.

Trace the French Fry Quotes—B

Use these quotes to develop your food system map by deciding what role each of these people plays in the food system.

Bob Smartfood

"As a member-owned cooperative natural foods market, we are committed to supporting local, organic agriculture. We pay farmers more than the average supermarket because our overhead and advertising costs are less. In the conventional model, the farmer gets 7.8 cents per pound for growing the potato. In the supermarket, the consumer pays around 49 cents per pound for potatoes and \$3.88 for packaged mashed potatoes. At the Silver Arches, the consumer pays \$5.80 per pound for the french fries, and the farmer is still getting that 7.8 cents per pound. We give our farmers a fair price for the food, and we charge more than 49 cents a pound to consumers because it is organic and produced in a healthier manner."

Alice Chalmers, Suburban Landscapers, Inc.

"My business collects 50 tons of leaf waste and lawn clippings every year. In the past we had to pay to unload it at the city dump. Now Chris's farm takes it for a lot less and uses it to make compost fertilizer."

Emily Granola

"I shop at the co-op because I'm into organics—good for the body, good for the soul, good for the earth."

Chris Young, Community Supported Agriculture Farm

"As an organic farmer I have spent a lot of time building my farm as an ecosystem. The goal is to not buy many inputs like chemicals or pesticides but to build the farm system. I use cover crops and compost instead of chemical fertilizers, and I plant strips of flowers to attract beneficial insects. I don't always use organic pesticides like Bt, but I worry that I won't have the option to use it because of genetic engineering. Also, our farm is doing \$20,000 to the acre, \$10,000 more than the typical Massachusetts vegetable farm. We could even do more because we plant intensively and manage our soil fertility without those inputs. We direct market right to our customers, so more of the value of our produce comes directly back to us instead of going to the middlemen."

Martha Field, Shareholder

"I like being able to see how my food is grown and knowing the farmers who are growing it. I am also receiving the freshest produce possible. It was picked fresh that morning, meaning more nutrition for me and my family."

¹⁷⁸ Sara Coblyn, *French Fries and the Food System* (Massachusetts: The Food Project, Inc. 2008), 155. Copyrighted material of The Food Project. Used with permission.

Trace the French Fry Background Information

Understanding the complex path of our food as it leaves the farm and arrives on our table can be a confusing but very important concept. With the increasing amount of consumer awareness about organic food and biotechnology, exploring these issues is quite timely. Here are some definitions that will provide background for this lesson and resources to find more information.

Food System: "A food system involves the functions of production, processing, transportation, storage, marketing, preparation, consumption, disposal and decomposition. It can be visualized by imagining all the steps necessary for bringing food from the land or sea to the table and back to the land (or sea)."³

Community Food System: There are several words being used to describe an alternative to the current national and global food system. Community, local, regional and sustainable food systems all refer to similar concepts. In the study, "Growing a Community Food System," Steven Garret and Gail Feenstra define a community food system as one "in which sustainable food production, processing, distribution and consumption are integrated to enhance the environmental, economic, and social and nutritional health of a particular place."⁴ These regional, community food systems are being developed as a response to industrialized agriculture, driven by agribusiness (large corporate food producers), and its impact on the environment, family farms, consumers, food safety and the quality of life in rural communities. For consistency's sake, in this curriculum we refer to this alternative food system as a sustainable food system.

Conventional Agriculture: Since the end of World War II, there have been dramatic changes in agriculture. "Food and fiber productivity soared due to new technologies, mechanization, increased chemical use, specialization and government policies that favored maximizing production. These changes allowed fewer farmers with reduced labor demands to produce the majority of the food and fiber in the U.S."⁵ This trend is often identified as the industrialization of agriculture, a process by which fewer and much larger farmers are producing the majority of our food, and corporations and multinational firms are controlling production operations. Government subsidies for large-scale food production continue to make it hard for small producers to survive. For example, less than 20% of the largest farms (\$1 million or more in sales) in the U.S. are responsible for over 80% of total production. Less than 4% of the largest farms produce 66% of vegetables, sweet corn and melons.⁶ These farms, with their subsidies and poor farming practices, are putting the small, family farmer out of business.

¹⁷⁹ Sara Coblyn, *French Fries and the Food System* (Massachusetts: The Food Project, Inc. 2008), 156. Copyrighted material of The Food Project. Used with permission.



