2016

From Their Home to Ours: Establishing Environmental and Health Literacy via Urban Gardening for At-Risk Youth

Tiffany B. Hunter
Wright State University

From their Home to Ours: Establishing Environmental and Health Literacy via Urban Gardening for At-Risk Youth

Tiffany B. Hunter, MA

Wright State University, 2016

Acknowledgements

To my mother and father, whose determination and devotion to serving others has made me who I am today. I love you both.

To the Levin Family Foundation.

Table of Contents

Abstract

The Global Health concentration of the Master of Public Health highly encourages its students to participate in efforts which promote health and prevent disease either for a cultural group abroad or with a local disparate group (e.g. first-generation immigrants, established minority groups). The current research aimed to develop a similar model of community engagement and health promotion within an urban setting as witnessed in a developing country.

During an internship with Israel's Ministry of Health, I witnessed a successful community garden and environmental education program designed for children whom reside in an Arab village. Much like the Israeli Arab community abroad, Black Americans are the minority whom suffer similar health consequences due to food insecurity (e.g. food deserts), high energy-dense food options (including an abundance of fast food restaurants and small convenience stores) and poor health literacy. The goal of the current research was to develop a community garden and environmental literacy program for an urban, minority-concentrated school population within Dayton, Ohio similar to the in Baqa El-Gharbiya, Israel. A pilot study was administered during July 2016 which applied lesson plans from an eight-week curriculum. The pilot study was administered at a local foodbank with a pre-existing urban garden and the participants lived in urban, low income areas. Results demonstrated that the participants have poor eating habits and low literacy scores but the program enhanced learning and understanding of the world around them.

Keywords: urban sustainability, bi-directionality, environmental literacy, non-western health, public health, eating habits, African American

Part I: From their Home to Ours

From their Home to Ours: Establishing Environmental and Health Literacy via Urban Gardening for At-Risk Youth

According to the U.S. Census Bureau (2016), the population within the United States consists of over 3.23 million people. As of 2015, adulthood obesity affects nearly one-fourth of Americans (78.6 million, or 24.2%), with the highest rates of obesity[1] found in Black Americans (47.8%), followed by Hispanics (42.5%), non-Hispanic Whites (32.6%), and Asians (10.8%) (Centers for Disease Control and Prevention [CDC], 2015a). Overweight in adults is defined as a body mass index (BMI) of 25.0-29.9 and obesity in adults is defined as a BMI of 30.0 or greater (CDC, 2015b). Health comorbidities associated with obesity in adults are largely preventable and include heart disease, stroke, type two diabetes, and cancer (CDC, 2015a). Upstream determinants such as education and socioeconomic status serve as important factors in determining the prevalence of obesity among minorities[2]. For example, there is a negative relationship between income and obesity rate for males, where males with higher income are more likely to be obese, but level of education does not play a role in rates of obesity (while holding income constant) (Ogden, Lamb, Carroll, & Flegal, 2010; CDC, 2015a). On the other hand, there is a positive relationship between obesity and income for Black females: the lower the income, the higher the prevalence of obesity. Unlike their male counterparts, level of educational attainment serves as a protective factor for Black females (Ogden et al., 2010; CDC, 2015a).

Obesity in children and adolescents (up to the age of 18 years) is defined as a BMI at or above the 95th percentile for individuals of the same age and sex (CDC, 2015c). Obesity in

[1] While adjusting for age.
[2] For the purposes of the current study, the term “minority” specifically includes Black Americans of non-Hispanic descent.

children[3] and adolescents has respectively doubled and quadrupled over the last 30 years in the United States (in 2012, 7.0% vs. 18.0% and 5.0% vs. 21.0%) (Ogden, Carroll, Kit, & Flegal, 2014; CDC, 2015c). Some factors related to the increase in incidences of childhood and adolescent obesity include dietary patterns, genetics, physical inactivity, high calorie-dense foods, limited access to healthy food options, parents' education, and a lack of a feeling of safety within their local environment (CDC, 2015e). Moreover, rates of obesity disproportionately affect Hispanic (22.4%) and Black American (20.2%) children (CDC, 2015f) and rates of obesity for children in large rural areas (34.6%) is higher than children living in urban (30.9%) areas (U.S. Department of Health and Human Services, 2010). However, in the following paragraphs, a different ethnic group's disparities are utilized in exemplifying the possible changes for minority children on a more local level.

During the summer of 2015, I held an internship with Israel's Ministry of Health under the supervision of Ms. Liora Goldman. This internship was designed to demonstrate different aspects of a state-wide centralized public health department and the programs established under their sectors, including mental health, maternal and infant care, and food and nutrition. A particularly fascinating site visitation that became the inspiration for my culminating experience took place at a kindergarten in the Arab village of Baqa El-Gharbiya. This particular kindergarten, featured in Figure 1, was developed to meet the local needs of the growing Arab population and sought to establish the foundations of environmental and health literacy for young children (ages 4 to 6 years) through the use of gardening. To enhance the hands-on learning experience for these young children, the brightly-colored kindergarten was situated around multiple raised garden beds, a hydroponic gardening system, and recycled materials (e.g.

[3] According to the CDC (2015d), children are grouped between the ages of 6-11 years, and adolescents are between the ages of 12-19 years.

tires, liter-sized plastic bottles) utilized for the purposes of sustainable resourcing (see Appendix A).

Figure 1. Community garden kindergarten in Baqa El-Gharbiya, an Arab village in Israel. Photo taken by author.

Arabs make up an estimated 20.7% (1.7 million) of the Israeli population, with a population growth of 2.2% compared to the 1.7% growth of the Jewish population (American-Israeli Cooperative Enterprise, 2016). The largest population of Arabs in Israel is located in Nazareth, where Arabs make up nearly 60% of the population within the metropolitan area (Ram, Marcus, Joubran, Abdo, & Asal, 2013). The Arab population in Israel is very diverse in their religious affiliations (e.g. Muslim, Christian, Druze), living accommodations (e.g. agricultural, urban, nomadic), dialectical language(s), even social status. However, many Arabs share genetic disparities for conditions like heart disease, diabetes, and hypertension. They also share a strong comorbidity to a higher likelihood of overweight and obesity when compared to Israeli Jews (Kaluski & Berry, 2005; Kalter-Leibovici et al., 2007; Ram et al., 2013). Specifically, Israeli Arabs are at high risk for obesity-related illnesses and causes of death, including type two diabetes, stroke, and cardiovascular diseases, especially among women

(Kalter-Leibovici et al., 2007). Such health disparities become more prevalent among Israeli Arabs during middle adulthood (during their 30s and 40s) and their risk of obesity-related morbidities and mortalities steadily increases over their lifetime (Kalter-Leibovici et al., 2007).

Obesity statistics among Israeli Arab adults indicate that Arab women have the highest rates for obesity (41.0% compared to 22.0% Jewish women), but Arab men share similar rates of obesity with their Jewish male counterparts (22.0% vs. 19.0%, respectively) (Myers-JDC-Brookdale Institute, 2012). Since overall obesity trends for Israeli Arabs are difficult to ascertain at present, deductive knowledge draws parallels through similarities in structural discrimination lends assistance to understanding the risk and prevalence of obesity among Israeli Arabs. According to Rosenblum (2014), the rate of obesity and overweight shares a negative relationship with level of education; the higher the level of education attained by individuals, the lower the rate of obesity and overweight. Moreover, lower levels of education are related to higher rates of unemployment (Kalter-Leibovici et al., 2007). According to Leibovitz (2014), an average of approximately 32% of Arabs Israelis drop out of high school and only 9.8% are found in the population of institutions for higher learning (i.e., universities). This is compared to an 8.0% high school dropout rate for Israeli Jews and a 53.0% rate of higher education continuation (Leibovitz, 2014). As exemplified in Table 1, data from Myers-JDC-Brookdale Institute (2012) indicates that 73.0% of Arab Israeli women received between 12 years or less of education and 27.0% obtained at least 13 years of education; for Arab Israeli men, 75.0% received between 12 years or less of education and 25.0% obtained at least 13 years of education.

Table 1

Educational Attainment of Arab Israelis and Jewish Israelis, by Gender

	Arab Israelis		Jewish Israelis	
Education	**Women**	**Men**	**Women**	**Men**
0-12 years	73.0%	75.0%	42.0%	48.0%
13+ years	27.0%	25.0%	58.0%	52.0%

Given the low rate of higher education and higher dropout rate among Israeli-Arabs (both male and female), their rates of employment are significantly lower than the total population[4] (25.0% vs. 64.0%) (Myers-JDC-Brookdale Institute, 2012). Moreover, those that choose not to serve in the Israeli Defense Force[5] (IDF) have blunted opportunities to advance economically and socially; thus, many Arabs are forced to work in lower-paying jobs to make ends meet. This statement is further supported by the rates of poverty in Israel among Israeli Arabs: as of 2010, 53.0% (163,600) of Arab families are at or below the poverty line, with 66.0% of Arab children at or below the poverty line (Myers-JDC-Brookdale Institute, 2012). More specifically, Arab Israelis make between 40 to 60% less than Israeli Jews, at an average of 44 Israeli New Shekel (NIS) (or $11.67) per hour, compared to 29 NIS (or $7.69) per hour (Shemer, 2011). Lastly, Arab Israeli families are generally larger than their Jewish counterparts, with 11.0% of Arab Israeli families having five or more children compared to 3.0% of Jewish families. Therefore, the combination of high unemployment/underemployment, lower levels of education, and larger

[4] Employment rate is dependent upon years of education obtained, with fewer years of education resulting in lower rates of employment.

[5] Arab Muslims, who make up 82.0% of the Arab population living in Israel (Myers-JDC-Brookdale Institute, 2012), are given the opportunity to opt-out of a mandatory four-year service commitment in the IDF.

family sizes in Arab-Israelis create larger economic gaps and therefore, a greater demand on cheaper food sources, lower rates of health literacy, and a greater toll on individual health.

To preface the parameters of the current topic, two subjects must first be briefly introduced: 1) the size of Israel is comparable to the state of New Jersey – it is a very small, yet developed country despite its large income gaps; and 2) the Arab population in Israel, especially the Arab Muslim population, is a culturally and economically disparate group, much like Black Americans. During my experiences abroad in Israel, I observed racial disparities and their impact on a minority group which is not of my own. Through that experience, I was able to observe how social hierarchies operate based on structural segregation and the hardships which follow, in both health and economics. It is through my experience that I felt a selfish, yet brief, relief from the social pressures of being a Black female in the United States; through this relief, I was able to see parallels between two ethnic groups that may outwardly seem drastically different. In the following paragraph, I explain the disparate hardships of Black Americans overall, then change the focus from nationwide-level, to state-level, to city-level in order to highlight the specific problems in Dayton, Ohio.

In the United States, Black Americans experience many types of hardships and injustice like Arab Israelis as the result of structural racism and bias, which widens the gap in health disparities – particularly morbidities and mortalities associated with overweight and obesity. While Black Americans account for 13.3% (42.5 million) of the national population (U.S. Census Bureau, 2015a), national averages for Blacks demonstrate that 37.9% of males over the age of 20 years are obese and 57.6% of females over the age of 20 years are obese (CDC, 2016g). Overall, 13.5% of Black Americans of all ages are considered to be of ‘fair’ or ‘poor’ health; the leading causes of death among Black Americans includes heart disease, cancer, and

stroke; and diseases such as hypertension affect 39.9% of Black males and 44.5% of Black females (CDC, 2016g). Nationally, 87.0% (37.0 million) of Black Americans have their high school diploma (or GED) by the age of 25, and 22.5% (8.3 million) of Black Americans have a bachelor's degree or more as of 2015 (Ryan & Bauman, 2016). In comparison to White Americans'[6] high school diploma (or GED) rate of 93.3% (230.3 million) and 32.8% (75.5 million) rate of bachelor's degree attainment, these data demonstrate a gap in equitable social and economic advancement. Table 2 (below) demonstrates the educational attainment gap between Black and White Americans while accounting for gender and holding other variables constant.

Table 2

Educational Attainment of Black Americans and White Americans, by Gender

	Black Americans		**White Americans**	
Education	**Women**	**Men**	**Women**	**Men**
0-12 years	90.5%	93.5%	95.9%	95.4%
13+ years	23.8%	20.8%	43.9%	37.7%

Note: Information sourced from the National Center for Education Statistics (NCES, 2014)

In Table 3 the educational attainment of Arab Israelis and Black Americans are compared while holding all variables (aside from gender) constant. Black Americans have the advantage of higher rates of high school graduation (12 years or less of education) when compared to Arab Israelis. However, the levels of educational attainment for 13 years and beyond is similarly low for both ethnicities, with a slight advantage for Arab Israelis. Furthermore, attainment of higher

[6] Population of White Americans in the United States is estimated to be 246.8 million, or 77.4% as of 2014 (U.S. Census Bureau, 2014).

education is similarly higher for Arab Israeli and Black American women than their male counterparts.

Table 3

Educational Attainment of Arab Israelis and Black Americans, by Gender

	Arab Israelis		Black Americans	
Education	**Women**	**Men**	**Women**	**Men**
0-12 years	73.0%	75.0%	90.5%	93.5%
13+ years	27.0%	25.0%	23.8%	20.8%

Source: Myers-JDC-Brookdale Institute, 2012; NCES, 2014

In Ohio, Black Americans account for 13.7% (1.6 million) (Ohio Development Services Agency, 2014) of the population, yet 74.9%[7] of that same group is considered either overweight or obese (Henry J. Kaiser Family Foundation, 2014b). The household median income for Black Americans in Ohio is $28,000[8] (Ohio Development Services Agency, 2014), 29.0% of the state's Black population lives at or below the poverty line[9] and their unemployment rate is 16.7% (Center for American Progress, 2016). In Montgomery County[10], Ohio, Blacks are 21.1% (n=111,774) of the population (U.S. Census Bureau, 2015b); 18.3% of that population lives at or below the poverty line and the average family size is 3.1[11] (Town Charts, 2016) and has an average income of $37,684 (Montgomery County Family & Children First Council, 2013).

[7] Compared to a state average of 66.7% (Henry J. Kaiser Family Foundation, 2014a) and 66.1% average for overweight/obese White adults in Ohio (Henry J. Kaiser Family Foundation, 2014b).
[8] Compared to the state average of over $48,000 (Ohio Development Services Agency, 2014).
[9] Compared to 12.5% of White Americans living at or below the poverty line in Ohio.
[10] The city of Dayton is located in Montgomery County: the county statistics are utilized herein for the purposes of the current research.
[11] This statistic could not be divided by race, as the information was not available in that format.

According to Kral and Faith (2009), an overweight or obese child is likely indicative that one or both of their parents is overweight or obese (Whitaker, Wright, Pepe, Seidel, & Dietz, 1997). The Dayton Children's Hospital (2011) indicated that 37.0% of the children in the Montgomery County area are overweight or obese, and over half (59.9%) (Dayton Public Schools, 2014) of the children in the Montgomery County area have low literacy scores, which may be indicative of low literacy scores in their parents (Boyse, 2010) and a lower-income household (Reardon, Valentino, & Shores, 2012). All of the aforementioned demographics regarding the Black population of Montgomery County, Ohio demonstrate similar and unique minority hardships which exacerbate the prevalence of obesity, large income gaps, and low rates of literacy (and health literacy) due to systematic segregation.

The leading protective factor against obesity and obesity-related diseases for both adult males and females (regardless of race or ethnicity) is intervention and nutritional education during childhood and adolescence (McAleese & Rankin, 2007). Despite the lower prevalence of childhood obesity among Arab Israeli children[12], the income-restrictive diet and health behaviors that are first introduced in childhood are risk factors for obesity and its comorbidities later in life. Risk of overweight and obese Black in American children in Montgomery County, Ohio could be mitigated to alleviate future health concerns if the problems are addressed and mitigated early in life. The high prevalence of food insecurity[13] (16.1%), very low food security (7.1%), and a large part (24.3%) of the population receiving food assistance (Ohio Department of Job & Family Services, 2013) coupled with limited access to adequate grocery stores (greater than one

[12] According to Kalter-Leibovici et al. (2007), the prevalence of overweight and obesity is generally similar to that of Israeli Jews during childhood and adolescence, but the likelihood of obesity increases with age for Arab men and women but not for Israeli Jews.

[13] Food insecurity, as it is defined by Ohio Department of Job & Family Services (2013), is a "reduction of food intake by some household members and therefore a disruption of normal eating patterns due to limited resources," (p. 2).

or 10 miles) (U.S. Department of Agriculture, 2016) is indicative of an area which suffers from food deserts. Food deserts are areas that lack access to healthy food sources and have low accessibility to supermarkets (U.S. Department of Agriculture, 2015). Low accessibility to supermarkets is measured as more than one mile away for urban areas and more than 10 miles away for rural areas (U.S. Department of Agriculture, 2015). In the city of Dayton, there is low accessibility to grocery stores for some of our poorest areas, where access to a grocery store is greater than 10 miles in urban areas (U.S. Department of Agriculture, 2016).

Given the circumstances of the urban Black communities located within Montgomery County, there needs to be an intervention which addresses personal and environmental needs while it can be offered to those in need in their neighborhoods. My internship advisor, Ms. Goldman, and the care providers of the kindergarten in Baqa El-Gharbiya, advised that one of the best routes of incorporating health changes within the multigenerational family settings in their village was to educate the young children (that is, increase their health literacy). Inspired by this idea and concept, I decided to construct a garden with the use of an urban garden setting to develop an engaging curriculum for local children. Urban gardening, as it is conceptualized by Eco Life (2011), involves the act of growing plants "of all types and varieties in an urban environment" (first paragraph). While some summer gardening programs exist in the Montgomery County area (e.g. City Beets, www.metroparks.org/city-beets/), they are very exclusive[14] and may be inaccessible to willing volunteers and needy families. Likewise, there are several existing urban and community gardens located at schools and community-run

[14] City Beets permits only approximately 16 volunteers to be a part of their gardening program every summer. Those volunteers undergo a competitive interviewing process and must provide their own means of travel to reach the sites, which are not located in the urban areas of Dayton and are not accessible through transit authority.

organizations around the Montgomery County area which would benefit from a comprehensive learning curriculum.

Environmental literacy, as conceptualized by the Campaign for Environmental Literacy (2007), encompasses the capacity to act successfully on an individual, daily basis with a "broad understanding of how people and societies relate to each other and to natural systems," with the overarching goal of sustainability (first paragraph). By utilizing the theme of environmental literacy with improving health literacy in a hands-on setting, children learn through engagement and also have a sense of accomplishment. The community garden located in Baqa El-Gharbiya is unique in that it combines the physical and conceptual aspects of developing a healthy lifestyle and maintaining a sustainable environment through educational materials and hands-on gardening. Thus, the kindergarten is responsible for short-term and long-term health goals; namely, to provide children and their families with healthy food options and to encourage a harmonious ecological framework for future generations.

For the current research, an educational curriculum was developed to reflect the availability of foodstuffs as well as the needs of the local population. Specifically, there are significant differences in diet preferences and availability of foodstuffs between Americans and Israelis. Israel is ranked as one of the healthiest countries in western culture (Eichner, 2015) and there are distinctive dietary laws to observe, namely Kosher and Halal dietary laws. Given that the Mediterranean diet includes many items which thrive in warmer climates (olives, fruits, vegetables) and near bodies of water (fish), even some of their culturally popular food items (falafel, shawarma, humus) are significantly healthier than American popular food items (hamburger, pizza, fried chicken). On average, the diet of most Israelis includes an abundance of vegetables, fresh fish, fruits, whole grains, and lower rates of alcohol consumption (Comtec

Med, 2012). Moreover, fresher foods (fruits, vegetables, and bulk grains) cost significantly less than processed foods, making it easier to follow a healthier diet as a way of life (Eichner, 2015).

With regard to Arab Israelis, their diet is somewhat compromised by their scant availability of income and large families. During my conversations with locals, Arab Israelis said that they must conserve their funds by using cheaper food items and packaged, high-calorie, energy dense foods to feed more people within their household. Many Arab Israeli homes are multigenerational, which affects the meal options for the entire household; the meals are often traditional, handed down from the elders, and made by the head female. However, Arab Israelis are still eating healthier than in comparison to food choices available to low-income families within the United States.

Despite Halal dietary laws (no pork or alcoholic beverages) for Arabs who adhere to it, sugar-sweetened beverages are very popular (Comtec Med, 2012). On average, Americans are consuming high amounts of added sugar, saturated fats, and sodium, which are often found in fast foods and processed and packaged foods (Harrington, 2016). According to Schlosser (2002), at least 25% of Americans eats some type of fast food item every day and they eat 31% more packaged food than fresh food (Fairfield, 2010). A major reason for this high consumption rate of fast foods and processed foods pertains to Americans' busy lifestyles, which can be assessed through their consumption of meals in cars (Do Something, 2014; Stanford University, n.d.) and their grazing habits (Fairfield, 2010) with convenient meals (packaged, processed, and fast foods). More specifically, Black Americans' eating habits are strongly influenced by tradition, especially such tradition which was handed down from their parents and grandparents who likely resided in the southern states (Ewing, 2015). While some southern foods are rather healthy, including leafy green and yellow vegetables (e.g. kale, collard), beans, legumes, and grains (e.g.

rice), other foods are low in essential vitamins and minerals and high in saturated fats (Ewing, 2015) and preparation methods often offset the good – bacon grease on greens and deep-fried vegetables (L. Farish personal communication, July 12, 2016). Furthermore, economically disadvantaged Black Americans are less likely to be able to afford fresh fruits and vegetables, lean meats, and seafood; instead, said families rely on foods that meet their budget (Ewing, 2015).

In the following section, a description of the eight-week program and the pilot study are discussed (see also Pilot Curriculum in Appendix B).

Methodology

The goal of the current research was to create and pilot an intervention program which could mitigate some of the economic disadvantages within the Black community. A grant for $3,000 was awarded by the Community Engaged Scholarship and Teaching Mentored Grant Program (CEST) through Wright State University (see Grant Proposal in Appendix C). Grant funds were used to supplement the needs for the educational and hands-on aspects of the lesson plans. A list of the items supplied through the grant is listed in Appendix D.

Approval from Wright State University's Institutional Review Board (IRB) was obtained (see Appendix E).

Participants

A partnership was established with The Foodbank, Inc., located in Dayton, Ohio. The Foodbank, Inc. has an existing program of raised bed urban gardens and pollinator garden[15] for educational purposes and to supply fresh produce to families. The Foodbank, Inc. is located near

[15] A pollinator garden consists of flowers, herbs, and other pollinating plants which are present for the purposes of pollinating insects to feed on the plant and in turn, distribute its pollen (Carlton, 2015).

West Dayton, which is largely a minority-centered (i.e., Black Americans) part of the city. The Foodbank, Inc. of Dayton serves underserved and food insecure families and individuals who reside in the counties of Montgomery, Greene, and Preble and they are within a network of more than twelve other foodbanks located throughout Ohio.

In order to test the curriculum, a pilot study was initiated at the Foodbank, Inc. on three days during July 2016. The eight-week schedule was shortened to a one-day, five-hour class where participants learned about selected topics within the curriculum. Participants were recruited from the Wesley Community Center, an establishment which caters to low-income families (predominantly Black or African descent) within the West Dayton area. The Wesley Community Center provides summer day programs for children and their partnership with The Foodbank, Inc. of Dayton to benefit community involvement and hands-on education within a safe environment. The pilot curriculum was selected based on the preference of the instructors at the Wesley Community Center, which included pollinator gardens (*Week 5*) for the youngest participants (under eight years) and food economics (*Week 4*) for the older participants (ages eight and over). Participants were grouped according to age, with children between kindergarten and second grade (5 to 8 years old; n=23) enrolled in the pollinator garden curriculum, and two separate age groups (third through sixth grade, 8 to 12 years old, n=23; seventh and eighth grade, 13 to 15 years old, n=12) enrolled in the food economics curriculum. A copy of the condensed lesson plans for the pilot program can be found in Part II of this manuscript.

Curriculum: Lesson Plans

The curriculum is comprised of eight lesson plans (*Part II*) designed to be offered over the course of eight weeks during the summer (June through August). Participants are expected to be involved in both hands-on activities and within-group activities in an indoor and outdoor

classroom-type setting. The lesson plans are a work based on lessons from *Growing Minds* (http://growing-minds.org) and *KidsGardening* (http://www.kidsgardening.org), and using the curriculum framework from a local program called City Beets (www.metroparks.org/city-beets/). Table 4 (below) demonstrates the lesson plan outline during the eight-week course.

Table 4

Lesson Plan Outline for Eight-week Course

	Lesson Plan Outline	
Week	**Hands-on**	**Lesson**
1	Food tracking	Pre-test *What's Up with Food?*
2	Watering, Mulching, and Healthy Soil Composition Soil Lasagna	*What Do I Eat?*
3	Who's Your Buddy? Eating the Rainbow	*Bio-Intensive Gardening*
4	Chef Solus' Build a Meal Cooking Lab: Local Ingredients	*Food Economics: What Is Local?*
5	Pollinator Garden: Scavenger Hunt Honey Tasting	*Insects in the Garden!*
6	Plant crowns Plant a seedling	*Plant Care*
7	Composting	*Recycling*
8	Salad party	Post-test *Grand finale*

Evaluation

Eight-week program. While the overall goal of the program was to improve healthy behaviors of the participants by providing fun and educational services, the program is expected to compare and assess improvements before and after the program to create a valid evidence base for the curriculum's effectiveness. An anonymous pre-/post-test was designed with four basic sections, as seen below in Table 5. A detailed description of each section can be found below in the subsection titled *Pre-/Post-test*.

Table 5

Four Basic Sections and their Theme of the Pre-/Post-test for the Eight-week Program

	Theme
Section I	Characteristics of the participants
Section II	Basic knowledge about plants
Section III	Nutrition
Section IV	Environmental literacy

The purpose of the pre- and post-test is to evaluate what information participants learned over the eight-week course. For the purposes of the eight-week program, the tests were administered to participants between the ages of six (6) and 17 years. However, for participants who are younger (e.g. between the ages of six and nine years), the test was administered within the context of a group interview or a one-on-one interview. Moreover, if any of the participants had questions about the test that border on personal information being given, the participant was taken aside to complete the test in private.

Pilot study. For the purposes of the pilot study, the pre-/post-test was condensed to contain only test materials related to the selected curriculum. The pre-test was administered before the commencement of the lesson and the post-test was distributed immediately following the end of the condensed class. For the youngest group (kindergarten through second grade), the

children were given the option to participate in a group discussion or to take the test independently. The older groups of participants took the test independently. The condensed tests can be found in Appendix F and Appendix G, respectively[16]. Although the pre-/post-test was administered to all groups, only results from the youngest group were available for this manuscript.

Pre-/post-test. The test consists of four components: characteristics, basic plant knowledge, nutrition, and environmental literacy. It should be noted that the questions from the pre-/post-test were addressed during the lesson plans.

- In *Section I*, characteristics of the participants were captured. The participants were first asked to answer a few non-identifiable questions about themselves in a way that may eliminate confusion (*How old are you? What grade are you going to be in?*). Next, the participant was asked some questions about their eating habits, including their favorite foods, how many times do they eat at a fast food restaurant, and who prepares their meals at home. To control for some of the variability in possible responses, most of the questions related to eating habits were followed with structured responses (e.g., *0 or never*, *1-2*, *3-4*, *5 or more*).
- In *Section II*, basic knowledge about plants was ascertained. A table describing plant parts was created based on research conducted by Morris, Koumjian, Briggs, and Zidenberg-Cherr (2002). However, the column listed as "Examples of what you can eat from it" is blank on the test and participants were asked to provide examples. The purpose of the plant parts table is to demonstrate how plants grow and function and

[16] Note: In the pilot program, some of the responses to the questions were not expected to change due to the single-day lesson, but the tests were administered for demographic description and to evaluate the selected lessons content.

which parts of a plant are edible. Table 6 demonstrates the examples of edible plant parts which are not listed on the pre-/post-tests.

Table 6

Plant Parts Table

Plant Part	Function: What does it do?	Example of what you can eat from it
Roots	Pulls water and other nutrients from the soil	Parsnip, carrot
Stem	Moves water and other nutrients from the roots to the rest of the plant	Kohlrabi
Leaves	Produces food from sunlight	Mint
Flower	Makes the plant's seeds	Artichoke
Fruit	Protects the plant's seed Any food with seeds in it	Bell pepper
Seeds	Contains an unborn plant Is usually protected inside the fruit	Rice

Note: Adapted from Morris, Koumjian, Briggs, and Zidenberg-Cherr (2002)

- In *Section III,* nutrition was assessed. This section measured the participants' comprehension of nutrition labels by using a nutrition label (Figure 2) from King County, WA (2014).

Nutrition Facts

Serving Size 1 cup (228g)
Servings Per Container 2

Amount Per Serving

Calories 250	Calories from Fat 110
	% Daily Value*
Total Fat 12g	**18%**
Saturated Fat 3g	**15%**
Trans Fat 3g	
Cholesterol 30mg	**10%**
Sodium 470mg	**20%**
Total Carbohydrate 31g	**10%**
Dietary Fiber 0g	**0%**
Sugars 5g	
Protein 5g	
Vitamin A	**4%**
Vitamin C	**2%**
Calcium	**20%**
Iron	**4%**

* Percent Daily Values are based on a 2,000 calorie diet. Your Daily Values may be higher or lower depending on your calorie needs.

	Calories:	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Figure 2. Nutrition label for macaroni and cheese (King County, WA, 2014).

- Lastly, *Section IV* focused on basic aspects of environmental literacy, including questions such as: '*How do earthworms help soil?'* and '*Do you think it is important to recycle? Why or why not?'*.

Pilot program data analysis. Information from the pilot program's pre-test and post-test was analyzed with SPSS (IBM, 2013). Statistical analysis included paired t-tests to determine the difference between pre- and post-test within specified age groups, as well as the difference between age groups, based on an alpha level of .05 (α=.05). Table 7 provides a variable list showing the variables of interest for the current analysis.

Table 7

Variable List for the Pilot Program's Data Analysis

#	Variable	Data Label	Description
1	Age	AGE	Indicates the participant's age
2	Grade	GRADE	What grade the participant will be entering the following year
3	Gender	GENDER	Indicates the participant's gender identification
4	Race	RACE	Indicates the participant's racial background
5	Favorite foods	FOODS	(Qualitative) Describes what the participants' favorite foods are (up to four food items)
6	Fast foods	FAST_FOODS	How many times per week the participant eats at a fast food establishment
7	Meals	MEALS	Which person (mother, father, etc.) cooks the participant's meals while at home

#	Variable	Pre-test	Post-test	Description
8	Daily fruit consumption*	DAILY_FRUITS0	DAILY_FRUITS1	How many fruits the participant eats on a daily basis
9	Daily vegetable consumption*	DAILY_VEGS0	DAILY_VEGS1	How many vegetables the participant eats on a daily basis
10	Knowledge of plants**	PLANT_KNOWL0	PLANT_KNOWL1	Cumulative score from Part II of the test, graded on a scale of 0-6 out of 6 (0%-100%)
11	Nutrition assessment**	NUTRITION0	NUTRITION1	Cumulative score from Part III of the test (questions 10-17), graded on a scale of 0-8 out of 8 (0%-100%)
12	Environmental literacy**	ENV_LIT0	ENV_LIT1	(Qualitative) Cumulative score from Part IV of the test (questions 18-22), graded on a scale of 0-25 out of 25 (0%-100%) with each question measuring a score of 0-5 (0%-100%)

Note: *Quantitative data, **Qualitative data

Results

Results from the current research (Table 8) demonstrate that the study participants (n=16) were approximately seven years old and entering the second grade the following school year. The participants included eight males and eight females (*M*=0.50), and their median score associated with race (*M*=2) corresponds with African American, or Black.

Table 8

Descriptive Statistics for the Study Participants

	Mean
Age (years)	7.12
Grade (upcoming)	2.31
Sex	0.50
Race	2.00
	n=16

In Table 9 frequencies are reported with the median and mode capturing more specific information about our audience. The study participants reported some information regarding their eating habits and their pre-test cumulative score was calculated by evaluating their responses to the test's open-ended questions. The variable labeled 'Favorite foods' was scored on the basis of 1) if the food was prepacked and/or included preservatives, 2) if the foods listed included fresh fruits and vegetables, and 3) if there was a variety of different foods listed (e.g. soup, carrots, chicken, apples) in lieu of high-calorie, high-fat foods (e.g., pizza, pizza rolls, pancakes, cookies). A score of one (1, *Very Poor*) represented a deficiency in possible food choices, which may demonstrate a lack of availability in stores, a lack of variety or funds within the household, or a lack of time to prepare meals within the kitchen. Conversely, a score of five (5, *Excellent*) demonstrated that the participant was introduced to healthier food options within the household and encouraged to incorporate them into their diet. As it relates to the current

study participants, their mean score for ‘Favorite foods’ was 2.00 (*Poor*), with a mode of 1.00 (*Very Poor*) (M=2.00, mode=1.00). Simply put, most of the participants received a score of *Very Poor* in regards to their eating preferences; a few of the participants scored three (3, *Neither Poor or Good*) or four (4, *Good*) in regards to their responses, which increased the average score.

Table 9

Frequency Statistics for the Study Participants

	Mean	**Mode**
Favorite foods	2.00	1.00
Fast foods	1.50	1.00
Cooks meals – 1	1.15	1.00
Cooks meals - 2	2.75	3.00
Pre-test: Open ended questions (cumulative)	3.38	0.00

For the variable titled ‘Fast foods’, the question asked the participants to indicate how many times per week that they ate at a fast food restaurant (e.g. McDonald’s, Burger King, Pizza Hut, Dominos, etc.). A score of zero (0) indicated that the participant almost never eats at a fast food restaurant, a score of one (1) indicated dining out around once or twice per week, a score of two (2) indicated dining out three to five times per week, and a score of three (3) indicated dining out more than five times per week. Most of the participants reported dining out only once or twice per week, but an overall average (*M*=1.5) indicated that participants may dine out anywhere between one and five times per week.

Next, the participants responded to questions related to food preparation while eating at home, in which they could indicate if more than one person prepared their meals. Participants were able to indicate whether their mother (*1*), father (*2*), grandmother (*3*), grandfather (*4*), aunt (*5*), uncle (*6*), or if someone else (*7*) prepared their meals. Most children indicated that their

mother (*1*) (n=13, *M*=1.15) or their grandmother (*3*) (n=4, *M*=2.75) prepared their meals while eating at home.

Lastly, the pre-test open-ended questions presented in Part II of the condensed test for pollinator gardens demonstrated very low environmental literacy scores. The maximum score that any participant could receive was a cumulative score of 25.0 out of 25.0 (100%), or 5.0 out of 5.0 for each question. The score listed in Table 9 describes the cumulative score for each participant's pre-test open-ended question series, which translates to 3.38 out of 25.0 (or, 13.5%) (*M*=3.38, mode=0.00). The participants' scores were based on 1) whether they provided a 'yes' or 'no' (or, '*good'* or '*bad'*) response, 2) provided relevant justification for their response, and 3) accuracy of response to the particular question. If the participant did not provide a response or responded with 'I don't know', they received a score of zero (0). Most of the participants either indicated that they did not know the answer or they left the space blank (*no response*). For the participants who did respond to the questions, most of them left a 'yes' or 'no' response without further justification, which resulted in receiving one (1) point for each question.

In order to complete the tests in a timely manner and to maintain cooperation with the young participants, the post-test was conducted as a group interview. For that reason, the post-test cannot be quantitatively compared to the pre-test but the results are discussed below, along with some suggestions for later research.

Discussion

Results from the pilot study indicated that the participants' eating habits and their environmental literacy scores are quite low. Given that the participants are from a low-income urban area within Dayton, Ohio, it is understandable that many of the participants may lack accessibility to certain healthier food options and green space within their community, the latter

of which enhances play, learning, and creativity (Laaksoharjua, Rappea, & Kaivolab, 2012). However, during the three-and-a-half hours spent teaching the participants about pollinators and pollinator gardens, noticeable changes were observed in participants' responses to Part II during the post-test group interview. Given that Part II was the section being compared between pre- and post-test, the importance of comparing responses is critical in the understanding of the efficacy of the lesson plan. For instance, participants' responses to questions such as 'Do earthworms help soil?' included a unanimous oral response of 'yes' with justifications such as, 'they help the earth to breathe' and 'they help the soil by moving it around in the ground'. During the pre-test, this question was most often left blank or responded to with 'I don't know'.

The participants utilized information about bees in their justification for questions regarding bees and their importance to the environment. Answers included, 'bees are important to the environment because they make honey', '… the honey makes us strong' (in reference to improving one's immune system with raw honey), and 'bees share pollen for food and honey', indicated that the participants demonstrated a clear understanding of the material presented to them. Regarding recycling, most (n=14) of the participants indicated that recycling is important because it 'helps our community' and 'littering is bad'. Likewise, all of the participants indicated that it was bad to throw garbage on the ground because 'you don't want to dirty the earth'.

Sustainability. This was a pilot project with the intention of continuing this program and looking for additional funding sources for The Foodbank, Inc. of Dayton. Through the partnership with The Foodbank, Inc. of Dayton, participants from Montgomery County are expected to be recruited from the local YMCA, East End Community Center, and several other organizations within the Dayton area. Depending on the demand and popularity of the program, the classes will be held once or twice per week, not including holidays. This organization hopes

to implement it and the program will be available to offer to other organizations as requested. A donation request was developed to solicit funds and equipment from local businesses and garden nurseries for the purposes of The Foodbank, Inc.'s raised garden program. A copy of the donation request can be found in Appendix H.

Bi-directionality of health. Public health professionals from the United States can consider adopting health intervention programs from other countries, non-western cultures included, for strategies which may prove cost-effective and generalizable. Non-western cultures may provide a perspective that previously may have not been considered due to less familiarity with said culture's health concerns, budgeting, social or health care structures. However, personal experiences demonstrated that non-familiarity could provide fresh strategies for approaching pre-existing conundrums.

Limitations

Given that the current pilot study aimed to investigate performance and suggested improvements for the lesson plans, a few noticeable alterations regarding the curriculum presentation with the youngest participants (6 to 8 year olds) should be utilized. The most important change regards the presentation of the pre-/post-test to the young participants; namely, the test should be administered within the context of an individual or group interview. Since the pre-test was disseminated in the form of an individual test and the post-test was a group interview, the pre- and post-test cannot be compared due to the lack of matching individual responses. The reason for the change in test distribution style between the pre- and post-test was due to the attention span of the children. Some of the participants were not able to provide justifications for some of their responses because they could not write them out, while others either could not confidently read the material or were too young to express their learning in the

context of an independent test. Future administration of such tests for younger age groups should include easier ways to record data in the form of a group interview, as well as more time allotted to collect those responses.

Another limitation to the current pilot test group was that the video section of the lecture could not be presented due to the lack of an alternative indoor space. The videos included child-friendly information which would have encouraged visual and auditory pathways for learning but given the space and time restrictions, it was not possible to provide this part of the program. However, the curriculum was prioritized based on what was most important to teach first, including hands-on projects to supplement the teaching material. Lastly, while this curriculum has not been tested on outside entities, its content derives from reputable programs like City Beets (www.metroparks.org/city-beets/) and *Growing Minds* (http://growing-minds.org). Therefore, it is with certainty that the content is accurate, user-friendly, and applicable to a wide variety of situations.

Overall, the participants included within the pilot study of the pollinator garden showed improvement between the pre- and post-test, including better justifications within the context of environmental literacy. Given that the participants are still very young, the biggest concern is their long-term comprehension and retention of the material. However, with the suggested improvements to the limitations above, the learning curriculum could demonstrate longer-lasting changes within the participants if carried out over an eight-week program.