Organic Agriculture: In the past two decades, a growing movement has been questioning the impact of conventional agricultural methods. Topsoil depletion, groundwater contamination, the decline of family farms and rural communities, poor labor conditions on farms, and increased costs of production due to capital intensive methods have all been linked to conventional agriculture. The recent surge of interest in organic and sustainable agriculture has been a response to find more socially and environmentally beneficial ways of growing food.

The Organic Trade Association defines the term *organic* according to the national organic standards definition passed in 1995: "Organic agriculture is an ecological production management system that promotes and enhances biodiversity, biological cycles and biological activity. It is based on minimal use of off-farm inputs and on management practices that restore, maintain and enhance ecological harmony."⁷ As a more simplistic definition for your students, *organic* can also be defined as a production practice using very little, if any, synthetic chemicals. (This includes chemical fertilizers, herbicides, pesticides and insecticides.) Alternatives include using organic fertilizers, compost, and cover crops for fertility and using beneficial insects, physical barriers and companion planting to manage insect populations.

Sustainable Agriculture: "Sustainable agriculture integrates three main goals—environmental health, economic profitability, and social and economic equity."⁸ It is a method of agriculture where the farmer must think about the long-term implications of his or her farm practices and make choices based on the interactions of the whole farm ecosystem, including plants, animals, insects and soil life. This may include such techniques as crop rotations, in which several crops are grown and moved around the farm from year to year to avoid taking the same nutrients out of the soil and to avoid breeding certain types of insects. These farm practices must also be balanced with profit, the needs of the community and the consumer. There are no standards for sustainable agriculture like there are for organic agriculture; therefore, the labeling of a farm as sustainable is still a matter of opinion among working farmers and professionals.

¹⁸⁰ Sara Coblyn, *French Fries and the Food System* (Massachusetts: The Food Project, Inc. 2008), 157. Copyrighted material of The Food Project. Used with permission.

Community Supported Agriculture (CSA): CSA is a growing model of direct marketing currently utilized by many organic farms and an increasing number of small non-organic farms. In this model consumers buy shares in the farm in the beginning of the season or as part of a payment plan decided upon by the farmer. Shareholders receive a quantity of vegetables each week by going out to the farm for a pickup or at designated drop-off sites in their area. A full share is usually a healthy amount of vegetables for a family of four, and smaller shares are usually available as well. Some of the farms give shareholders the option to pick their own set of vegetables, which usually includes crops like string beans, cherry tomatoes and flowers. The CSA model is a form of direct marketing to the consumer and is economically viable for the farmer because it cuts out the middleman (distributor or wholesaler) and therefore allows the farmer to receive the full value that his or her produce is worth. CSA also provides consumers with the freshest vegetables possible and, in some arrangements, the opportunity to visit and work on the farm.

Trace the French Fry Discussion

Use the above information to help your students begin their introduction to the food system and the trend towards a more sustainable, regional system based on organic agriculture. The central issue in this lesson is the difference between these two parallel food systems. It is important to note that the sustainable food system map is only one example of a more localized system based on smaller farms. It is not the only alternative. Try brainstorming additional alternatives. Maybe the farmer is selling produce at a local farmers' market or to a local supermarket. Does the producer in this system need to be an organic producer? It is possible to make up a regional food system from a variety of small producers, some of whom are certified organic and others who are making the transition to organic. The more important issue to present is the size and control of the producers. In the conventional model, they are represented by large, corporate-owned farms that are out-competing the family farmer. Often, the differences between the two food systems focus solely on organic versus conventional, and this is a misrepresentation.

¹⁸¹ Sara Coblyn, *French Fries and the Food System* (Massachusetts: The Food Project, Inc. 2008), 158. Copyrighted material of The Food Project. Used with permission.

Additional Background

"Like many farmers today, the ones I met feel trapped by the chemical inputs required to extract the high yields they must achieve in order to pay for the chemical inputs they need. The economics are daunting: a potato farmer in south-central Idaho will spend roughly \$1,965 an acre (mainly on chemicals, electricity, water and seed) to grow a crop that, in a good year, will earn him maybe \$1,980. That's how much a french fry processor will pay for the 20 tons of potatoes a single Idaho acre can yield. (The real money in agriculture—90 percent of the value added to the food we eat—is in selling inputs to farmers and then processing their crops.)"¹⁸²

This is related to Bob Smartfood's quote on the difference between what the farmer gets for the product and what is paid in the end. The processing sector in between is the one that takes a majority of the product. When a corporation controls all of the steps between the farmer and the consumer, or all of the food system for that one product, the corporation benefits, not the farmer or consumer.

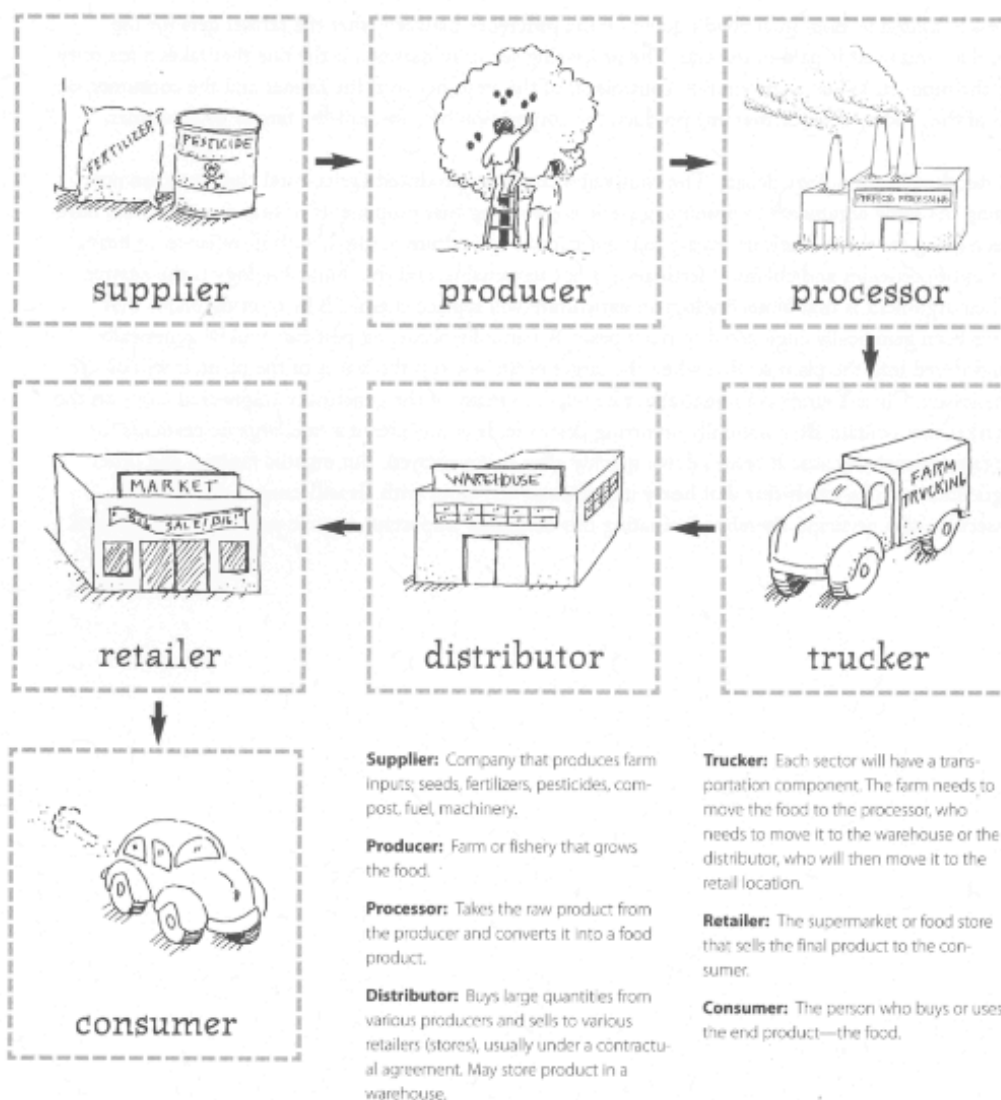
Enter the biotechnology debate. The companies that have produced agricultural chemicals are now using the same arguments to promote genetic engineering that proponents of organic agriculture have been using for years. They are saying that our current agriculture method, with its reliance on heavy doses of pesticides and chemical fertilizers, is not sustainable, and that biotechnology is the answer. Their argument is that biotechnology in agriculture will replace chemicals by offering plants that have been genetically engineered to resist pests. A naturally occurring pesticide will be genetically engineered into the plant so that when the target pest chews on the leaves of the plant, it will die. In the lesson, Chris Young's comment about Bt refers to many of the genetically engineered crops on the market that contain Bt, a naturally occurring pesticide. It is considered a safe, organic pesticide for organic farmers because it breaks down quickly after being sprayed. But organic farmers and other agriculture professionals fear that heavy use of these GE crops with Bt will cause a resistance in insects to this pesticide, thereby eliminating this extremely important organic pest management tool.