References

American-Israeli Cooperative Enterprise. (2016). Vital statistics: Latest population statistics for Israel. Retrieved on April 10, 2016 from http://www.jewishvirtuallibrary.org/jsource/Society_&_Culture/newpop.html

Boyse, K. (2010). Reading, literacy, and your child. Retrieved on April 12, 2016 from http://www.med.umich.edu/yourchild/topics/reading.htm

Campaign for Environmental Literacy. (2007). What is Environmental Literacy? Retrieved April 5, 2016 from http://www.fundee.org/facts/envlit/whatisenvlit.htm

Carlton, M. (2015). What is a pollinator garden? Retrieved August 15, 2016 from http://www.foxleas.com/what-is-a-pollinator-garden.asp

Center for American Progress. (2016). Poverty by state: Ohio. Retrieved on April 12, 2016 from http://talkpoverty.org/state-year-report/ohio-2014-report/

Centers for Disease Control and Prevention (CDC). (2015a). Adulthood obesity: Data. Retrieved April 10, 2016 from http://www.cdc.gov/obesity/data/adult.html

Centers for Disease Control and Prevention (CDC). (2015b). Adulthood obesity: Defining. Retrieved April 10, 2016 from http://www.cdc.gov/obesity/adult/defining.html

Centers for Disease Control and Prevention (CDC). (2015c). Childhood obesity: Defining. Retrieved April 10, 2016 from http://www.cdc.gov/obesity/childhood/defining.html

Centers for Disease Control and Prevention (CDC). (2015d). Childhood obesity. Retrieved April 10, 2016 from http://www.cdc.gov/healthyschools/obesity/facts.htm

Centers for Disease Control and Prevention (CDC). (2015e). Childhood obesity: Causes. Retrieved April 10, 2016 from http://www.cdc.gov/obesity/childhood/causes.html

Centers for Disease Control and Prevention (CDC). (2015f). Childhood obesity: Data. Retrieved April 10, 2016 from http://www.cdc.gov/obesity/data/childhood.html

Centers for Disease Control and Prevention (CDC). (2016g). Health of Black or African American non-Hispanic population. Retrieved April 11, 2016 from http://www.cdc.gov/nchs/fastats/black-health.htm

Comtec Med (2012). Israeli eating patterns. Retrieved on May 11, 2016 from http://www.israelnutritionweek.com/israeli_nutrition.aspx

Dayton Children's Hospital. (2011). Regional pediatric health assessment: Childhood obesity. Retrieved on April 12, 2016 from http://www.childrensdayton.org/cms/resource_library/files/e59665ca233bdfcf/obesity.pdf

Dayton Public Schools. (2014). 2013-2014 Profile. Retrieved on December 1, 2015 from http://www.dps.k12.oh.us/content/documents/DPS-Sept14-Quarterly-Report-pdf.pdf

Do Something. (2014). 11 facts about American eating habits. Retrieved on May 12, 2016 from https://www.dosomething.org/us/facts/11-facts-about-american-eating-habits

Eco Life. (2011). Definition of urban gardening. Retrieved on April 13, 2016 from http://www.ecolife.com/define/urban-gardening.html

Eichner, I. (2015). Study: Israel has the healthiest diet in the West. Retrieved on May 11, 2016 from http://www.ynetnews.com/articles/0,7340,L-4633821,00.html

Ewing, J. (2015). Cultural diversity: Eating in America – African American. Retrieved on May 12, 2016 from http://ohioline.osu.edu/factsheet/HYG-5250

Fairfield, H. (2010). Factory food. Retrieved on May 12, 2016 from http://www.nytimes.com/2010/04/04/business/04metrics.html?_r=0

Harrington, R. (2016). Here's a visual breakdown of Americans' appalling eating habits. Retrieved on May 12, 2016 from http://www.techinsider.io/american-eating-habits-usda-new-dietary-guidelines-2016-1

IBM Corp. (2013). IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp.

Kaiser Family Foundation. (2014a). Percent of adults who are overweight or obese. Retrieved on April 11, 2016 from http://kff.org/other/state-indicator/adult-overweightobesity-rate/#map

Kaiser Family Foundation. (2014b). Overweight and obesity rates for adults by race/ethnicity. Retrieved on April 11, 2016 from http://kff.org/other/state-indicator/adult-overweightobesity-rate-by-re/

Kalter-Leibovici, O., Atamna, A., Lubin, F., Alpert, G., Keren, M.G., Murad, H., Chetrit, A., Goffer, D., Eilat-Adar, S. & Goldbourt, U. (2007). Obesity among Arabs and Jews in Israel: A population-based study. *Israel Medical Association Journal*, *9*, 525-529.

Kaluski, D. N. & Berry, E. M. (2005). Prevalence of obesity in Israel. *Obesity Reviews*, *6*(2), 115-116.

King County, WA. (2016). Nutrition and Health. Retrieved on April 24, 2016 from http://www.kingcounty.gov/healthservices/health/nutrition/nflabelfacts.aspx

Kral, T. V. E. & Faith, M. S. (2009). Influences on child eating and weight development from a behavioral genetics perspective. *Journal of Pediatric Psychology*, *34*(6), 596-605.

Laaksoharjua, T., Rappea, E., & Kaivolab, T. (2012). Garden affordances for social learning, play, and for building nature–child relationship. *Urban Forestry & Urban Greening*, *11*, 195-203.

Leibovitz, L. (2014). Trouble getting into college? It might be the language you speak. Retrieved on April 11, 2016 from http://www.tabletmag.com/jewish-news-and-politics/186483/israeli-students-arabic-language

McAleese, J. D., & Rankin, L. L. (2007). Garden-based nutrition education affects fruit and vegetable consumption in sixth-grade adolescents. *Journal of the American Dietetic Association, 107*(4), 662-665.

Montgomery County Family and Children First Council. (2013). 2013 Progress report on community outcomes, indicators and strategies. Retrieved on April 12, 2016 from http://www.mcohio.org/document_center/HS/2013_FCFC_annual_report.pdf

Morris, J. L, Koumjian, K. L., Briggs, M., & Zidenberg-Cherr, S. (2002). *Nutrition to Grow On*: A garden-enhanced nutrition education curriculum for upper-elementary schoolchildren. *Journal of Nutrition Education and Behavior*, *34*(3), 175-176.

Myers-JDC-Brookdale Institute. (2012). The Arab population in Israel: Facts and Figures 2012. Retrieved on April 11, 2016 from http://brookdale.jdc.org.il/_Uploads/dbsAttachedFiles/Myers-JDC-Brookdale-Facts-and-Figures-on-Arab-Israelis-March-2012.pdf

National Center for Educational Statistics (NCES). (2014). Digest of education statistics: Table 104.20. Retrieved on May 30, 2016 from https://nces.ed.gov/programs/digest/d14/tables/dt14_104.20.asp

Ogden, C. L., Lamb, M. M., Carroll, M. D., & Flegal, K. M. (2010) Obesity and socioeconomic status in adults: United States 1988–1994 and 2005–2008. NCHS data brief no 50. Hyattsville, MD: National Center for Health Statistics. 2010. Retrieved on April 10, 2016 from http://www.cdc.gov/nchs/data/databriefs/db50.pdf

Ogden, C. L., Carroll, M. D., Kit, B. K., & Flegal, K. M. (2014). Prevalence of Childhood and Adult Obesity in the United States, 2011-2012. *Journal of the American Medical Association, 311*(8), 806-814.

Ohio Department of Job and Family Services. (2013). 2013 Montgomery County profile: Statistical and demographic data. Retrieved on April 12, 2016 from https://jfs.ohio.gov/county/cntypro/pdf13/Montgomery.stm

Ohio Development Services Agency. (2014). Ohio African Americans. Retrieved on April 12, 2016 from https://development.ohio.gov/files/research/p7003.pdf

Ram, E., Marcus, O., Joubran, S., Abdo, B., & Asal, N. R. (2013). Prevalence of obesity among Arab school children in Nazareth, Israel: comparison with national (Jewish) and international data. *Pediatric Obesity, 8*, 428-438.

Reardon, S. F., Valentino, R. A., & Shores, K. A. (2012). Patterns of literacy among U.S. students. *The Future of Children, 22*(2), 17-38.

Rosenblum, S. (2014). Half of Israeli adults are overweight. Retrieved on April 11, 2016 from http://www.ynetnews.com/articles/0,7340,L-4491919,00.html

Ryan, C. L., & Bauman, K. (2016). Educational attainment in the United States: 2015. Retrieved on April 12, 2016 from https://www.census.gov/content/dam/Census/library/publications/2016/demo/p20-578.pdf

Schlosser, E. (2002). Americans are obsessed with fast food: The dark side of the all-American meal [interview]. Retrieved on May 12, 2016 from http://www.cbsnews.com/news/americans-are-obsessed-with-fast-food-the-dark-side-of-the-all-american-meal/

Shemer, N. (2011). Study: Income gap between Jews, Arabs grew in past decade. Retrieved on April 12, 2016 from http://www.jpost.com/Business/Business-News/Study-Income-gap-between-Jews-Arabs-grew-in-past-decade

Stanford University. (n.d.). What's for dinner? Multidisciplinary teaching and research at Stanford. Retrieved on May 12, 2016 from https://www.dosomething.org/us/facts/11-facts-about-american-eating-habits

Town Charts (2016). Montgomery County, OH demographics data. Retrieved on April 12, 2016 from http://www.towncharts.com/Ohio/Demographics/Montgomery-County-OH-Demographics-data.html

U.S. Census Bureau (2015a). Population estimates, July 1, 2015. Retrieved on April 11, 2016 from https://www.census.gov/quickfacts/

U.S. Census Bureau. (2015b). State and county quick facts. Retrieved April 12, 2016 from http://quickfacts.census.gov/qfd/states/39/39113.html.

U.S. Census Bureau (2016). U.S. and world population clock. Retrieved on May 30, 2016 from http://www.census.gov/popclock/

U.S. Department of Agriculture. (2015). Definitions. Retrieved August 15, 2016 from http://www.ers.usda.gov/data-products/food-access-research-atlas/documentation.aspx

U.S. Department of Agriculture. (2016). Food desert locator. Retrieved on April 12, 2016 from http://www.ers.usda.gov/data-products/food-access-research-atlas/go-to-the-atlas.aspx

U.S. Department of Health and Human Services. (2010). Child Health USA 2010. Health Resources and Services Administration, Maternal and Child Health Bureau. Rockville, Maryland: U.S. Retrieved on April 10, 2016 from http://www.mchb.hrsa.gov/chusa10/popchar/pages/105ruc.html

Whitaker, R. C., Wright, J. A., Pepe, M. S., Seidel, K. D., & Dietz, W. H. (1997). Predicting obesity in young adulthood from childhood and parental obesity. *New England Journal of Medicine*, *337*(13), 869-873.

Part II: The Eight-week Curriculum Materials

Pre-test and Post-test

Pre-test / Post-test

Section I

1) How old are you? _____

2) What grade are you going to be in? _____

3) I am a…
   a) boy
   b) girl
   c) I would rather not say

4) I am…
   a) White
   b) Black
   c) Hispanic
   d) Asian
   e) Biracial
   f) I would rather not say / I don't know

5) What are your favorite foods? You can say up to four.
   1)
   2)
   3)
   4)

6) How many times per week do you eat at a fast food restaurant?
   a) 0
   b) 1-2
   c) 3-5
   d) more than 5

7) Who cooks most of your meals?
   a) mom
   b) dad
   c) grandma
   d) grandpa
   e) aunt

f) uncle
g) Someone else (Who? _____)

8) How many fruits do you eat every day?
   a) 0
   b) 1-2
   c) 3-4
   d) 5 or more

9) How many vegetables do you eat every day?
   a) 0
   b) 1-2
   c) 3-4
   d) 5 or more

Section II

In the table below, I want you to tell me what kind of vegetables or fruit you can eat based on what part of the plant it comes from. If you don't know, you can just write "I don't know".

Plant Part	Function: What does it do?	Example of what you can eat from it
Roots	Pulls water and other nutrients from the soil	
Stem	Moves water and other nutrients from the roots to the rest of the plant	
Leaves	Produces food from sunlight	
Flower	Makes the plant's seeds	
Fruit	Protects the plant's seed Any food with seeds in it	
Seeds	Contains an unborn plant Is usually protected inside the fruit	

Section III

You are going to look at a nutrition label taken from a food item that most people eat very often. Below the nutrition label, there will be questions about the label and what to look for.

Nutrition Facts

Serving Size 1 cup (228g)
Servings Per Container 2

Amount Per Serving

Calories 250	Calories from Fat 110
	% Daily Value*
Total Fat 12g	**18%**
Saturated Fat 3g	**15%**
Trans Fat 3g	
Cholesterol 30mg	**10%**
Sodium 470mg	**20%**
Total Carbohydrate 31g	**10%**
Dietary Fiber 0g	**0%**
Sugars 5g	
Protein 5g	
Vitamin A	**4%**
Vitamin C	**2%**
Calcium	**20%**
Iron	**4%**

* Percent Daily Values are based on a 2,000 calorie diet. Your Daily Values may be higher or lower depending on your calorie needs.

	Calories:	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

1) What is one serving of this item? _____
2) How many servings are in this item? _____
3) How many calories are there in one serving? _____
4) How many calories from fat are in one serving? _____
5) How many grams of fat are in one serving? _____
6) How much sodium is in one serving? _____
7) How much calcium is in one serving? _____%
8) How much vitamin A is in one serving? _____%

Section IV

In the last part of this test, you will be asked about nature and what helps the environment. Try your best to answer the questions but if you do not know, just write "I don't know" under each question.

1) How do earthworms help soil?

2) Are bees important to the environment? Why or why not?

3) Do you think it is important to recycle? Why or why not?

4) Do you think it is good or bad to throw garbage on the ground? Why?

5) Do you have a garden at home? If you do, what do you like to grow in it?

Curricula. Lesson plan outline for 8-week course.

	Lesson Plan Outline	
Week	**Hands-on**	**Lesson**
1	1. Food tracking	Pre-test ***What's Up with Food?***
2	1. Watering, Mulching, and Healthy Soil Composition 2. Soil Lasagna	***What Do I Eat?***
3	1. Who's Your Buddy? 2. Eating the Rainbow	***Bio-Intensive Gardening***
4	1. Chef Solus' Build a Meal 2. Cooking Lab: Local Ingredients	***What Is Local?***
5	1. Pollinator Garden: Scavenger Hunt 2. Honey Tasting	***Insects in the Garden!***
6	1. Plant crowns 2. Plant a seedling	***Plant Care***
7	1. Composting	***Recycling***
8	1. Salad party	Post-test ***Grand finale***

Week 1 Project

Pre-test: approximately 30-60 minutes

Materials: Pre-test/Post-test, writing utensil

Procedure

> All participants fill out an evaluation. The evaluation asks what they already know about food, as well as getting a general profile of their daily eating habits. They will receive the exact same evaluation after the season; this allows us to see areas of growth.

Garden Topic 1: Planting Correctly

Seedlings: Dig a small hole the exact size or a tiny bit deeper than the seedling. Gently pull the seedling out of the container using the base of the stem and tipping it upside-down. Set the root ball of the seedling in the hole, use the soil set aside from digging the hole to fill in the space around the seedlings root ball. Flatten your hand with fingers and thumb together (like a karate chop hand!). Use your fingertips to press firmly around the edge of the root ball to pack the soil. This fills in any air pockets and will help the seedling grow strong by making sure there is soil on its roots instead of air. This will keep water close to the roots and lessen the plants shock from the transplanting.

Facilitator / volunteer participant (VERY IMPORTANT*):* *demonstrate* with a seedling if we have one; use a cup if we don't. Then have everyone go to their Quad and practice. Each Youth Manager checks their team members planting for air pockets around the root ball and for proper depth.

Spacing between plants: different plants need different spacing between plants, always ask if you don't know. Use your hand trowel to space! Every hand trowel is about 1 ft long; use your trowel to measure the distance needed between plants. Here is a quick chart for your notes: Tomatoes: 2 ft; Peppers: 1.5 ft; Greens: 1 ft; Melons/Squash: 2 ft; Cabbage: 1.5 ft.

Water right after planting any seedling- don't wait!

Seeds: First prep the area by removing any large sticks, rocks, roots and crush any large dirt clods. Be sure to start with a nice smooth soil area when planting seeds. ALWAYS read the seed packet! If we don't have the seed packet ask a grownup. Spacing and depth depends on the seed. Be sure you know this information before planting so you don't waste seed. ll hole and large seed gets a big, or deeper hole. Dig the appropriate hole or trench using your fingers, not a tool so the hole isn't too deep.

- Pour seeds into your hand first, NOT DIRECTLY INTO THE HOLE. Drop seed according to spacing needs. Cover seeds up with the soil moved to the side from the hole, lightly pat down the soil. Water the seeds.
- Quick list for row spacing: Lettuce: rows: 6 inches apart, 1 seed every inch in the row; Radish: rows: 3 inches apart, 1 seed every inch in the row; Carrots: rows: 6 inches apart, 1 seed every inch in the row. Pole Beans: row: along a trellis, 1 seed every 4 inches.

Lesson 1: What's up with food?

Food Systems Icebreaker: 20 min

Materials: None

Procedure

1. Ask everyone to stand in a circle. Explain that this activity will help us discover our commonalities with gardening, food, and youth leadership.
2. Tell them the facilitator will ask a question. If the question rings true for them they should take a few steps into the center of the circle and look around to see with whom they share common ground. After each question, tell people to go back to their original places.
3. Tailor your questions to the group. Start with 1 - 2, low-risk questions that people will feel comfortable answering. (For example: "Were you born in the Midwestern U.S.?") If you are asking sensitive questions, avoid forcing people to identify themselves by prefacing the question with, "Who knows someone who…." For example, if the group is composed of farmers, ask "Who knows someone who has had to seek off-farm work?"

4. For example, you could ask people to step forward if they:
   - Have ever worked in a garden
   - Ate some kind of food from a garden?
   - Regularly read the ingredients on their food purchases?
   - Ever read the ingredients on a food package?
   - Participate in grocery shopping choices at home
   - Ever seen a farm-stand?
   - Ever bought food from a farm-stand?
   - Ever babysat a younger kid?
   - Ever had to be a role model?
   - Ever given advice to a friend?

5. Ask participants to suggest 2 - 3 questions of their own. Stop when the energy is still high.

6. After the last question, ask what we have learned about our team by the number of people who ended up in the circle after each question? What are our strengths? What might be an area we need to work on?

This is an icebreaker that allows the participants to get comfortable with each other and to learn something about their new teammates.
(You can adapt it by using questions that are meaningful to your group).

Discussion: 10 min

Why does it matter? What is fresh food? Why does it matter what I eat? Who has access to fresh food? (city access/food desserts) How are we involved? Different ways we are involved? Break into small groups come up with questions to ask the group, shout them out to the group.

Explain Homework: 5 min ***Food Tracking***

Track what you eat for a day. Write down everything you eat in an entire day and bring your list to next week's class.

Week 2 Project

Garden Topic 2: Watering, Mulching and Healthy Soil Composition

Correct watering habits: Water the soil and not the plant! Try to avoid hitting the plant (leaves or flowers) with water. Some plants, especially the ones with fuzzy leaves, do not like water on their leaves. Watering these plants' leaves and flowers could cause them to get a disease and/or fungus. Sometimes it's the water hanging around on the leaves for too long that encourages fungal growth. Sometimes watering the plant instead of the soil will carry an already existing disease to another plant. This can all be avoided by watering the soil around the plant instead of over-top of the plant.

How to water correctly: Gently move the plant to the side and point the watering can down to the ground close the soil.

Bad watering habits: Pouring the watering can over top of all the plants; shooting the hose over all the plants; running a sprinkler over top of all the plants.

What is mulch? Mulch can be anything lying on top of bare soil. This can include newspaper, hay or straw, leaves, compost, cardboard, grass clippings, pine needles, and even black plastic sheets.

Mulching the Vegetable Garden:

Mulching your vegetable garden greatly **reduces weeding and conserves water**. Mulching can be done using many different **materials** and most **can be found at little to no cost**. Some of these items include, **newspaper** (free), **hay or straw** (may cost $), **leaves, compost, cardboard, grass clippings, pine needles, plastic row sheets** (costs $).

Mulching with newspaper (sheet mulching): lay newspaper in 6-7 sheet thickness right next to the plant (not touching) and sprinkle handfuls of soil on top to weigh it down. If this looks too messy, cover the newspaper with some other yard debris (and any of the other mulching suggestions at a 1 inch depth. Leaves, pine needles, hay/straw, or compost can be applied at a finished depth of 2-3 inches. Consider the loft of the material being used and how it will settle after a rain. Plan in advance and accumulate various yard wastes for the next season's mulching needs. Mulching also benefits the soil composition by adding a new layer of carbon.

What is soil? Soil is what we garden in. It is made up of living and decomposing elements including microscopic microbial life (literally TONS of tiny animals!). Soil is very important because it's the first step in agriculture and gardening. Thinking about the soil as a living element that requires care (just like a plant) will help you have a bigger harvest. Caring for the soil will also keep the land healthy for those who garden after us.

The world's first recorded civilizations were in Africa. Tribes began to settle near the Nile River because of the incredible fertility of the soil. Slowly more and more tribes stopped living a nomadic life and began farming. Fertile soil is a major building block of the society we know today.