¹⁸² Sara Coblyn, *French Fries and the Food System* (Massachusetts: The Food Project, Inc. 2008), 159. Copyrighted material of The Food Project. Used with permission.

Food System Structure

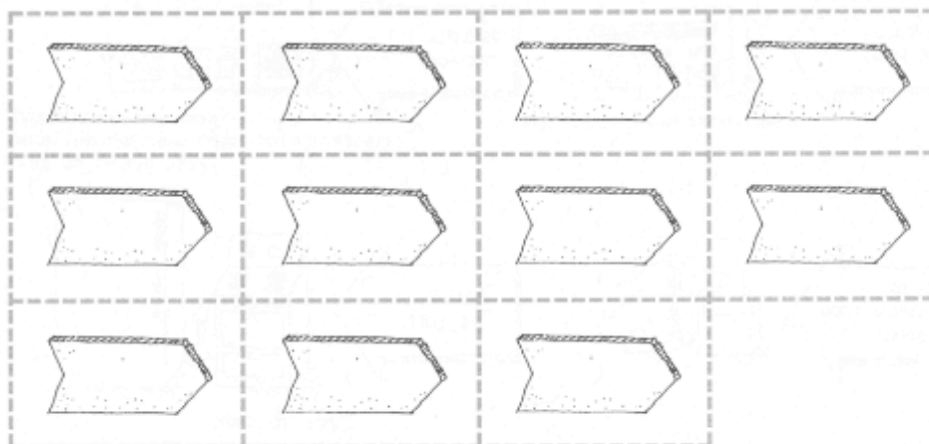
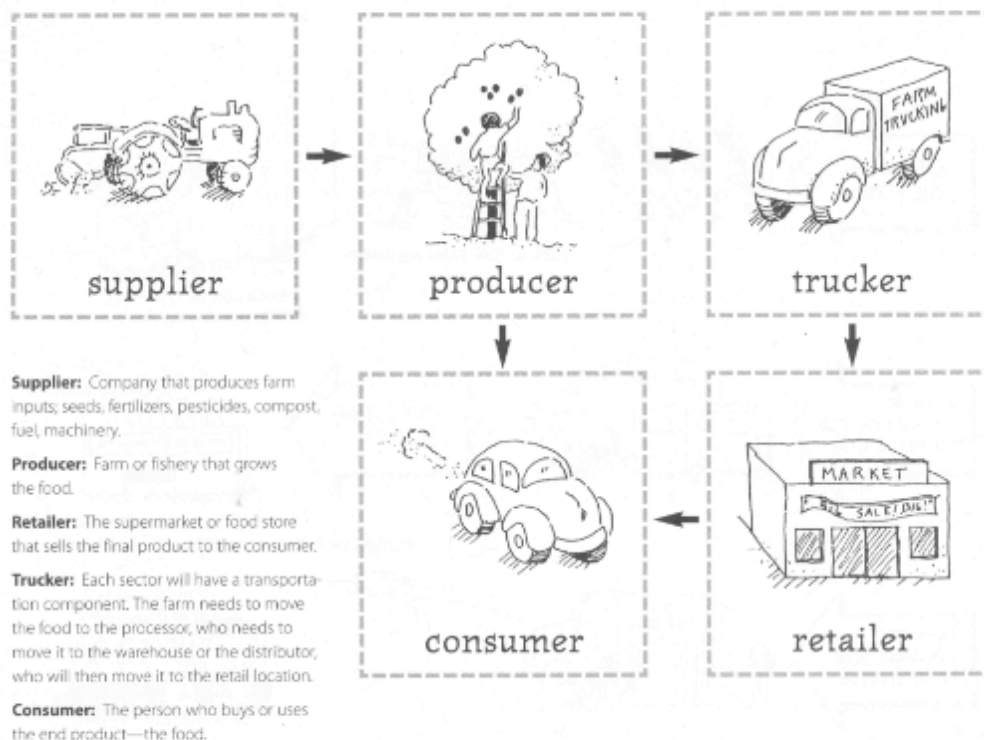
Use the map below as a guide when constructing food system maps. A brief description of each sector precedes it.

CONVENTIONAL



¹⁸³ Sara Cobllyn, *French Fries and the Food System* (Massachusetts: The Food Project, Inc. 2008), 160. Copyrighted material of The Food Project. Used with permission.

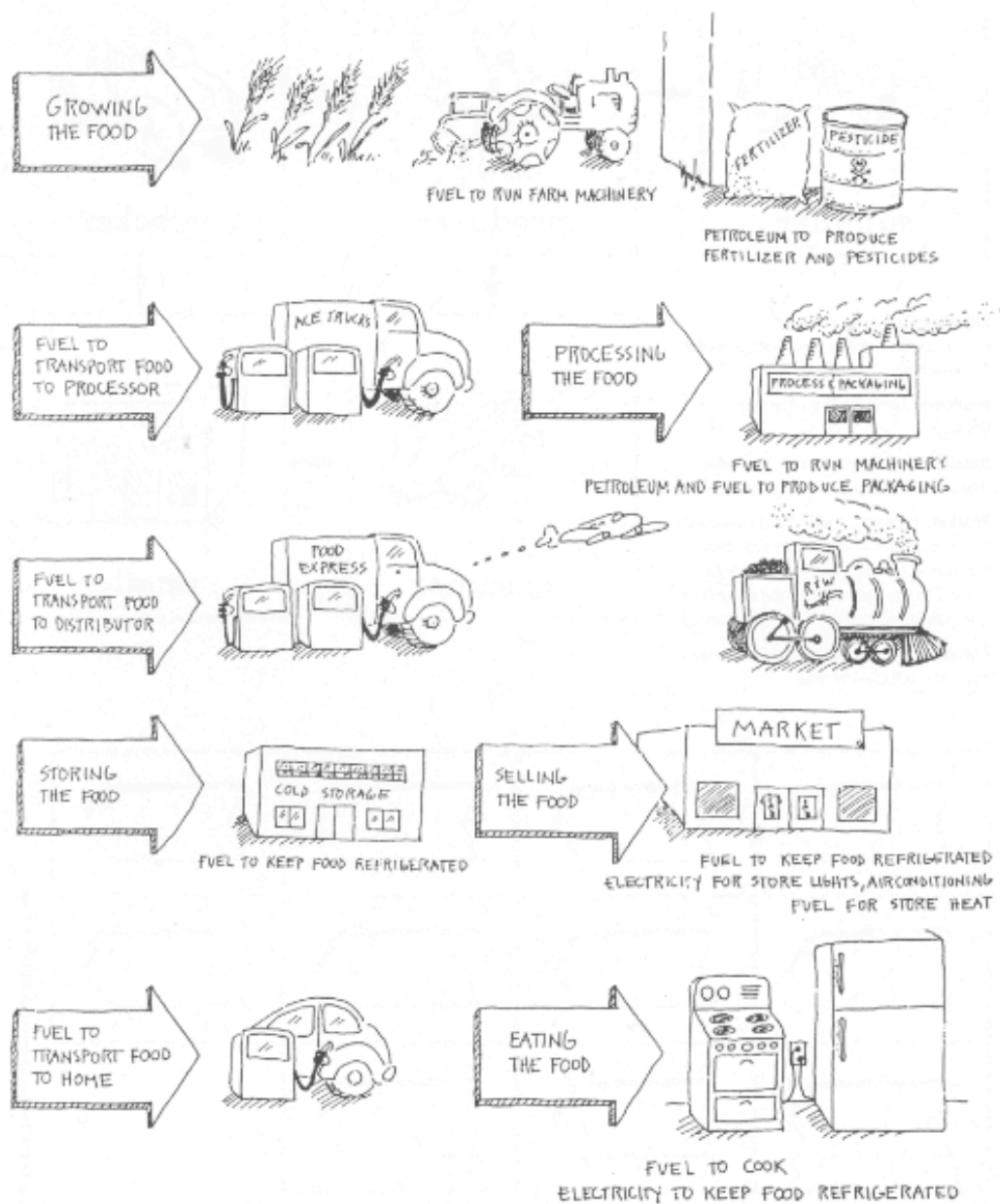
LOCAL



Use these arrows to construct the food maps.