What is dirt? Dirt is a general word used for soil, earth, whatever is below your feet. **Most gardeners refer to their garden "dirt" as soil. You can use the term soil now that you are knowledgeable on *soil structure* and *soil nutrients* in the garden soil.**

Five-minute video clip: Worms are Wonderful (https://youtu.be/l-zc_1vjLnI)
Materials:

- Laptop
- Speakers

Group project: Soil Lasagna, *How do worms help the soil?* (Adapted from Kids Gardening, 2016).

This Classroom Project is an exploration of building life-giving humus that blends these methods -- Nature's slow "mulching" and gardeners' accelerated composting. (If students keep up with their role as mulchers, they'll not only feed the soil, but cut down on their weeding and watering chores, to boot!) Along with earthworm populations and healthy harvests, interest and enthusiasm are sure to proliferate. The Curriculum Connections and Resources sections offer suggestions for helping students cultivate a "sense of humus" in the garden and classroom.

Materials:

- Newspaper
- Water source and hose
- Organic materials: grass clippings, hay, straw, leaves, weeds, livestock manure -- whatever is available
- Sawdust, wood chips, or bark mulch for paths (optional)
- Tools: wheelbarrow, bucket or tub, gloves, lawn mower (optional), black plastic (optional)

BUILDING A LASAGNA GARDEN

With this approach, you can build a garden purely on kid power, without having to dig sod or fire up a tiller. By smothering grass or a weedy patch with layers of mulch and organic matter -- akin to assembling a lasagna layer by layer -- you're setting up an environment that will suppress unwanted plant growth and encourage decomposing organisms to turn your "ingredients" into rich soil. Some gardeners prefer to let decomposers do their work through fall and winter, and plant the bed in spring. Others plant directly into the mulch, or into pockets of compost or soil nestled within it, as soon as it is built.

Start by brainstorming sources of organic matter with your class. They might suggest grass clippings from home lawn mowing, leaves and clippings from landscaping services, and mulch hay donations from farms. Urban dwellers can contact parks and recreation departments to deliver loads of organic material, collect coffee grounds from cafes, and request donations of

peat moss or other material from garden centers. Note: To be safe, it's best not to accept clippings from lawns that have been treated with pesticides and herbicides.

Step 1: Level existing vegetation. Use a lawn mower, leaving clippings in place, or stomp tall grass and weeds flat to the ground.

Step 2: Define your beds. Use stakes or a garden hose to mark the edges of your bed. Beds should be narrow enough that students can reach the center without straining. That way, they can work from the paths and stay off the beds, preventing compaction.

Step 3: Smother it! Fill a tub with water and moisten 4 to 6 pages of newspaper at a time (and see how long it takes before someone becomes engrossed in an article). Lay the damp paper over the defined area, overlapping the edges by at least two inches. If you create multiple beds, cover the pathways between them with newspaper topped with a thick layer of sawdust, bark mulch, or wood chips.

Step 4: Mulch, mulch, and mulch some more. Spread layers of organic matter (see Materials list). Keep off the bed as much as possible to reduce compaction. Spray dry materials with water until they are as damp as a well-wrung sponge before adding the next layer. If you use materials that contain weed seed, such as hay or non-composted horse manure, use them as lower layers in your lasagna to minimize weed growth.

Keep adding layers until the bed is covered at least 12 inches deep. (Pat Lanza, author of *Lasagna Gardening*, recommends 18 to 24 inches. Depth is a variable students can experiment with.) To hasten decomposition, use high-nitrogen material, such as fresh grass clippings or livestock manure, alternated with layers of high-carbon materials like straw and brown leaves. Decomposers will get to work and turn this smorgasbord into a rich medium for planting by the next spring. Or you can follow Step 5 and "bake" your lasagna.

Step 5: Planting. Pat Lanza, who lives in upstate New York, has had success planting her lasagna beds immediately after building them, even in autumn. Wherever you live, your students may wish to experiment with fall planting. Be sure to give perennials several weeks to grow and establish their roots before a hard frost is due.

Suggest that students measure temperatures within the bed to see if decomposers heat up the materials. If you're in a cool climate, heat from decomposition may help the growth of fall plantings.

To transplant, pull mulch away to form a hole, install the plant, and firm the mulch back around its roots. You can also fill planting holes with compost or soil, and then put plants in place. To sow seeds, sift an inch or two of compost or soil over the surface of the mulch, plant seeds, and cover with more compost. Keep the seedbed moist, and as soon as the seedlings emerge, gently pull mulch around them. Monitor them daily to make sure they have enough moisture.

10:25-10:40 Team Game led by Instructor

a. **Name Game ball toss first time** (we use light weight foam balls): Circle the group and have them spread apart an arms' length. Have the group go around and introduce themselves loud and clear (they are also wearing name tags). Begin by tossing a ball to a student. Say the name of the student as you throw the ball. When they catch the ball, the second person then throws the ball to a third person and also states their name. Each student must catch and pass the ball only once, until everyone has touched the ball. The ball must be returned to the instructor to complete the circle. This is a great game to do several times a season to check up on the kids getting to know each other's names.
    1. Add more balls for difficulty and fun
    2. Tell the participants to name different vegetables, fruits, insects, etc. to make it more interesting.

Process questions; refer to list of process questions

11:40-12:10 Food Systems Class/ hands on activity

Lesson 2: What do I eat?

(This week's food systems activity will take longer than normal)

<u>Discuss Homework from previous week:</u> 15 minute ***Food Tracking***

1. Hang a map of the world for food location guessing
2. Discussion:. Ask students to identify the fruits and vegetables from their homework lists. Spark discussion with questions such as, did you eat each item by itself (an apple or a carrot?)? Or as a part of a dish (e.g. soup or pizza?)? Were your fruits and vegetables fresh, frozen, canned, dried? Did you help, choose, or grow any of the fresh ones? Or help clean them or cook them?
3. Tell students you would like to focus on the fruits and vegetables on their lists that started out fresh.
4. Have them shout out their fresh or whole food item (ex. Wheat instead of bread; apple instead of apple sauce) write the crops on a big class list and put their name next to it.
5. Ask: where do you think these foods came from before they got to the grocery store or market? If it doesn't come up prompt the kids thinking about geography. Do you think they come from *somewhere local, a nearby state, a distant part of the US, or another country? How could we find out where the food on our plates is grown?*
6. Write down their best guess next to each student's fruit veg. or whole grain chosen and point to the location on the map.

<u>Explain Homework:</u> 15 min ***Grocery Store Detective.***

1. Grocery store detective, (ask class): If we were to try to find out where a fruit or vegetable comes from, how would we find this? What would we look for? Assign them to take a notebook and a pen to the grocery store and look around the produce department to find out where the fruit or vegetable came from (if they don't guess, tell them to look at the little stickers and signs). If they can't make it to the grocery have them look on line, but encourage the trip to the grocery.
2. Now assign each student the fruit, vegetable, or whole grain they previously listed to find out where it was grown for the next class! Remind them it is easy "mind work" and that we need their information for the next class.

Activity **(**45 min)**: The Smart Shopper: Buying Ingredients, Not Single Serve Meals**
Materials

1. Groceries or photos of groceries (use empty boxes or cans or real looking photos from the internet):

Fruit-loops (off-brand) Apples (1 large bag) Oats or quick oats (1 large canister, not singles!) Honey Cinnamon Butter Can of peas (1), Mayo Lettuce (green leaf or red leaf)	Mac and cheese (off-brand) Tuna 2 cans Fresh bunch of collards Cheese (2 non processed: no Velveeta or American) Pizza rolls (1 small box) Potatoes (1 large bag) Yogurt (3 plain, nonfat large containers) Chips

2. Ingredients definitions http://www.cspinet.org/reports/chemcuisine.htm#hfcs
3. 8 grocery bags
4. Receipt (real receipt from purchase or made up receipt)
5. Group the groceries following the chart below

Processed Food	**Healthier Alternative**
Dinner: Mac and cheese/ tuna/ can peas	Rice /cheese/ tuna or mackerel / fresh collards or kale
Lunch: Pizza rolls (lunch)	Baked potato/ low-fat plain yogurt/broccoli/cheese
Snack: Chips/pretzels/cookies (snacks)	Carrots and homemade ranch dip (yogurt mayo and spices) or a small salad/hardboiled egg
Breakfast: Fruit loops (off brand)	A piece of fruit, and quick oats with cinnamon and honey, or toast with honey, yogurt with honey and apples and cinnamon

Procedure

1. Place the '**Processed Food'** in a grocery bag next to its paired '**Healthier Alternative'** in a separate grocery bag
2. Set each of the four pairs of foods on different tables, creating one station per pair
3. Place the printed ingredients list (from the website above) taped vertically together making just one list along with pencils at each station
4. Tape a copy of the receipt to the table at each station
5. Split the group into four smaller groups, assign one group to each station
6. Tell each group to look through the contents of each bag and read the ingredients together.
7. Next they will search the ingredients list and circle any ingredients they find in the foods at their station
8. Finally each group shares their findings with the group
    a. What '**Processed Food'** did they have?
    b. What '**Healthier Alternative'** did they have?
    c. What did they find on the ingredients list?.
    d. Are there any ingredients from the ''Avoid" column of definitions in their foods?
    e. Any ingredients from the "Cut Back "column of definitions in their foods?
    f. Any ingredients from the "Safe" column of definitions in their foods?

Discussion:

1. Why is one bag of food called a '**Processed Food'?**
2. Why is one bag of food called a '**Healthier Alternative'**
3. Did anything surprise you reading the ingredients labels?

4. Explain the ingredients rule of thumb: *in general* the shorter the ingredients list, the healthier the food choice.
5. Why do you think there are these bad ingredients in food?
6. Does anyone know what a food additive is? Discuss aspects of food additives; color, texture, etc.
    a. Did you know there is a silicone product in McDonald's nuggets that is also in silly putty?
    b. Did any of the **'Healthier Alternative'** foods have food additives? Why not? (A: they are all whole foods)
7. Let's talk money.
    a. Which foods were more expensive?
    b. What is a single meal purchase? Are they really less expensive?
        i. Discuss buying ingredients vs. single meal items and the cost savings
8. Ask some students their unhealthy food choices and an alternative they might be able to eat instead.
9. Print this and pass out for students to take home:

An easy list of healthy inexpensive foods to keep in the house: Whole Carrots, fresh greens (collards, kale, mustard) leaf lettuce (not ice-burg), a bag of apples, bag of potatoes, rice, fresh garlic, honey, quick oats (canister, not packets), cheese (not American or Velveeta), beans (dried or canned).

A list of easy foods to grow at home: lettuce, greens (collards, kale, mustard), herbs (chives, basil, parsley, cilantro, dill), peppers (sweet and hot), okra, tomatoes.

Week 3 Project

Garden Topic 3: Bio-Intensive Gardening

Bio-intensive gardening means each bed is planted with **companion plants**, **succession planting**, and **crop rotation** working together in a system**.** Bio-intensive Gardening allows us to grow more crops in a smaller space and it helps with natural pest control. The most important aspect of bio-intensive gardening is a **nutrient rich soil**.

Here is brief explanation of the different aspects of bio-intensive gardening and why we garden this way:

Succession planting: planting seeds and seedlings at different times so you have a continuous harvest. A good rule of thumb is to plant a 6-8 foot row of each vegetable every 2-3 weeks.

Crop rotation: planting crops that eat different nutrients from the soil, in different parts of the garden each season. Ex: Planting beans (give nitrogen to the soil) in one garden bed this summer, next summer planting collard greens (eat a lot of nitrogen from the soil) where the beans were planted. This is an example of crop rotation.

Inter-planting: planting different types of crops together specifically to deter disease and pests. This is a natural way to control pests and disease.

Companion planting: Planting two or more crops together that benefit from each other, spatially or chemically, kind of like plant-friends **(review Companion Planting handout and YouTube video).**

Four-minute video clip: Companion Planting (**https://youtu.be/G_Acdv-IkdI**)
Materials:

- Laptop
- Projector
- Speakers

Group project: *Who's Your Buddy? (15 min)*

For this game, we will have printouts of different vegetables (tomatoes, corn, basil, carrots, garlic, squash, lettuce, peppers, etc.) and a select few of the participants will hold up the print outs while their classmates tell which plants to stand together. The participants will be allowed to use their Companion Planting handout to help them figure out which plants are other plants' buddies.

- Add more plants to demonstrate "bad buddies" (or, bad companions) to make the game more difficult, only if the children seem to understand the concept of "good buddies".
- Process questions

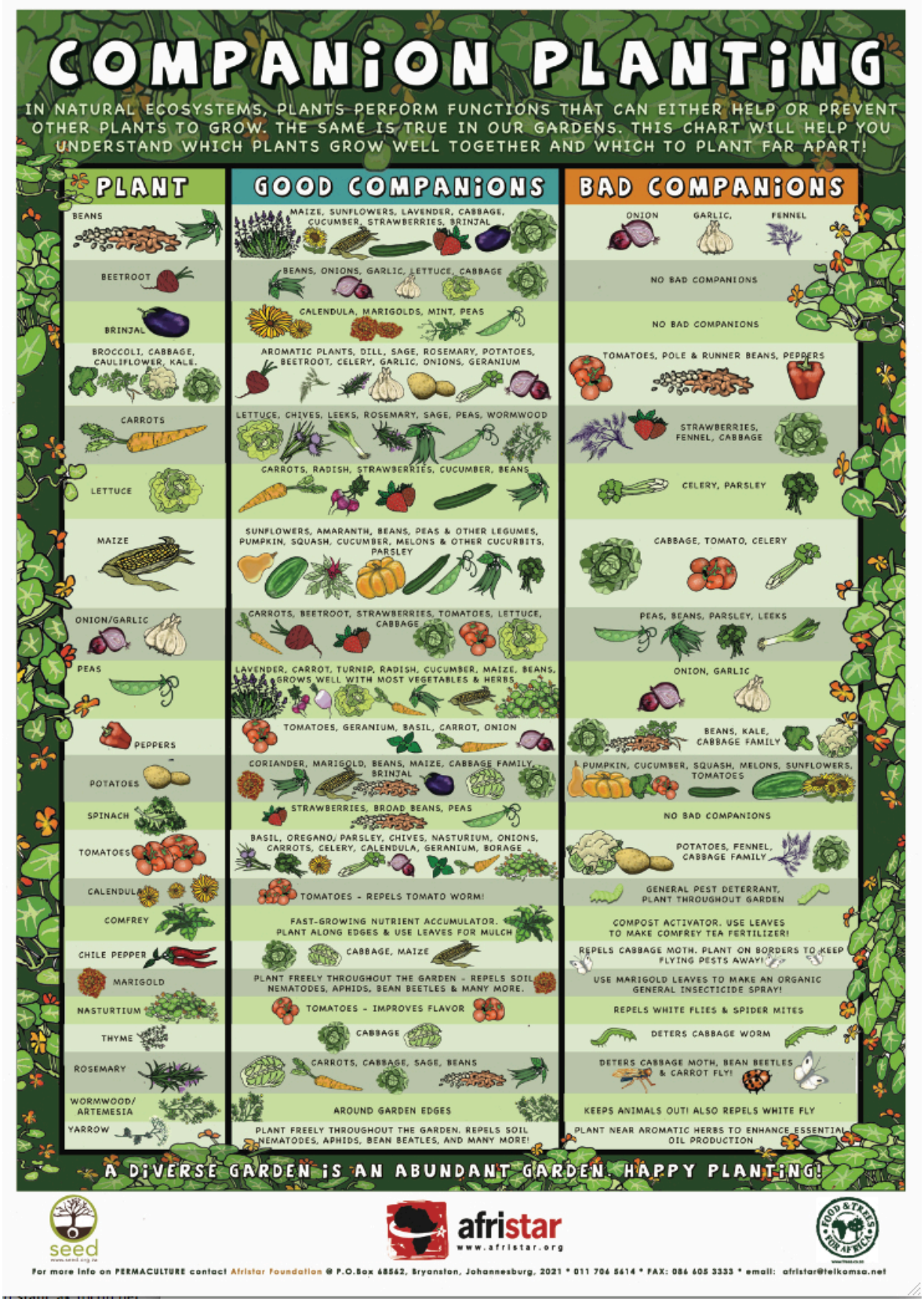


Figure 1.4, Companion Planting handout (courtesy of Permaculture Research Institute, 2016).

Lesson 3: Eating the Rainbow

Overview: Students will learn about the health benefits of eating a variety of fruits and vegetables.
Print handouts for participants (http://www.kidsgardening.org/wp-content/uploads/2016/03/KG_LessonPlans-eatarainbow-1.pdf)

Students will learn:
1. The different parts of a plant.
2. That they need to consume at least 5 fruits and vegetables a day
3. The importance of "eating a rainbow" (a variety of fruits and vegetables)
4. That color can indicate different nutrients available in fruits and vegetables

Time: 1 hour

Materials:

- Plant part chart (below)
- Chalkboard and chalk or dry erase board and markers
- Variety of fruits and vegetables representing different colors
- Small cups
- Toothpicks
- Napkins
- Knife and cutting board

Background Information:

In addition to providing the essential vitamins, minerals, and fiber that keep our bodies working, fruits and vegetables are also linked to health prevention benefits including decreased risk of stroke, cancer, and heart disease; improved memory; and lowered blood sugar levels. These benefits are attributed to **phytonutrients** (also known as **phytochemicals**) – substances in plants that are not recognized as vitamins or minerals, but provide a definite health boost.

Various fruits and vegetables contain different levels and kinds of lifesaving phytonutrients, so to reap the benefits we need to consume a wide variety of produce. Nutrition educators have come up with a handy and fun way to communicate the message: “Eat a Rainbow.”

Many of the phytonutrients are also pigments responsible for the color of fruits and vegetables. Plants have pigments to protect them against environmental factors (such as sunlight) and from harmful byproducts of plant processes like photosynthesis. When we consume fruits and vegetables, we receive benefits from the phytonutrients that are similar to what they provide to the plant – protection from environmental factors and cell damaging chemical byproducts.

Below is a chart from the Vegetable and Fruit Improvement Center with information about fruit and vegetable color, phytonutrient content, health benefits and produce examples. You can adapt this chart to make it age-appropriate for your students.

Color	**Phytonutrient(s) Associated with Color**	**Health Benefit Associated with Phytonutrients**	**Example Fruits and Vegetables**
Red	Lycopene and Anthocyanins	Strengthening collagen proteins in the body Preventing lung, prostate and stomach cancer	Strawberries Tomatoes Watermelon Cherries Red grapefruit
Orange	Beta-carotene and Liminoids	Protecting against chronic bronchitis, asthma and emphysema Reducing the risk of cataracts and lung cancer Decreasing cholesterol levels	Carrots Squash Citrus Melons
Yellow	Liminoids, Beta-carotene and Zeaxanthin	Protecting against chronic bronchitis, asthma and emphysema Reducing the risk of cataracts Decreasing cholesterol levels Protecting vision Preventing tumors and cancer in the colon, breast and prostate glands	Yellow peppers Corn Legumes

Green	Lutein, Saponins and Glucosinolates	Preserving eyesight Maintaining heart and skin health Increasing enzyme activity to detoxify carcinogens Preventing cancer and lowering lipid levels	Spinach Collard greens Broccoli Tomatillos
Blue/ Purple	Anthocyanins and Flavonoids	Strengthening collagen proteins Preventing cancer Providing anti-inflammatory and analgesic benefits	Blueberries Grapes Plums Grapes Raspberries Eggplant

Advanced Preparation: Obtain a variety of fruits and vegetables to sample. Students can sign up to bring in an item (enough for each child in class to have a taste), arrange with your cafeteria to provide some items, or contact local grocery stores for donations. Try to provide enough variety so that each color can be represented by at least two options. Serve each food by itself, either raw or cooked (as much as possible, try to serve fresh foods however canned and frozen foods can be used). Check with your school to see if you need parent permission for tasting activities.