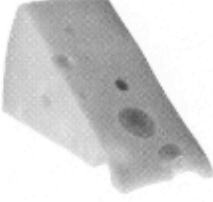
¹⁸⁴ Sara Coblyn, *French Fries and the Food System* (Massachusetts: The Food Project, Inc. 2008), 161. Copyrighted material of The Food Project. Used with permission.

Energy Used in Producing Food

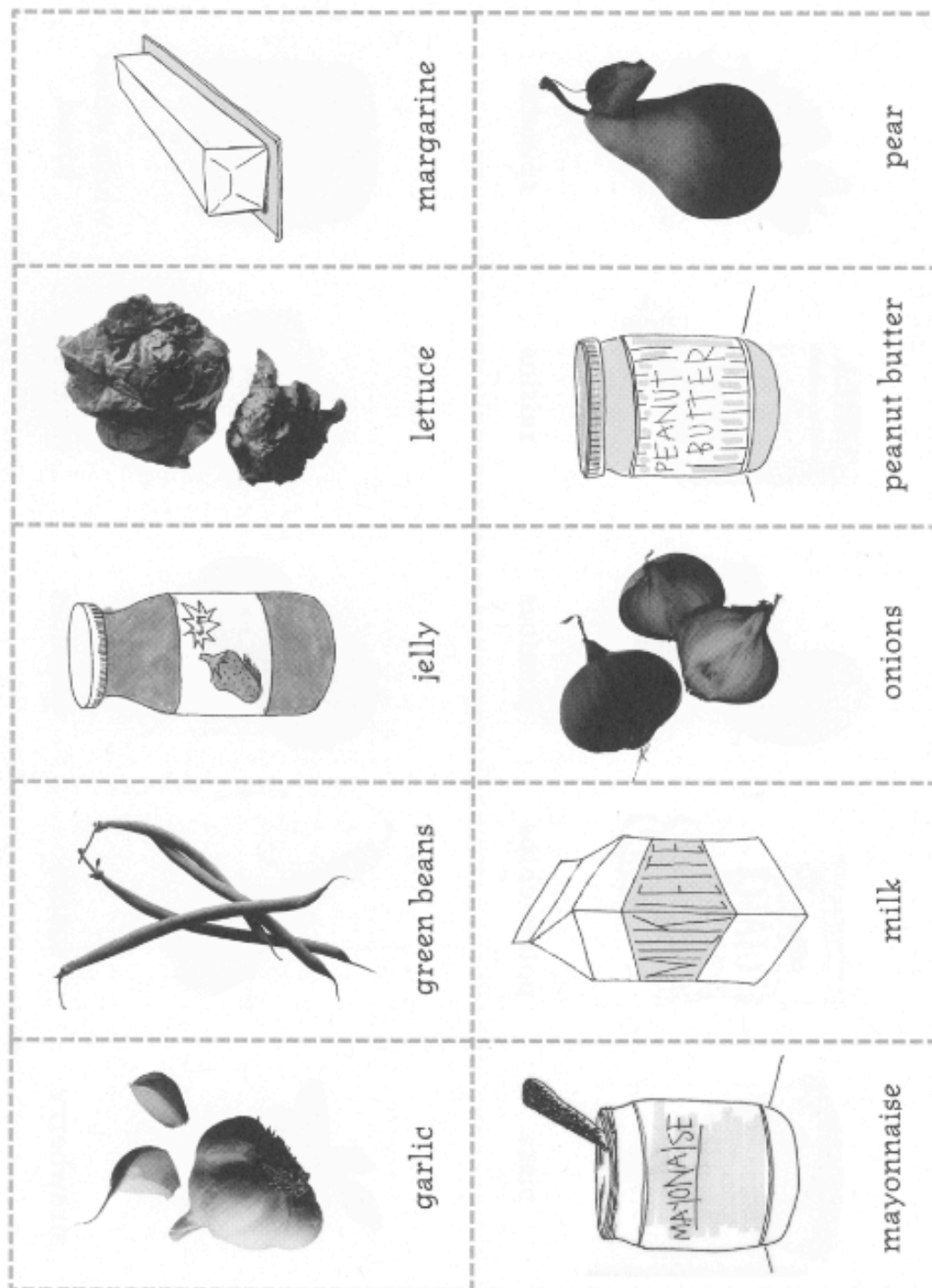


¹⁸⁵ Sara Cobllyn, *French Fries and the Food System* (Massachusetts: The Food Project, Inc. 2008), 162. Copyrighted material of The Food Project. Used with permission.

Pesticide Banquet Food Cards

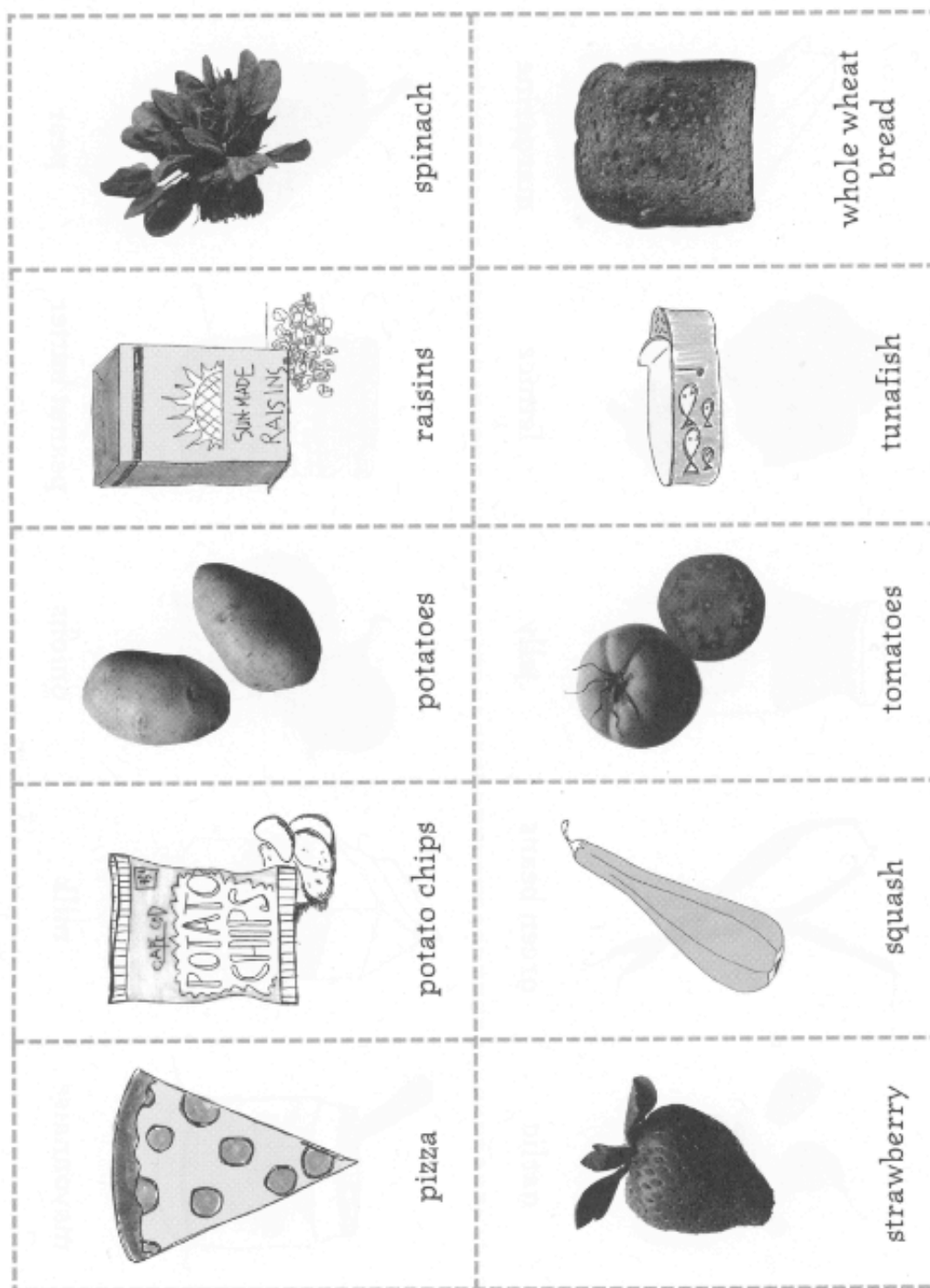
| | | | |
|---|-------------|--|----------------|
|  | carrots |  | eggplant |
|  | broccoli |  | dill pickle |
|  | bell pepper |  | corn |
|  | apple |  | collard greens |
|  | apple juice |  | cheese |

¹⁸⁶ Sara Cobllyn, *French Fries and the Food System* (Massachusetts: The Food Project, Inc. 2008), 208. Copyrighted material of The Food Project. Used with permission.