Laying the Groundwork:

Review plant parts, how they serve a plant, and how you identify them with your class. If possible, obtain a model or poster of the parts of a plant and worksheets for students to label the plant parts. The parts include:

Roots: found underground; absorb water and nutrients for growth; store food for plant

Stems: connect leaves to roots; carry water and nutrients from roots to leaves, and carbohydrates and other things from leaves to roots for growth; some provide food storage

Leaves: catch the sun, which gives plants energy to grow; release moisture and oxygen

Flowers: where fruits/seeds form

Fruits: contain seeds

Seeds: form inside fruit; when put in soil, grow into a new plant

Ask, which part of the plant do we eat? Do we eat all parts of all plants? *Our common fruits and vegetables represent different parts of the plant, but we do not eat all parts of all plants.*

Next, ask students why they think it's important for them to eat fruits and vegetables each day. *Fruits and vegetables contain different vitamins and minerals that are essential to our bodies, and they need to eat at least five servings of fruits and vegetables each day.*

Last, encourage students to begin thinking about other ways we can sort fruits and vegetables we eat. What are other characteristics that define different fruits and vegetables? What colors are represented by our fruits and vegetables? *All colors can be found, all though some are more common.*

Exploration:

1. Introduce phytonutrients and fiber, and other health benefits associated with eating produce. Explain that all fruits and vegetables contain different amounts of vitamins, minerals, fiber, and phytonutrients, and eating a lot of different types of fruits and vegetables is important to staying strong and healthy. Introduce the concept of eating a rainbow from the background information. Explain how the different colors of the fruits and vegetables indicate that they contain different vitamins, minerals, and phytonutrients, and that by eating all different colors, you are also getting all the different nutrients.
2. Lead an informal discussion about fruits and vegetables the students like, those they don't like, and those they've not tried. As they talk about various foods, encourage them to use descriptive words such as "sweet," "tangy," or "spicy" rather than "yucky," "okay," or "awesome."
3. Set up a chart on your whiteboard or chalkboard with colored markers or chalk similar to the one below. Ask students to help fill in the blanks with names of vegetables and fruits that you have obtained that match these colors. (We have listed some examples… but feel free to adapt based on availability for your class).

Student/Group Name_____

Color	**Plant Part**	**Raw/Cooked**	**Flavor**	**Try Again?**
Red 1.strawberries 2.tomatoes				
Orange 1. orange 2. carrots				
Yellow 1. pineapple 2. yellow peppers				
Green 1. broccoli 2. kiwi				
Blue/Purple 1. blueberries 2. grapes				

4. Introduce students to the idea of a tasting activity by telling them there are people in the world who have the job of sampling new vegetable and fruit varieties before the seeds are sold to gardeners and farmers, or testing foods that companies package for market. Tell them they'll be playing the role of food tasters during the tasting activity, and like real tasters, will rate flavors, using descriptive words as mentioned above. They'll also note if they'd be willing try each food again.
5. Clean fruits and vegetables thoroughly. Cut each item into bite-sized pieces as necessary. Provide toothpicks, paper cups, and napkins for students to use during the tasting.
6. Fill in the classroom chart with the comments from the students. Take a vote on whether each student will try the fruit or vegetable again.

Making Connections:

Discuss the tasting experience. Ask, which fruits and vegetables were our favorites? Did color have any impact on taste?

Brainstorm a larger list of fruits and vegetables representing different colors. Create a handout for students to take home and encourage them to try new fruits and vegetables with their families.

Academic Connections (Branching Out):

English - Encourage students to keep a journal of their fruit and vegetable consumption for a week after the tasting. Some suggestions for what they might write about include: 1) experiences with new flavors; 2) ways that foods are prepared at their home; 3) if prepared foods or restaurant meals are consumed, what fruits and vegetables are part of those meals; 4) interviews with family members about their favorite fruits and vegetables.

Social Studies - Ask students to find a recent article related to the health benefits of fruits and vegetables in a newspaper or magazine. Instruct them to read the article and then discuss their current event either in writing or by a class presentation. During the discussion of these articles, try to focus on how encouraging healthier behaviors could effect/benefit our society.

Nutrition - Explore the nutritional content of common fruits and vegetables either as an individual or group project. http://www.dole5aday.com/ReferenceCenter/R_Home.jsp Instruct each student to create a brochure on a specific fruit or vegetable or on a specific vitamin (such as Vitamin C). The brochures can be displayed at school, or if resources are available, send copies of all brochures home.

Research/Writing - After the tasting exercise, discuss which of the plants students might like to try to grow. Have them research growing requirements for various crops and come up with a plan for including them in the garden. For assessment purposes, have students record findings in journals; present them in class; or report them via research papers.

Week 4 Project

Garden Topic 4: What is local?

Slide show: 15 min ***Gardens Are Great!***

Materials

Projector
Slide show (courtesy of City Beets)
Short YouTube video (2-minute introduction) (below in Food Miles)

Procedure

1. Does anyone garden outside of this program? Do you know someone who gardens? Do they garden at home or in a community garden?
2. Do you think gardening helps people eat locally? *Instructor Note: Try to convey the message that eating locally also means growing your food not just shopping for local foods.*

Seven Benefits of Eating Local Foods (Klavinski, R., 2016)

- **Locally grown food is full of flavor.** When grown locally, the crops are picked at their peak of ripeness versus being harvested early in order to be shipped and distributed to your local retail store. Many times produce at local markets has been picked within 24 hours of your purchase.
- **Eating local food is eating seasonally.** Even though we wish strawberries were grown year round in Michigan, the best time to eat them is when they can be purchased directly from a local grower. They are full of flavor and taste better than the ones available in the winter that have traveled thousands of miles and picked before they were ripe.
- **Local food has more nutrients.** Local food has a shorter time between harvest and your table, and it is less likely that the nutrient value has decreased. Food imported from far-away states and countries is often older, has traveled and sits in distribution centers before it gets to your store.
- **Local food supports the local economy.** The money that is spent with local farmers and growers all stays close to home and is reinvested with businesses and services in your community.
- **Local food benefits the environment.** By purchasing locally grown foods you help maintain farmland and green and/or open space in your community.
- **Local foods promote a safer food supply.** The more steps there are between you and your food's source the more chances there are for contamination. Food grown in distant locations has the potential for food safety issues at harvesting, washing, shipping and distribution.

- **Local growers can tell you how the food was grown.** You can ask what practices they use to raise and harvest the crops. When you know where your food comes from and who grew it, you know a lot more about that food.

Discussion 5 min

- What does it mean to eat locally?
- Do you think it's a good idea? Why?
- What do you think about this idea?
- How could we discover why people promote the concept?
- How much did the diesel cost per gallon?

Explain 5 min ***Food Miles***

1. Explain the concept of "Food Miles"
    i. **Field to Fork: "Food Miles"** – https://www.youtube.com/watch?v=b7rn5hH5XN8
2. Reference these quick figures for eating locally vs. shipping: **Apples**: Buying local: 61 mi., Shipped in: 1726 mi.; **Beans** Buying local: 65 mi, Shipped in: 1313 mi; **Pumpkins** Buying local: 41 mi, Shipped in: 311 mi; **Cabbage** Buying local: 50 mi, Shipped in: 719 mi.

Lesson 4: Cooking Lab: Local Ingredients

Overview: Participants will learn how to make healthy snacks and prepare meals to share with their families. All of the recipes (and a few more) will be given to the children to take home in the form of a booklet.

Recipes are provided by

http://chefmom.sheknows.com/articles/963111/garden-fresh-vegetable-recipes-your-kids-will-love

http://articles.extension.org/pages/71164/using-veggies-from-school-gardens-in-recipes

http://www.myrecipes.com/recipe/mixed-bean-cherry-tomato-salad-with-basil-vinaigrette

http://www.myrecipes.com/recipe/herby-cucumber-salad

http://www.myrecipes.com/recipe/garden-harvest-cake

http://growing-minds.org/documents/fresh-summer-salsa-recipe-and-lesson-plan.pdf

http://growing-minds.org/documents/lettuce-wrap-recipe-lesson-plan.pdf

http://growing-minds.org/documents/cucumber-stacks-k-2.pdf

http://growing-minds.org/documents/spinach-smoothies.pdf
http://growing-minds.org/documents/sweet-potato-fritters-recipe-and-lesson-plan.pdf
http://growing-minds.org/documents/apple-salad-recipe-and-lesson-plan.pdf
http://growing-minds.org/documents/apple-cabbage-quesadilla-recipe-and-lesson-plan.pdf

Students will learn:

1. To make healthy alternatives for snacks and meals, using local ingredients.
2. That they need to consume at least 5 fruits and vegetables a day
3. The importance of eliminating preservatives and alleviating environmental stress due to food miles.
4. The importance and fun of sharing time and communicating with their family in the kitchen.

Time: 1 hour

Materials:

- Blender/food processor
- Variety of fruits and vegetables appropriate for three easy recipes
    - Garden salsa: http://growing-minds.org/documents/fresh-summer-salsa-recipe-and-lesson-plan.pdf
    - http://growing-minds.org/documents/apple-salad-recipe-and-lesson-plan.pdf
    - http://growing-minds.org/documents/fresh-summer-salsa-recipe-and-lesson-plan.pdf
    - http://allrecipes.com/recipe/14873/garden-veggie-pizza-squares/
- Cookbook handouts
- Small cups and plates
- Cutleries
- Napkins
- Knife and cutting board

Discussion:

- Can you think of how any of your favorite foods could be used in your meals?
- Can you eat vegetables for breakfast? Fruits for dinner? What would you be willing to try in your meals?
- What new ideas do you think you could show your family? Would you like to make it with them?

Group project: *Chef Solus' Build a Meal (15-20 min)*

Materials Needed:

- Laptop/mouse
- Projector
- Speakers
- Caloric handouts (below)
- Website: https://www.brainpop.com/games/chefsolusbuildameal/

For this project, we will gather the participants in small groups (no more than 4) to work together to build a hypothetical meal plan for their day. The interactive game, developed by BrainPOP (2016), will demonstrate the basic daily nutritional values that children need to satisfy, based on a diet of 1,800-2,000 calories per day (which is partly dependent upon their activity level).

Handouts based on activity level:

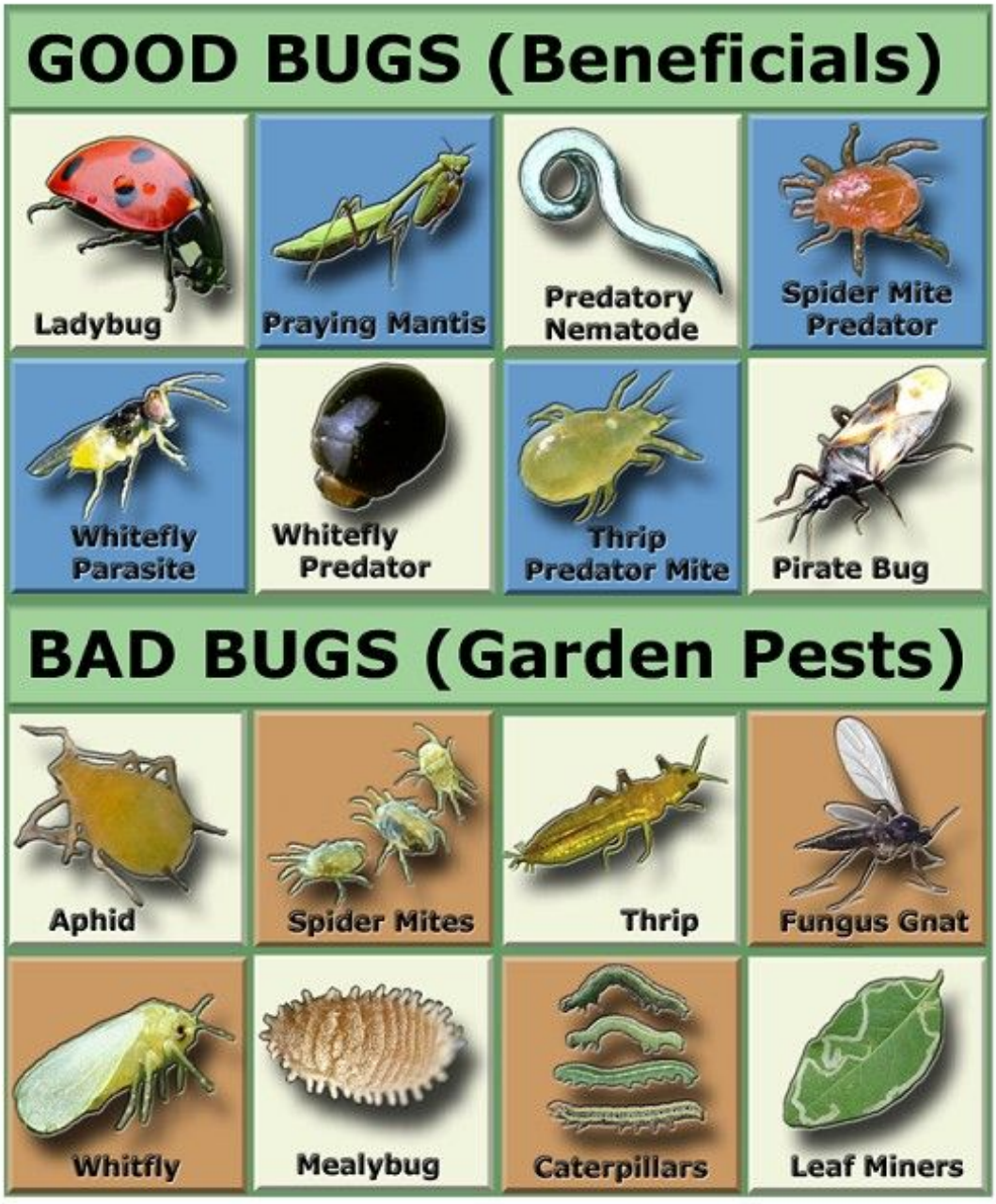
2,000 meal plan:
https://www.brainpop.com/games/chefsolusbuildameal/PDF_Meals/2000mealplan.pdf

1,800 meal plan:
https://www.brainpop.com/games/chefsolusbuildameal/PDF_Meals/1800mealplan.pdf

Week 5 Project

Garden Topic 5: Insects in the Garden!

If you look in the garden what do you see? Plants? Soil? Anything else? Look closely and you will see there is a lot of action! Our garden is filled with a variety of insects all doing different jobs. There are all different types of insects in the garden, some even help us garden!



https://s-media-cache-ak0.pinimg.com/736x/bb/10/1e/bb101ee04167ef0440725068151574a2.jpg

Look at your insect sheet, why is one side called **'good bugs?'**

- ✓ What might the good bugs do?

Why is one side called **'bad bugs?'**

- ✓ What might the bad bugs do?

There are many different things we can do in the garden to help repel 'bad bugs.' We won't use any chemicals because we grow our food organically and so here are a few methods we will use and you could try at home.

Natural Pest Control

Inter-planting: planting different crops together so one bug or disease won't affect entire crop.

Trap crops: planting a crop to draw a pest away from another crop. Ex: planting radish near eggplant to draw flea-beetle away from the eggplant. The radish greens will be eaten but the bulb will still develop so that the eggplant might be spared.

Nitrogen levels in the soil: if nitrogen levels are too high it might attract certain pests, like aphids to the garden.

Natural insecticidal sprays: (see printed sheet for recipes and instructions)

Dealing with fungus: (white fuzzy spots on plant leaves, or rotten flowers, usually cucumber, zucchini, tomato, melons, squash)

- ✓ Prevention: don't overhead water; overhead watering can carry fungal spores from plant to plant.
- ✓ Care during: Inspect plants regularly, if you find fungus, cut off leaves
- ✓ Discard infected leaves in the trash or an area of the property FAR AWAY FROM THE COMPOST PILE

Lesson 5: Pollinator Garden and Honey Tasting

Insect and Pollinator Information (lesson plan provided by: http://www.pollinator.org/education#cr)

Discuss the basics about insects, what are pollinators, and why do we need them: ~20-25 minutes

ANATOMY

Insects (including butterflies, flies, beetles, bees, dragonflies, ants, and many others) are characterized by six (6) legs, three (3) body parts [HEAD, THORAX, and ABDOMEN], a hard EXOSKELETON and COMPOUND EYES. Most insects have a pair of ANTENNAE and two (2) pairs of wings.

Spiders are NOT insects, but like insects and are ARTHROPODS (jointed legs, hard outer layer).

They have eight (8) legs, compound eyes, an exoskeleton and two (2) body parts [HEAD and CEPHALOTHORAX]. Some spiders have URTICATING HAIRS which they will throw at a predator when attacked. This defense stings the predator's eyes and temporarily blinds it.

BEHAVIOR

Insects can be herbivorous or carnivorous. Some insects are pests to humans: mosquitoes feed on mammalian blood, aphids and scale insects infest our gardens and wasps produce a nasty sting.

But many more insects are incredibly beneficial to humans: bees, beetles and butterflies pollinate our gardens and crops, making possible such foods as chocolate, honey, nuts and most fruits; some insects are decomposers, helping to breakdown dead material; and other insects, like ladybugs and praying mantis, feed on pest insects. Even mosquitoes and many other insects are food for other animals.

Flowers have adapted various attributes (color, scent, shape, size) to attract certain pollinators such as bees, butterflies and hummingbirds. These pollinators sip sweet nectar from the flower, collect pollen and carry this pollen to the next flower of the same species (or in some cases, the pollinator moves the pollen within the same flower), thus fertilizing the flower.

Types of pollinators in the Montgomery County area include:

Monarch Butterflies: let milkweed grow, this wild native plant might plant itself or it can be found in plant and seed stores.

Parasitic Wasps (kill caterpillars in the garden by laying eggs on them)**:** plant thyme, lovage, savory, sweet alyssum, dill, and cilantro.

Swallowtail Butterflies: plant dill

Bats: plant late day blooming and night scented plants like evening primrose, phlox, night flowering Silene catchfly, fleabane, goldenrod. If you don't have trees near by build a bat-box to hang and plant a tree for future bats!

Humming birds: Plant zinnia, scarlet runner bean, lantana, cardinal flower, hosta, and columbine.

What are pollinators? Why do we need them?

Materials:

Projector
Laptop
Speakers
Crayons
Notepads/journals
Handouts ("Meet the Pollinators: http://www.fws.gov/uploadedFiles/Meet%20the%20Pollinators%20poster%20re-ordered.pdf) & ("Pollinator Friendly Practices:

http://www.fws.gov/uploadedImages/Region_2/NWRS/Zone_2/Bosque_del_Apache/Sections/Cosa/sign_pollinators.jpg)

Procedure:

Pass out the handout, titled "Get to Know Pollinators" & the handout "Pollinator Friendly Practices"

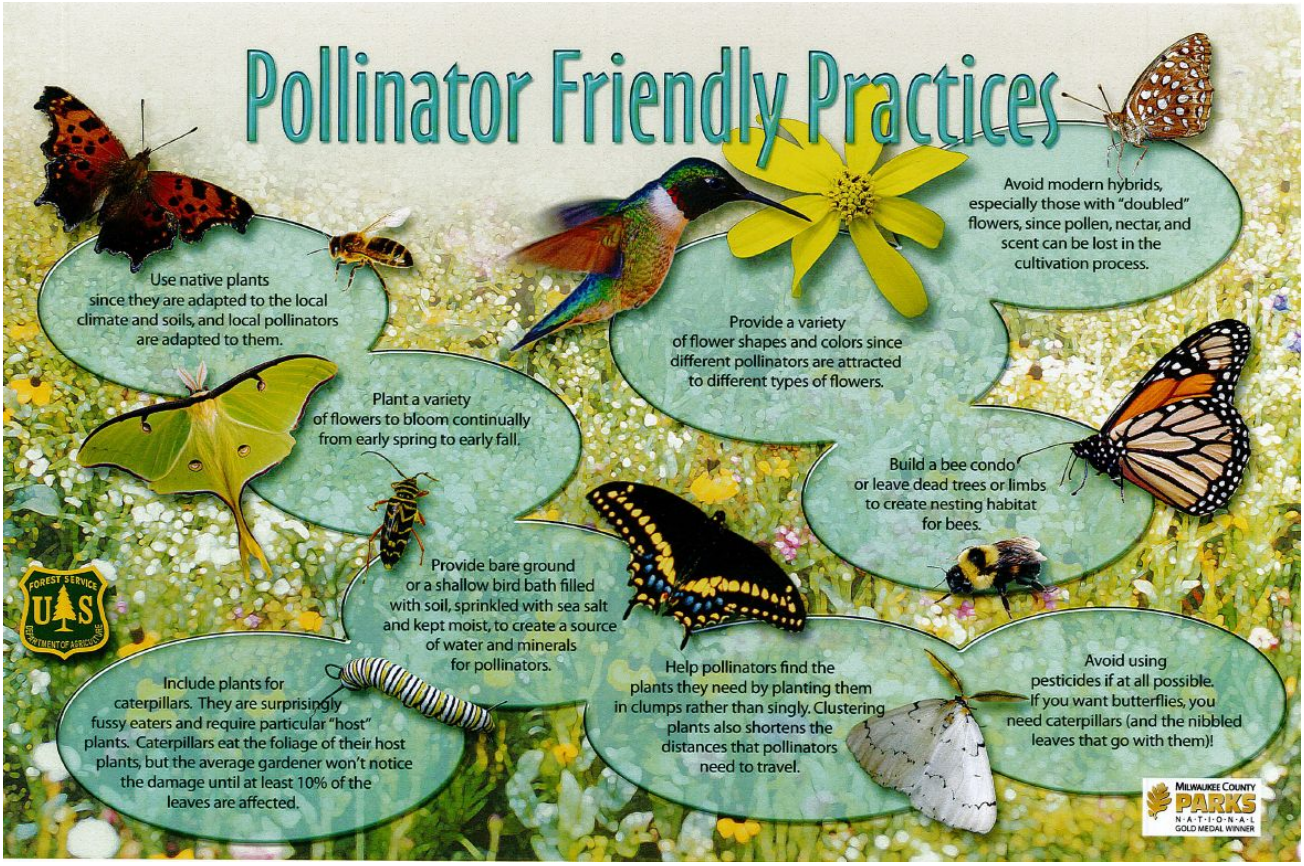
Play YouTube video, titled "'Pollen' a Stop Motion Science animation video: Pollination, Flower, Nectar Lesson for Kids" (https://youtu.be/zy3r1zlC_IU) (2:40)

Play YouTube video, titled "Why Are Bees Important" (https://youtu.be/YaaQUGPXtnU) (5:43)

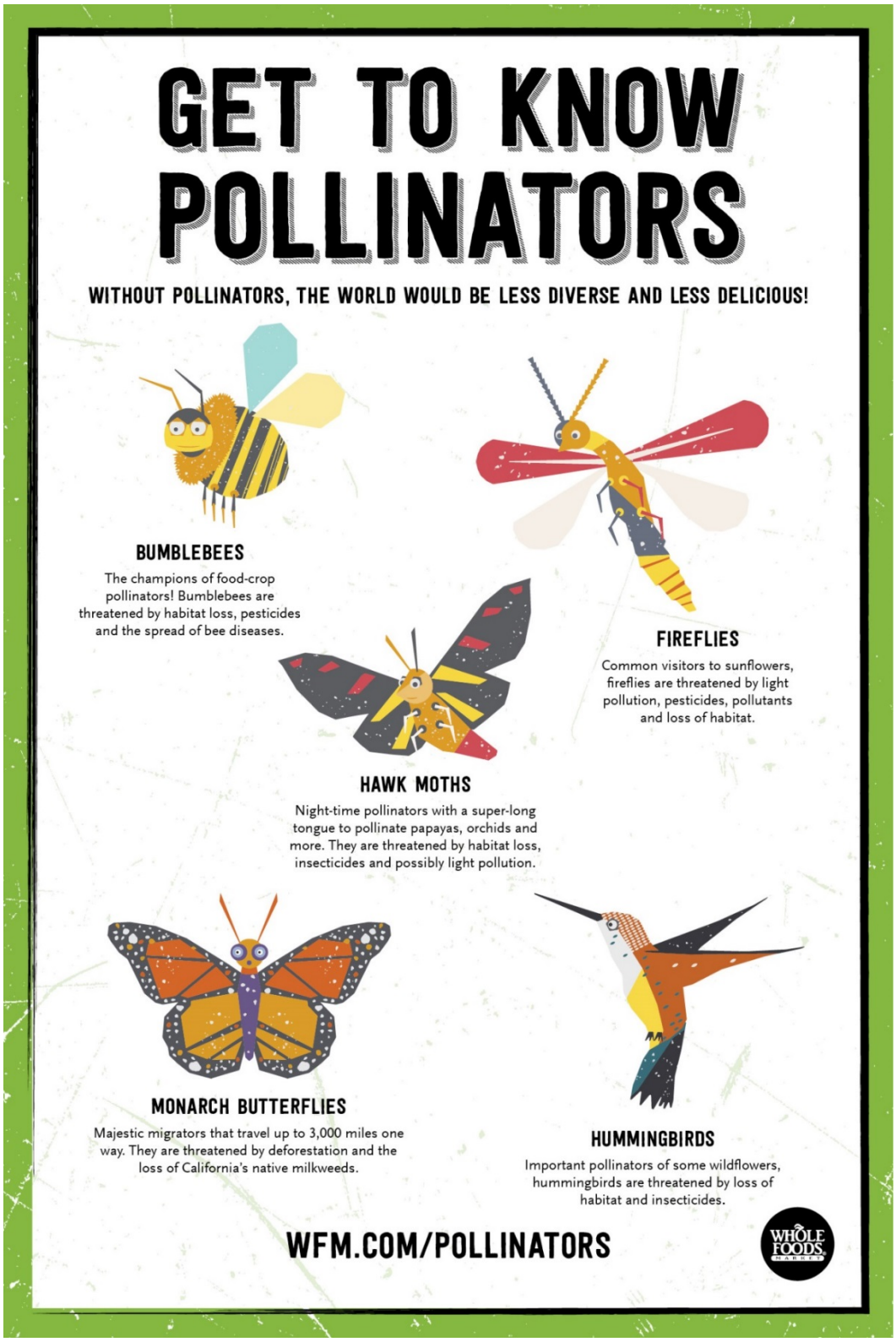
Explain what types of foods we wouldn't have if we didn't have bees:

Source: Bush, M. (2016)

After reviewing the content related to the pollinator handouts, take the participants out to the pollinator garden and let them explore. Encourage children to draw their favorite flower in their journal



Source: U.S. Fish & Wildlife Services, 2016



Source: Whole Foods Market (2016)

Honey Tasting – approximately 15-20 minutes

Overview: In order to introduce the participants to the different types of real honey and their unique flavors, which are the result of pollination with different plants, it is important to demonstrate their different flavors with honey samples.

Materials:

Honey (at least four different flavors)
Small spoons
Squeeze bottles (to distribute honey)
Water

Students will learn:

1. To differentiate how honey can taste differently based on bees interactions with different plants and their pollen.
2. How to creatively use their taste buds to express food preferences.

Discussion:

- Can you tell the difference between the honeys you tasted today? Which one was your favorite?
- How do you think you could use this honey in food? Could you use it instead of sugar?
- Do you think bees are important to our environment? Why or why not?

Week 6 Project

Garden Topic 6: Plant Care

Time: ~1 hour

Trellising: Trellising means tying any vining or droopy plants up to stakes for support. We use various stakes in our garden; any long, sturdy stick will do. At home, you can use regular sticks or old broom handles. An easy way to trellis is to build a 3-pole teepee with poles. Wrap string or twine around the sticks for the plant to climb. For some plants like tomatoes you have to tie the plant to the stake because they don't climb themselves.

- ✓ ***Go to the garden and look at an example of trellising***

Harvest: Whenever harvesting, be gentle with the plant. We need the plants to stay healthy so we can keep harvesting for families and snacks. Always use both hands when harvesting, use one hand to brace the plant and the other to pick

- ✓ ***Instructor demonstrates proper harvest using lettuce and then a pepper or berry.***

Always keep your harvest separated in the clear bins so it is easy to rinse and package, ***this makes less work for you!***

Weeding: We weed some wild plants because they compete with our crops for sunshine, space, and water. Be very careful NOT to weed out any seeds we planted. Sometimes these look like weeds when they first sprout. **Weeds are not evil!** Some weeds are edible and we let them grow, like dandelions. **Always weed out Bind-weed** (a vine that wraps around all over the crops we are growing) and **Johnston Grass** (a giant grass that looks a little like corn sprouting) **Thistle** (a spiky plant that looks like dandelion, use gloves-ouch!) (pass around pictures). **DO NOT put these weeds in the compost piles! Put weeds in the big barrels with water. We do this to kill the weeds so they don't grow in our compost.**

Watering: Always check your garden to see if it needs water. Watering is very important and is up to you!

1. Stick your finger into the soil near the base of the plant
2. Smear the soil between your fingers and thumb
3. If you see mud, don't water
4. If you see dust, water! **Water the soil, not the plant!**

Bring the participants inside for a short movie where a grandma reads a book about harvesting plants.
YouTube book: "Pick, Pull, Snap" (https://youtu.be/fVVliYB9x70) (9:59)

Materials:
Laptop
Speakers
Projector/screen

Discussion:

What did you like about this story? What didn't you like?

Did you see the trellises that grandma pointed to in the story?

Do you think you could pick and harvest plants better after hearing this story and our time out in the garden?

Hands-on activity #1: Plant crowns

Time: ~45-60 minutes

Materials:

printouts of plants (http://growing-minds.org/documents/introducing-vegetables-materials.pdf) (Growing Minds, 2016)

Vegetable Crown Supplies (Lesson plan provided by Growing Minds, 2016)

-Long, 2" strips of white paper
-Colored construction paper to make vegetable shapes or crayons to color in the shapes
-Glue Sticks
-Marker (Preferably Sharpie)
-Stapler
-Student Names (Optional)

Preparation

You will need to make long, 2" strips of white paper, which will be the base of the crowns. Cut out and prepare vegetable shapes to glue on the crowns. Use the Vegetable cut-out pages to help make squash, carrot, beet, tomato and apple shapes. Do not limit yourself to these examples – create more shapes of vegetable and fruits that grow in your area!

Vegetable Exploration

Show the students the fresh vegetables that correlate with the paper vegetable cut outs the kids will glue to their vegetable crowns (squash, carrot, beet, tomato, and apple). Hold up each

vegetable and ask the students to tell you its name. Have they tried the vegetable or fruit (ask the students to raise their hands when they see a vegetable they have tried)? Ask them to guess which parts of the vegetables they can eat – e.g. carrot-just the roots, beets-the roots and the tops, apple-everything except the stem and seeds, tomato and squash-the whole thing.

Taste the Carrots (Optional)

Pass out the pieces of carrot and ask each student to try one. Ask them to describe how the carrot tastes and feels. Is it sweet or salty? Is it soft or crunchy?

Make the Crowns

Give each participant one of each of the vegetable shapes, one white strip of paper, crayons, and a glue stick. Ask that the participants share crayons and to color in their vegetables. Ask the students to glue the vegetables and fruits onto their crowns. When the glue has dried, help the students assemble their crowns by stapling the ends of the white strips together to the crown fits on the students' head.

Add the students' names to the crowns (Optional)

At the beginning of the program, everyone is working on learning one another's names. An optional activity is to ask each student to write his/her name in large print on the strip of white paper. They can then glue the fruits and vegetables on the paper strip around their names.

Hands-on activity #2: Plant a Seedling

Lesson plan provided by American Association for the Advancement of Science (2010)

Time: ~20-30 minutes

What you need:

- Seeds (any kind that would do well for your area, make a variety and [*optional*] let the participants pick which seeds they want to plant) (see note below)
- Biodegradable egg crates (or other small containers)
- Large plastic tray (to catch the water)
- Small plastic cups (to water the seedlings)
- Soil
- Pencil
- Popsicle sticks

Note: If you're using seeds from a seed packet, follow the planting instructions on the packet. You can use dried beans from the cupboard, but you may want to soak them in water for a couple hours first.

Procedure:

Seeds come in all shapes, sizes, and types. There are some seeds that are so tiny, they look like dust. Other seeds, though, can be as big as a basketball! Seeds remain asleep until they are given soil, water, and light. In fact, all plants need certain things to grow, including: room to grow, the right temperature, light, water, air, nutrients, and time.

Have you ever wondered how a seed becomes a plant? Now is your chance to find out! You get to grow a plant from a seed!

What to do:

1. Place your cup on a table covered with newspaper to protect the table. (You could also work outside.)
2. Poke a hole in the bottom of the egg crates with a pencil.
3. Fill the crate almost full with soil.
4. Make a couple holes in the soil with your finger or pencil.
5. Place one or two seeds in the hole and cover them with soil.
6. Place plastic tray under crates, water the seeds, and place the crates in a sunny spot.
7. Water the soil when it looks dry. If you stick your finger one inch into the soil and it feels dry, then water your plant. When you water the plant, moisten the soil by using enough water so that it starts to come out of the hole in the bottom of the cup.
8. Remember that it takes time to grow and care for plants. Some plants require more time to grow than others.

Week 7 Project

Garden Topic 7: Recycling

Lesson plan covered by: ReCommunity (2015a)
http://www.recommunity.com/wp-content/themes/recommunity/pdf/ReLessonPlan_1-5.pdf

Time: 45 – 60 minutes

Part 1- Introduction to Recycling

Most students today are already familiar with the concept of recycling. The purpose of this lesson is to:

- Educate students about the importance of recycling.
- Teach students which items can be recycled.
- Motivate students to recycle whenever possible, at school and at home.

Materials:

A four-pound weight or something equivalent

Section 1: How much trash is there?

The average person in this country creates more than four pounds of trash daily. You can give students a visual by showing a bag of trash or passing a four-pound dumbbell around the room. Teaching Tip: To show how quickly this can add up, multiply four pounds by the number of students in class; and that number by seven to show how much trash the class produces in a week and then by 52 to illustrate how quickly this can add up.

Explain that there is only so much room in landfills and many items sit for hundreds of years before “decomposing, or breaking down to become dirt”. And some materials, like Styrofoam and glass, never break down and they take up space in landfills forever. In addition to taking up ground space, trash in landfills pollutes the air we breathe. It has become necessary to keep trash out of landfills and in the product chain for years- that’s where recycling comes in.

Section 2: What is recycling?

To “recycle” something means to use it again. Ask students what they know about recycling and why they think it is so important.

Questions to encourage classroom participation:

"Does your family recycle at home?"
"Do they separate the recycling or collect it in one bin?"
"Do they take the recycling to a facility or put it on the curb with the rest of the trash?"
"How do you help with recycling at home?"

Explain that when recycling is picked up, it goes to a facility where the different materials are separated. The materials are then cleaned, broken down and turned into new products, Sometimes the material from one item will be used to create an entirely different item. For instance, a water bottle can be recycled into an article of clothing or an area rug.

Part 2 – Videos

Section 1

The videos explain how products go from the bin, through the recycling process and back on store shelves to be enjoyed again.

Materials:

Laptop
Speakers
Projection screen

Videos:

- "ReCommunity: How Recycling Works" https://vimeo.com/51933771
- "ReCommunity: Materials Recovery Facility" https://vimeo.com/51939288
- "ReCommunity: Cans: How they are recycled" https://vimeo.com/51939823

Section 2: If you're not sure, check the symbol

Explain that in order to make recycling easier, all recyclable products feature a recycling symbol and a code that can usually be found at the bottom of the item. The recycling symbol means the product can go around the usage chain many times. The code inside the logo tells us what type of material the product is made from and whether it can be recycled in your area. Print the recycling code chart below to review with students.

Materials:

Handouts of the recycling signs located on page 3 of the ReCommunity (2016a) lesson plan.

Printouts of recyclable diagram: http://www.recommunity.com/wp-content/uploads/2012/05/re_acceptable_materials_resedential_print.pdf (ReCommunity, 2015b).

Hands-on activity: Recycling game

Time: 15-20 minutes

Materials:

Four recycling bins

A sign on each recycling bin (one for glass, paper, plastic, and cans)

An assortment of recyclable materials

Create four equal teams, if possible. Within those teams, give each group an assortment of recyclable materials (glass, paper, plastic, and cans). With the use of their recyclable handouts, ask the kids to recycle the materials in the correct bins. Each group will be timed and the winning team gets a free pencil (or some other small prize).

Week 8 Project

Garden Topic 8: Post-test

Time: 30-60 minutes
Materials: Pre-test/Post-test, urban garden participants, small treat
Procedure:

Distribute the same test that was given at the beginning of the program to all of the participants. All participants fill out an evaluation. The evaluation asks what they already know about food, as well as getting a general profile of their daily eating habits. If some of the participants are too young, we can do a separate group session or individual interview. All materials received at the end of the interview remain anonymous.

Hands-on activity: Salad party

Prior to week 8's class, the salad party, food items should be collected and prepared a day in advance. Food should include items which can be found in our garden and potentially from local farming/gardening organizations if we do not have enough.

Participants will be divided into two groups and asked to help prepare easier food items, such as salad and a cold garden veggie pizza and a cold fruit pizza.

- Group one (giant salad): Use as many harvested veggies as possible.
    - Make salad dressings: homemade yogurt ranch and honey mustard chive (find recipes below)
    - Refrigerate immediately until ready to be served.
- Group two (cold pizzas): Cold garden veggie pizza and cold fruit pizza.
- The instructor should prepare the chicken in advance (marinate, bake/grill, and dice), which should be refrigerated until ready to be eaten. The chicken can be used to accompany the salad.

Items needed for salad party:

1. Lettuce/leafy greens (spinach, kale, sweet pea greens, etc.)
2. Chicken breast
3. Parsley
4. Garlic powder
5. Onion powder
6. Black pepper
7. Salt
8. Fresh chives
9. Greek yogurt
10. Buttermilk
11. Dijon mustard
12. Lemon juice
13. White vinegar
14. Honey
15. Olive oil

Recipes

Homemade Greek yogurt ranch dressing (Show Me the Yummy, 2016)
(http://showmetheyummy.com/homemade-greek-yogurt-ranch-dressing/)

Honey mustard chive dressing (Food.com, 2006)
(http://www.food.com/recipe/mustard-chive-vinaigrette-200604)

Resources

American Association for the Advancement of Science. (2010). Plant investigation. Retrieved on May 12, 2016 from http://seeds.sciencenetlinks.com/investigation/

BrainPOP. (2016). Chef Solus' build-a-meal [interactive game]. Retrieved on May 9, 2016 from https://www.brainpop.com/games/chefsolusbuildameal/

Bush, M. (2015). Foods pollinated by bees. Retrieved on May 12, 2016 from https://nohoneymoproblems.files.wordpress.com/2015/02/foods-pollinated-by-bees.png?w=764&h=526

Five Rivers Metroparks. (2015). City Beets: Curriculum. Retrieved on February 12, 2016 from http://www.metroparks.org/GetOutside/CityBeets.aspx

Growing Minds. (2016). Lesson plans: Introducing vegetables (K-2). Retrieved on May 9, 2016 from http://growing-minds.org/lesson-plans/introducing-vegetables/

KidsGardening.org. (2016a). Lesson plans: Mulch lasagna. Retrieved on April 26, 2016 from http://www.kidsgardening.org/classroom-projects/building-soil-natures-way-exploring-decomposition-and-soil-health

KidsGardening.org. (2016b). Lesson plans: Eat a rainbow [handout]. Retrieved on May 9, 2016 from http://www.kidsgardening.org/wp-content/uploads/2016/03/KG_LessonPlans-eatarainbow-1.pdf

Klavinski, R. (2016). 7 benefits of eating local foods. Retrieved on May 9, 2016 from http://msue.anr.msu.edu/news/7_benefits_of_eating_local_foods

Morris, J. L, Koumjian, K. L., Briggs, M., & Zidenberg-Cherr, S. (2002). *Nutrition to Grow On*: A garden-enhanced nutrition education curriculum for upper-elementary schoolchildren. *Journal of Nutrition Education and Behavior*, *34*(3), 175-176.

Permaculture Research Institute. (2016). Companion planting [handout]. Retrieved on May 9, 2016 from http://permaculturegloba l.org/system/post_images/13/original/Companion%20Planting%20FTFA.jpg?1296661915

ReCommunity. (2015a). Start recycling today lesson plan [PDF]. Retrieved on May 25, 2016 from http://www.recommunity.com/wp-content/themes/recommunity/pdf/ReLessonPlan_1-5.pdf

ReCommunity. (2015b). Acceptable materials residential guide to single bin recycling [PDF]. Retrieved on May 25, 2016 from http://www.recommunity.com/wp-content/uploads/2012/05/re_acceptable_materials_resedential_print.pdf

Show Me the Yummy. (2016). Homemade Greek yogurt ranch dressing. Retrieved on May 29 from http://showmetheyummy.com/homemade-greek-yogurt-ranch-dressing/

U.S. Fish & Wildlife Services. (2016).Pollinator Friendly Practices. Retrieved on May 12, 2016 from http://www.fws.gov/uploadedImages/Region_2/NWRS/Zone_2/Bosque_del_Apache/Sections/Cosa/sign_pollinators.jpg

Urban Sunshine. (2016). Don’t let it bug you. Retrieved on May 12, 2016 from https://www.urbansunshine.com/content/index.php?page=don-t-let-it-bug-you

Appendix A: Additional Photographs from the garden in Israel (Baqa El-Gharbiya) (Appendix A of grant proposal)

The front entrance to the kindergarten.