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¹⁸⁷ Sara Cobllyn, *French Fries and the Food System* (Massachusetts: The Food Project, Inc. 2008), 209. Copyrighted material of The Food Project. Used with permission.



¹⁸⁸ Sara Cobllyn, *French Fries and the Food System* (Massachusetts: The Food Project, Inc. 2008), 210. Copyrighted material of The Food Project. Used with permission.

Pesticide Residue Worksheet

| FOOD ITEM | RESIDUE | QUANTITY | TOTAL |
|-------------------|---------|----------|-------|
| apple juice | 25 | | |
| apple | 75 | | |
| bell pepper | 75 | | |
| broccoli | 50 | | |
| carrots | 20 | | |
| cheese | 100 | | |
| collard greens | 75 | | |
| corn | 25 | | |
| dill pickle | 75 | | |
| eggplant | 50 | | |
| garlic | 25 | | |
| green beans | 25 | | |
| jelly | 25 | | |
| lettuce | 25 | | |
| margarine | 25 | | |
| mayonnaise | 25 | | |
| milk | 25 | | |
| onions | 75 | | |
| peanut butter | 200 | | |
| pear | 75 | | |
| pizza | 75 | | |
| potato chips | 50 | | |
| potatoes | 100 | | |
| raisins | 100 | | |
| spinach | 100 | | |
| strawberry | 75 | | |
| squash | 75 | | |
| tomatoes | 50 | | |
| tunafish | 25 | | |
| whole wheat bread | 50 | | |
| TOTAL | | | |

¹⁸⁹ Sara Coblyn, *French Fries and the Food System* (Massachusetts: The Food Project, Inc. 2008), 211. Copyrighted material of The Food Project. Used with permission.

The Pesticide Cycle

The Health Risks of Inappropriate or Unnecessary Use of Pesticides

Many pesticides and fertilizers kill soil-borne organisms, leaving the land dead. These organisms are essential in a garden or farm ecosystem, because they break down organic matter and produce rich, fertile soil.

"To the eighty-nine percent of Illinois that is farmland, an estimated fifty-four million pounds of synthetic pesticides are applied each year." Steingraber, Sandra. "Living downstream," p. 65-69, 73-75. Orion, Summer, 1997.

"Pesticides have not lowered crop losses. Losses due to insects have gone from 7% of the total harvest in 1940 to 13% in 1980." Steingraber, Sandra. "Living downstream," p. 65-69, 73-75. Orion, Summer, 1997.

Pesticides contaminate the air that we breathe, when it blows in the wind and drifts off the farm during applications.

"Over 100 million Americans breathe air that according to air quality standards in the clean Air Act is officially illegal." Steingraber, Sandra. "Living downstream," p. 65-69, 73-75. Orion, Summer, 1997.

When pesticides enter the water cycle, they fall in the form of rain.

"In twenty-three states, raindrops contain herbicides known as triazines, which have been linked to breast and ovarian cancer in animals and in some human studies." Steingraber, Sandra. "Living downstream," p. 65-69, 73-75. Orion, Summer, 1997.

Insects are exposed to chemicals during pesticide and fertilizer application. Chemicals are absorbed through the insects soft tissue and can be ingested by the insect when they eat parts of a plant that have been treated with chemicals.

Unfortunately chemical pesticides often kill beneficial insects that are important for healthy gardens; "beneficial" are insects that pollinate our crops and eat pests that damage our gardens.

"Of the pesticides used in agriculture, only .01% routinely reaches the target pest; the other 99.9% goes into the general environment." Steingraber, Sandra. "Living downstream," p. 65-69, 73-75. Orion, Summer, 1997.

"Our widespread use of pesticides has created 535 known species of pesticide-resistant insects, 273 known herbicide-resistant weeds, and 210 fungicide-resistant plant diseases. The continued use of one chemical after another has created what insect experts call, the Pesticide Treadmill." Steingraber, Sandra. "Living downstream," p. 65-69, 73-75. Orion, Summer, 1997.

Birds are affected when they eat plants and berries or inhale drift from pesticide applications.

"Each year more than 67 million birds are killed by pesticides applied to US farmland." Burne, Joel. "The Organic Revolution," Audubon, March-April 1999, p. 66.

¹⁹⁰ Sara Cobllyn, *French Fries and the Food System* (Massachusetts: The Food Project, Inc. 2008), 212. Copyrighted material of The Food Project. Used with permission.