A rear view of the kindergarten.

A sample layout of raised flower beds and vegetable beds.

Recycled tires used for housing plants.

A second sample of raised flower and vegetable beds.

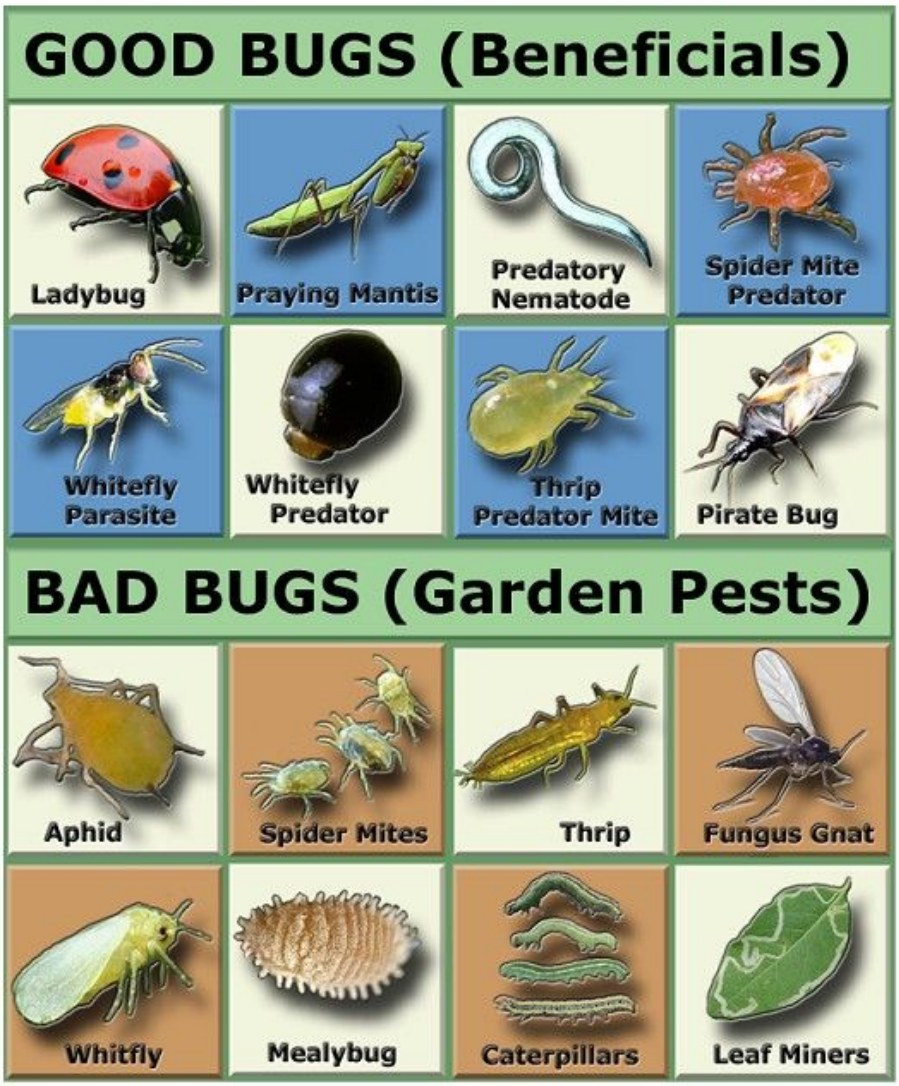
The children dressed in their bee costumes as they sang to the visitors.

Appendix B: Pilot (Condensed) Curriculum

Week 5 Project

Garden Topic 5: Insects in the Garden!

If you look in the garden what do you see? Plants? Soil? Anything else? Look closely and you will see there is a lot of action! Our garden is filled with a variety of insects all doing different jobs. There are all different types of insects in the garden, some even help us garden!



https://s-media-cache-ak0.pinimg.com/736x/bb/10/1e/bb101ee04167ef0440725068151574a2.jpg

Look at your insect sheet, why is one side called **'good bugs?'**

- ✓ What might the good bugs do?

Why is one side called **'bad bugs?'**

- ✓ What might the bad bugs do?

There are many different things we can do in the garden to help repel 'bad bugs.' We won't use any chemicals because we grow our food organically and so here are a few methods we will use and you could try at home.

Natural Pest Control

Inter-planting: planting different crops together so one bug or disease won't affect entire crop.

Trap crops: planting a crop to draw a pest away from another crop. Ex: planting radish near eggplant to draw flea-beetle away from the eggplant. The radish greens will be eaten but the bulb will still develop so that the eggplant might be spared.

Nitrogen levels in the soil: if nitrogen levels are too high it might attract certain pests, like aphids to the garden.

Natural insecticidal sprays: (see printed sheet for recipes and instructions)

Dealing with fungus: (white fuzzy spots on plant leaves, or rotten flowers, usually cucumber, zucchini, tomato, melons, squash)

- ✓ Prevention: don't overhead water; overhead watering can carry fungal spores from plant to plant.
- ✓ Care during: Inspect plants regularly, if you find fungus, cut off leaves
- ✓ Discard infected leaves in the trash or an area of the property FAR AWAY FROM THE COMPOST PILE

Lesson 5: Pollinator Garden and Honey Tasting

Insect and Pollinator Information (lesson plan provided by: http://www.pollinator.org/education#cr)

Discuss the basics about insects, what are pollinators, and why do we need them: ~20-25 minutes

ANATOMY

Insects (including butterflies, flies, beetles, bees, dragonflies, ants, and many others) are characterized by six (6) legs, three (3) body parts [HEAD, THORAX, and ABDOMEN], a hard EXOSKELETON and COMPOUND EYES. Most insects have a pair of ANTENNAE and two (2) pairs of wings.

Spiders are NOT insects, but like insects and are ARTHROPODS (jointed legs, hard outer layer). They have eight (8) legs, compound eyes, an exoskeleton and two (2) body parts [HEAD and CEPHALOTHORAX]. Some spiders have URTICATING HAIRS which they will throw at a predator when attacked. This defense stings the predator's eyes and temporarily blinds it.

BEHAVIOR

Insects can be herbivorous or carnivorous. Some insects are pests to humans: mosquitoes feed on mammalian blood, aphids and scale insects infest our gardens and wasps produce a nasty sting.

But many more insects are incredibly beneficial to humans: bees, beetles and butterflies pollinate our gardens and crops, making possible such foods as chocolate, honey, nuts and most fruits; some insects are decomposers, helping to breakdown dead material; and other insects, like ladybugs and praying mantis, feed on pest insects. Even mosquitoes and many other insects are food for other animals.

Flowers have adapted various attributes (color, scent, shape, size) to attract certain pollinators such as bees, butterflies and hummingbirds. These pollinators sip sweet nectar from the flower, collect pollen and carry this pollen to the next flower of the same species (or in some cases, the pollinator moves the pollen within the same flower), thus fertilizing the flower.

Types of pollinators in the Montgomery County area include:

Monarch Butterflies: let milkweed grow, this wild native plant might plant itself or it can be found in plant and seed stores.

Parasitic Wasps (kill caterpillars in the garden by laying eggs on them)**:** plant thyme, lovage, savory, sweet alyssum, dill, and cilantro.

Swallowtail Butterflies: plant dill

Bats: plant late day blooming and night scented plants like evening primrose, phlox, night flowering Silene catchfly, fleabane, goldenrod. If you don't have trees near by build a bat-box to hang and plant a tree for future bats!

Humming birds: Plant zinnia, scarlet runner bean, lantana, cardinal flower, hosta, and columbine.

What are pollinators? Why do we need them?

Materials:

Projector
Laptop
Speakers
Crayons
Notepads/journals
Handouts ("Meet the Pollinators: http://www.fws.gov/uploadedFiles/Meet%20the%20Pollinators%20poster%20re-ordered.pdf) & ("Pollinator Friendly Practices: http://www.fws.gov/uploadedImages/Region_2/NWRS/Zone_2/Bosque_del_Apache/Sections/Cosa/sign_pollinators.jpg)

Procedure:

Pass out the handout, titled “Get to Know Pollinators” & the handout “Pollinator Friendly Practices”

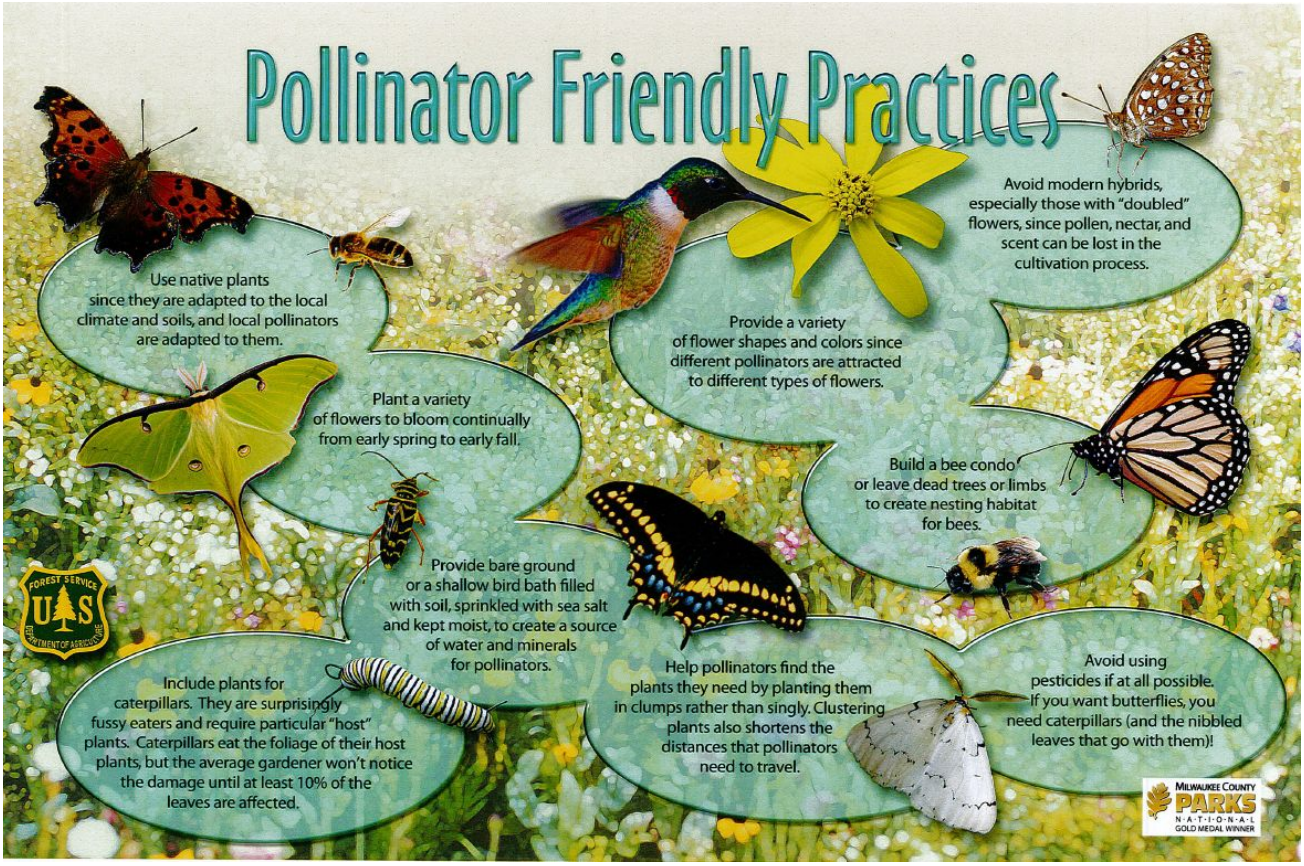
Play YouTube video, titled “’Pollen’ a Stop Motion Science animation video: Pollination, Flower, Nectar Lesson for Kids” (https://youtu.be/zy3r1zlC_IU) (2:40)

Play YouTube video, titled “Why Are Bees Important” (https://youtu.be/YaaQUGPXtnU) (5:43)

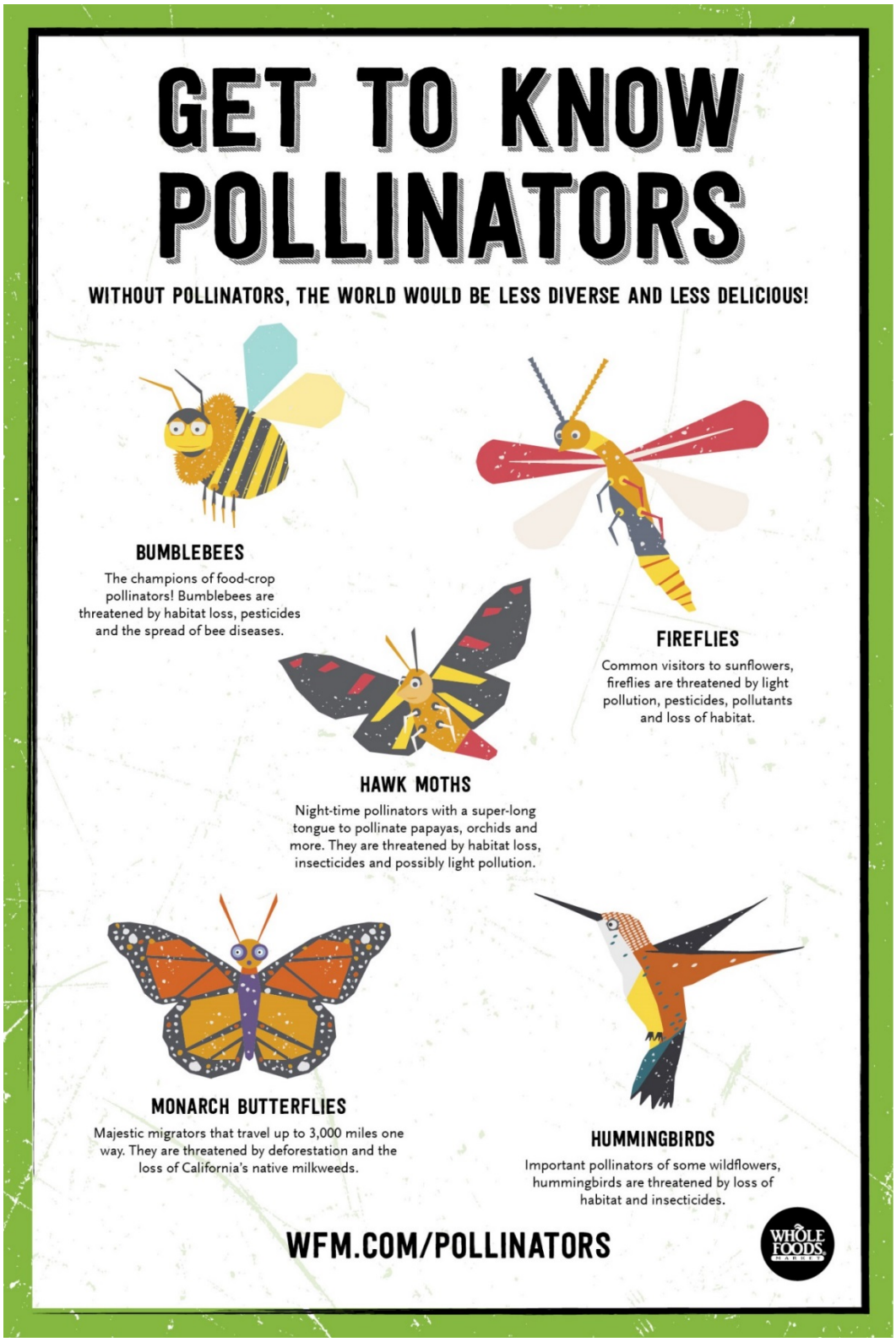
Explain what types of foods we wouldn’t have if we didn’t have bees:

Source: Bush, M. (2016)

After reviewing the content related to the pollinator handouts, take the participants out to the pollinator garden and let them explore. Encourage children to draw their favorite flower in their journal



Source: U.S. Fish & Wildlife Services, 2016



Source: Whole Foods Market (2016)

Herb bags – approximately 15-20 minutes

Overview: In order to introduce the participants to the different types of pollinating plants and their unique properties (e.g. smell, taste, color), we will gather dried herbs and let them sample different things to take home. These plants, which enable pollinators to thrive, are important to demonstrate to young children and encourage them to not be afraid of bees.

Materials:

Herbs (lavender, chives, cilantro, etc.)
Small linen satchels
Pencil/pen
Paper to label

Students will learn:

1. To differentiate how herbs can taste and smell differently and how pollinators interact with them.
2. How to creatively use their senses to express food preferences.

Discussion:

- Can you tell the difference between the herbs you saw today? Which one was your favorite?
- Do you think you could use any of the herbs in your food?
- Do you think insects are important to our environment? Which was your favorite pollinator?

Garden Topic: Food Economics: What is Local?

Slide show: 15 min ***Gardens Are Great!***

Materials

Projector
Slide show (courtesy of City Beets)
Short YouTube video (2-minute introduction) (below in Food Miles)

Procedure

3. Does anyone garden outside of this program? Do you know someone who gardens? Do they garden at home or in a community garden?
4. Do you think gardening helps people eat locally? *Instructor Note: Try to convey the message that eating locally also means growing your food not just shopping for local foods.*

Seven Benefits of Eating Local Foods (Klavinski, R., 2016)

- **Locally grown food is full of flavor.** When grown locally, the crops are picked at their peak of ripeness versus being harvested early in order to be shipped and distributed to your local retail store. Many times produce at local markets has been picked within 24 hours of your purchase.
- **Eating local food is eating seasonally.** Even though we wish strawberries were grown year round in Michigan, the best time to eat them is when they can be purchased directly from a local grower. They are full of flavor and taste better than the ones available in the winter that have traveled thousands of miles and picked before they were ripe.
- **Local food has more nutrients.** Local food has a shorter time between harvest and your table, and it is less likely that the nutrient value has decreased. Food imported from far-away states and countries is often older, has traveled and sits in distribution centers before it gets to your store.
- **Local food supports the local economy.** The money that is spent with local farmers and growers all stays close to home and is reinvested with businesses and services in your community.
- **Local food benefits the environment.** By purchasing locally grown foods you help maintain farmland and green and/or open space in your community.
- **Local foods promote a safer food supply.** The more steps there are between you and your food's source the more chances there are for contamination. Food grown in distant locations has the potential for food safety issues at harvesting, washing, shipping and distribution.
- **Local growers can tell you how the food was grown.** You can ask what practices they use to raise and harvest the crops. When you know where your food comes from and who grew it, you know a lot more about that food.

Discussion 5 min

- What does it mean to eat locally?
- Do you think it's a good idea? Why?
- What do you think about this idea?
- How could we discover why people promote the concept?
- How much did the diesel cost per gallon?

Explain 5 min ***Food Miles***

3. Explain the concept of "Food Miles"
    i. **Field to Fork: "Food Miles"** – https://www.youtube.com/watch?v=b7rn5hH5XN8
4. Reference these quick figures for eating locally vs. shipping: **Apples**: Buying local: 61 mi., Shipped in: 1726 mi.; **Beans** Buying local: 65 mi, Shipped in: 1313 mi; **Pumpkins** Buying local: 41 mi, Shipped in: 311 mi; **Cabbage** Buying local: 50 mi, Shipped in: 719 mi.

Lesson 4: Cooking Lab: Local Ingredients

Overview: Participants will learn how to make healthy snacks and prepare meals to share with their families. All of the recipes (and a few more) will be given to the children to take home in the form of a booklet.

Recipes are provided by

http://chefmom.sheknows.com/articles/963111/garden-fresh-vegetable-recipes-your-kids-will-love
http://articles.extension.org/pages/71164/using-veggies-from-school-gardens-in-recipes
http://www.myrecipes.com/recipe/mixed-bean-cherry-tomato-salad-with-basil-vinaigrette
http://www.myrecipes.com/recipe/herby-cucumber-salad
http://www.myrecipes.com/recipe/garden-harvest-cake
http://growing-minds.org/documents/fresh-summer-salsa-recipe-and-lesson-plan.pdf
http://growing-minds.org/documents/lettuce-wrap-recipe-lesson-plan.pdf
http://growing-minds.org/documents/cucumber-stacks-k-2.pdf

http://growing-minds.org/documents/spinach-smoothies.pdf
http://growing-minds.org/documents/sweet-potato-fritters-recipe-and-lesson-plan.pdf
http://growing-minds.org/documents/apple-salad-recipe-and-lesson-plan.pdf
http://growing-minds.org/documents/apple-cabbage-quesadilla-recipe-and-lesson-plan.pdf

Students will learn:

1. To make healthy alternatives for snacks and meals, using local ingredients.
2. That they need to consume at least 5 fruits and vegetables a day
3. The importance of eliminating preservatives and alleviating environmental stress due to food miles.
4. The importance and fun of sharing time and communicating with their family in the kitchen.

Time: 1 hour

Materials:

- Blender/food processor
- Variety of fruits and vegetables appropriate for three easy recipes
    - Garden salsa: http://growing-minds.org/documents/fresh-summer-salsa-recipe-and-lesson-plan.pdf
    - Garden veggie pizza http://allrecipes.com/recipe/16756/vegetable-pizza-i/
        - Note: substitute mayo and ranch seasoning for hummus
    - Apple salad http://growing-minds.org/documents/apple-salad-recipe-and-lesson-plan.pdf
    - Green smoothie http://growing-minds.org/documents/spinach-smoothies.pdf
- Cookbook handouts
- Small cups and plates
- Cutleries
- Napkins
- Knife and cutting board

Discussion:

- Can you think of how any of your favorite foods could be used in your meals?
- Can you eat vegetables for breakfast? Fruits for dinner? What would you be willing to try in your meals?
- What new ideas do you think you could show your family? Would you like to make it with them?
- During the cooking session, explain what part of the plant that the vegetable or fruits come from (e.g. flower, root, fruit)

Guest speaker: Local farmer to discuss economics

Appendix C: Grant Proposal

FROM THEIR HOME TO OURS: ESTABLISHING ENVIRONMENTAL AND HEALTH LITERACY VIA URBAN GARDENING FOR AT-RISK YOUTHS

Applicant: Tiffany B. Hunter, MA, MPH Candidate

Department/Unit: Boonshoft School of Medicine Department of Community Health/ MPH

Email: Phone:

Mentor: Naila Khalil, PhD & Nikki Rogers, PhD

Department/Unit: Boonshoft School of Medicine Department of Community Health/ MPH

Email: naila.khalil@wright.edu & nikki.rogers@wright.edu

Phone: (937) 258-5555

FAX: (937) 258-5544

Community Partner Organization: The Foodbank, Inc. (56 Armor Place, Dayton, Ohio 45417)

Community Partner Contact Person: Lee Lauren (Alder) Truesdale

Email: Phone: (937) 461-0265

FAX: (937) 461-3828

Anticipated start date of research: May 1, 2016

Anticipated end date of research: August 30, 2016

Applicant Signature: **[Digital Signature]** Date: April 22, 2016

Department Chair/Unit Supervisor Signature: [Dr. Nikki Rogers] Date: April 22, 2016

Mentor Signature: **[Dr. Naila Khalil]** Date: April 22, 2016

Department Chair/Unit Supervisor Signature: [Dr. Nikki Rogers] Date: April 22, 2016

Community Partner Contact Person Signature: **[Verbal permission granted]**
Date: April 22, 2016

I. Title Page

a. From their home to ours: Establishing environmental and health literacy via urban gardening for Black youths.

II. Abstract

a. Provide a summary of your proposed research in 200 word abstract identifying the focus of the research, the community partners, and anticipated outcomes.

The Boonshoft School of Medicine requires at least sixty hours of service learning and the Global Health concentration of the School of Public Health (an entity within the Boonshoft School of Medicine) highly encourages its students to acquire said hours either promoting health and preventing disease for a cultural group abroad or with a local disparate group (e.g. first-generation immigrants, established minority groups). However, the current research aims to develop a similar model of community engagement and health promotion within an urban setting as witnessed in a developing country. During an internship with Israel's Ministry of Health, I witnessed a successful community garden and environmental education program designed for children whom reside in an Arab village. Much like the Israeli Arab community abroad, Black Americans are the minority whom suffer similar health consequences due to food insecurity (e.g. food deserts), high energy-dense food options (including an abundance of fast food restaurants and small convenience stores) and poor health literacy. The goal of the current research is to develop a community garden and environmental literacy program for an urban, minority-concentrated school within Dayton, Ohio similar to the setup in Baqa El-Gharbiya, Israel.

A sample of pictures from the community garden in Baqa El-Gharbiya can be found in *Appendix A.*

III. Proposal Narrative

a. Describe the research question(s) you plan to address. Describe the context in which the research will take place. Describe anticipated outcomes and potential application in future CEST.

The primary goal of the current research project is to 1) develop a basic educational curriculum which may be utilized for the purposes of increasing students' environmental and health literacy with the assistance of 2) the development of a community garden within an urban setting. As such, the research questions which will be addressed include whether or not an urban garden and an educational curriculum related to environmental and health literacy will successfully increase students' knowledge about their health and the health of

the environment. In conjunction with the aforementioned, the current research project will investigate whether the implementation of an urban garden will result in a higher rate of vegetable consumption among students (and therefore, healthier eating habits).

The research will take place during the summer month (May-August) at The Foodbank, Inc. located near West Dayton. Within the selected location, a pollinator garden and several raised garden beds already exist on the grounds; the educational aspect will be a volunteer basis through participants of a summer day-camp program. These groups include students in third through fifth grades, junior high students, and young adults (as a part of a juvenile deterrent program). Prospective volunteers may include students from the establishment, as well as enrollees from Mound Street Academy – a dropout recovery program for individuals up to the age of 22 years.

It is anticipated that as a result of participation in the educational summer program, the students (approximately 100) will demonstrate higher health and environmental literacy scores. By incorporating these important skills with contextual and hands-on activities, the participants will retain the information and share it within their home to their families. Furthermore, completion of the program will demonstrate selection of and improved knowledge with regards to healthier food options and environmental appreciation. Lastly, through completion of this program, it is anticipated that the volunteers will develop a sense of autonomy, leadership, communication, and conflict resolution skills.

Application

b. Provide a profile of the community partner(s) with whom you will be working and explain why they are the best choice of community partner for this research.

The Foodbank, Inc. (www.thefoodbankdayton.org) is an organization which has served as “the primary food supplier to the hunger relief network in Montgomery, Greene, and Preble counties,” (The Foodbank, Inc., 2016). This organization is intimately connected with the community, its surrounding counties, the state of Ohio, and on a national level. The importance of collaborating with such a well-established group such as The Foodbank, Inc. is that they are a reputable organization with close collaboration with the 12 food banks across Ohio, as well as Feeding America and the Ohio Association of Foodbanks. The organization’s urban garden program fits succinctly with what I am looking for in regards to population: a densely black population living in a lower-income, urban setting. Despite the various age groups which participate in

the urban gardening project, they all interact on some level when it comes to developing the garden and thus, they can learn from one another. Likewise, since there is a suspected high dropout and delinquency rate within the intended group of participants, the comprehension level for the educational program can be suitable for the younger groups as well as the older groups.

What is unique about The Foodbank, Inc. is that they provide food and related supplies to groups who provide nourishment to the hungry via a network of food pantries, soup kitchens, emergency shelters, etc. (The Foodbank Inc., 2016). Moreover, The Foodbank, Inc. located in Dayton has members from 96 nonprofit agencies whom provide services through more than 100 feeding programs in the Miami Valley (The Foodbank Inc., 2016). Therefore, while the organization is a local effort and has an intimate relationship with the local community, they also have an outstanding reach and network beyond the community.

c. *Describe the research methodology, population to be included, and proposed data analysis.*

The learning objections for the course include the following:

1) The participants in the urban garden program will be able to recognize different parts of the plants they are growing, their health benefits, and how to properly grow their own food source.
2) Health literacy: the participants will gain an understanding of the difference between unhealthy food options (e.g., high calorie dense foods, saturated fats, processed and fast foods) and healthy food options (e.g. locally sourced, organic, fresh fruits and vegetables).
3) Health literacy: the participants' behaviors towards healthier food choices will improve through their ability to utilize fresh, healthy food options to supplement their daily diet.
4) Environmental literacy: the participants will gain an understanding and appreciation for their surrounding environment and the role that certain aspects play upon it (e.g. insects, pollination, recycling raw materials, water sourcing).

The service objectives for the course include the following:

1) The participants and their families will have access to locally grown food, which will be at no cost to them, and it will also provide an alternative summer program to the participants in order to deter juvenile delinquency.

2) The participants will have the confidence to communicate at a higher level about their personal health needs and goals, while also developing higher communication skills in order to adequately portray their ideas to others.
3) The Foodbank Inc. will have a comprehensive educational plan from which they can utilize and adapt to their participants' needs and level of comprehension, as well as regional needs (e.g., urban vs. rural).

Indeed, the overall goal of the program is to improve healthy behaviors of the participants through the concepts of health literacy and environmental literacy. However, the community engaged scholarship will focus on the population of the participants from the Greater Dayton area and how to best meet the goals of improving health literacy, autonomy and confidence, communication and leadership skills, as well as their role within the environment and how to make it more sustainable.

Participants will complete an anonymous pre- and post-test which A) demonstrates the different parts of a plant, their function, and example of edible plant parts; B) asks questions pertaining to nutritional labeling and what to look for; C) addresses concepts related to environmental literacy (e.g. the importance of bees, worms, natural or homemade pesticides, recycling). The tests will also ask the participants about what are their favorite types of food, how often do they eat at a restaurant or fast food establishment, how many fruits and vegetables they eat on a daily basis, who cooks their meals, and if they have a preexisting health problem such as diabetes or hypertension. The only individual variables which will be accounted for are sex, age, race, and grade level. An example of the aforementioned test is not available yet but a rough draft can be provided upon request.

Statistical analysis will involve a series of t-tests and ANOVAs (within, between) to determine the difference between pre- and post-test within specified age groups, as well as the difference between age groups, based on an Alpha level of .05 ($\alpha = .05$). Based on prior literature review, it is anticipated that participants within fourth grade, fifth grade, and junior high will demonstrate the most improvement in regards to 1) healthier behaviors, especially as it relates to diet and cooking (e.g., eating, on average, more fresh fruits and vegetables); 2) a greater willingness to change their eating habits and to incorporate aspects of improved health behavior (such as eating fresh fruits and vegetables, and reading a nutritional information label) into their and their families' daily lives; 3) demonstrate more creativity and a greater willingness to implement environmental sustainability efforts into their lives, both for themselves and their

families; and 4) a greater understanding of teamwork and problem solving skills as a result of their participation.

d. Complete appropriate IRB application and attach to proposal OR provide an explanation of why the research should be exempt from IRB review.

It is anticipated that the research is exempt from IRB review because I am providing assistance within a pre-established summer education program. Secondly, as a part of my graduation requirements, I am represented by two faculty members within my department who will only approve my material if it is academically and ethically sound. Moreover, under the federal regulations of exempted status, there is minimal human risk involved, including no deception, non-identifiable tests, and non-invasive questions regarding personal health.

e. Identify three potential publication sites for the results of the research

Journal of the American Dietetic Association
American Journal of Public Health
Health Expectations
*Alternatively, *Environmental Research* could also be a promising publication site.

f. Provide a review of previous experience with CEST (service learning courses, community based participatory research, educational research, etc.) for both the faculty applicant and the faculty member. If CITI training has been completed, provide proof of completion.

As a graduate student, I have acquired a wealth of knowledge regarding educational research and community based participatory research through my position as a research assistant for Dayton Children's Hospital (2014-2015) and during my internship with the Ministry of Health in Israel (June-August 2016). I have designed and collaborated with medical students and physicians in regards to medical educational research, and I have personally completed the data analysis for said projects. Furthermore, I have participated in courses during my public health studies which require a comprehensive analysis of environmental health, social determinants of health, communications, and aspects of global health (including health systems). Evidence of my prior research and experience may be explored in an excerpt from my curriculum vitae (CV), which can be found in Appendix B.

My department's CE co-chairs, Dr. Naila Khalil and Dr. Nikki Rogers, will act as my academic mentors since I am under their direction for my culminating experience graduate project.

My community partner, Ms. Lee Lauren (Alder) Truesdale, will act as my mentee since my services are being used to design an educational curriculum (as per my culminating experience requirement for program completion) for The Foodbank, Inc.'s urban gardening program.

CITI training completion certificates can be found in Appendix C.

g. *Describe how this research will further your professional goals within your department and in the larger university.*

The current research project will be used to help an existing hands-on program reach their target audience in a way that has not been used before – through educational materials. The material will be collected through incorporating literature provided by the American Heart Association and a local urban gardening program known as City Beets, which will lend credibility and support due to its reliable, sound research. On a personal level, the current research will be expanding on a topic of interest which can serve as a trajectory for future community efforts to assist disparate groups. By participating in the current research, I am making connections with the community and gaining the trust of those within it. As a member of my graduate department, this research will serve as a viable ambassador-style option for future graduates who would like to participate in community work. For the larger community, this research aims to provide educational material that will assist in feeding our hungry community and breaking the cycle of health disparities which disproportionately affect minority and impoverished groups. By educating said individuals, we can expect to see a trickle-down effect within their friends and families, as we are assisting them with building confidence, developing a more comprehensive and expressive way of communicating to one another about their health and the environment, and a sense of autonomy.

Appendix D: CEST Needs List

Needs list	
Item	**Cost approximation**
Garden supplies (kids' gloves, shovels, soil, etc.):	$500
Plant starters (vegetables, berry bushes, herbs):	$500
Class materials (paper, construction paper, crayons, note pads, pencils, recipe booklets, linen satchels, etc.):	$500
Cooking supplies (charcoal, knives, serving utensils, containers)	$250
Building materials (nails, hammers, etc.)	$400
Food and beverage (to supplement lesson plans and grill party)	$500
Total	**$2,650**

Appendix E: Wright State University IRB Approval

Office of Research and Sponsored Programs
201J University Hall
3640 Col. Glenn Hwy.
Dayton, OH 45435-0001
(937) 775-2425
(937) 775-3781 (FAX)
e-mail: rsp@wright.edu

DATE: September 20, 2016

TO: Tiffany B. Hunter, PI, Graduate Student
Community Health
Naila Khalil, Ph.D., Faculty Advisor

FROM: Jodi Blacklidge
Program Facilitator, WSU-IRB

SUBJECT: SC# 6307
'From Their Home to Ours: Establishing Environmental and Health Literacy via Urban Gardening for At-Risk Youths'

The above-listed study has been determined to meet Federal exemption criteria 45 CFR 46.101(b)(1). **Please note that any material change in the protocol must be reviewed by the IRB, as the project may no longer be exempt.** As a reminder, all investigators must maintain current CITI training certification.

If your research is being conducted at a facility other than Wright State University, you must have approval from that facility in order to proceed.

This action will be reported to the Full Board at their next scheduled meeting.

If you have any questions or require additional information, please contact me at 775-3974.

Best wishes for a successful study.

Appendix F: Pilot Pre-test/Post-test for Pollinator Garden

Pre-test / Post-test

Part I

10) How old are you? _____

11) What grade are you going to be in? _____

12) I am a…
    a) boy
    b) girl
    c) I would rather not say

13) I am…
    a) White
    b) Black
    c) Hispanic
    d) Asian
    e) Biracial
    f) I would rather not say / I don't know

14) What are your favorite foods? You can say up to four.
    1)
    2)
    3)
    4)

15) How many times per week do you eat at a fast food restaurant?
    a) 0
    b) 1-2
    c) 3-5
    d) more than 5

(Go to next page.)

16) Who cooks most of your meals?
    a) mom
    b) dad
    c) grandma
    d) grandpa
    e) aunt
    f) uncle
    g) Someone else (Who? _____)

17) How many fruits do you eat every day?
    e) 0
    f) 1-2
    g) 3-4
    h) 5 or more

18) How many vegetables do you eat every day?
    e) 0
    f) 1-2
    g) 3-4
    h) 5 or more

Part II

In the last part of this test, you will be asked about nature and what helps the environment. Try your best to answer the questions but if you do not know, just write "I don't know" under each question.

1) How do earthworms help soil?

2) Are bees important to the environment? Why or why not?

3) Do you think it is important to recycle? Why or why not?

4) Do you think it is good or bad to throw garbage on the ground? Why?

5) Do you have a garden at home? If you do, what do you like to grow in it?

(End of test.)

Appendix G: Pre-test/Post-test for Food Economics

Pre-test / Post-test

Part I

19) How old are you? _____

20) What grade are you going to be in? _____

21) I am a…
   a) boy
   b) girl
   c) I would rather not say

22) I am…
   a) White
   b) Black
   c) Hispanic
   d) Asian
   e) Biracial
   f) I would rather not say / I don't know

23) What are your favorite foods? You can say up to four.
   1)
   2)
   3)
   4)

24) How many times per week do you eat at a fast food restaurant?
   a) 0
   b) 1-2
   c) 3-5
   d) more than 5

(Go to next page.)

25) Who cooks most of your meals?
   a) mom
   b) dad
   c) grandma
   d) grandpa
   e) aunt
   f) uncle
   g) Someone else (Who? _____)

26) How many fruits do you eat every day?
   i) 0
   j) 1-2
   k) 3-4
   l) 5 or more

27) How many vegetables do you eat every day?
   i) 0
   j) 1-2
   k) 3-4
   l) 5 or more
   m) Part II
   n) In the table below, I want you to tell me what kind of vegetables or fruit you can eat based on what part of the plant it comes from. If you don't know, you can just write "I don't know".

Plant Part	Function: What does it do?	Example of what you can eat from it
Roots	Pulls water and other nutrients from the soil	
Stem	Moves water and other nutrients from the roots to the rest of the plant	
Leaves	Produces food from sunlight	

Flower	Makes the plant's seeds	
Fruit	Protects the plant's seed Any food with seeds in it	
Seeds	Contains an unborn plant Is usually protected inside the fruit	

Part III

You are going to look at a nutrition label taken from a food item that most people eat very often. Below the nutrition label, there will be questions about the label and what to look for.

Nutrition Facts

Serving Size 1 cup (228g)
Servings Per Container 2

Amount Per Serving

Calories 250	Calories from Fat 110
	% Daily Value*
Total Fat 12g	**18%**
Saturated Fat 3g	**15%**
Trans Fat 3g	
Cholesterol 30mg	**10%**
Sodium 470mg	**20%**
Total Carbohydrate 31g	**10%**
Dietary Fiber 0g	**0%**
Sugars 5g	
Protein 5g	
Vitamin A	**4%**
Vitamin C	**2%**
Calcium	**20%**
Iron	**4%**

* Percent Daily Values are based on a 2,000 calorie diet. Your Daily Values may be higher or lower depending on your calorie needs.

	Calories:	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

1) What is one serving of this item? _____
2) How many servings are in this item? _____
3) How many calories are there in one serving? _____
4) How many calories from fat are in one serving? _____
5) How many grams of fat are in one serving? _____
6) How much sodium is in one serving? _____
7) How much calcium is in one serving? _____%
8) How much vitamin A is in one serving? _____%

(End of test.)

Appendix H: Donation Request Form

May 12, 2016

To Whom It May Concern:

The Foodbank, Inc. of Dayton serves thousands of families in the counties of Montgomery, Greene, and Preble and this summer, we are developing an educational program for children and young adults. This program aims to teach healthier lifestyles and environmental friendliness through gardenining and recycling to those families whom are most at-risk. The Foodbank, Inc. of Dayton can only achieve its goals with the assistance of generous donations from members of our community. Without thee donations, serving those in our area would not be possible.

Since our organization relies on the generosity of individuals and local businesses, I am writing to ask you to consider a donation to our cause. Below, you will find a list of certain items we are in need of in order to successfully develop a raised garden program:

Starter plants: plants of any kind, especially fruit bushes and vegetables.

Cable: Approximately 1000’ feet of cable for a vertical green bean wall.

Seating/eating area: Lumber to build such arrangements.

Flower gardening: Potting soil/mulch, ornamental starts and paver rocks.

PVC Pipe: As much as we can get -- PVC pipe is always useful. We could begin making low tunnels/arched walkways with climbing plants.

Sign: We want to have a ‘Foodbank Garden’ sign made that is colorful and has the Foodbank logo on it.

Compost.

Gardening tools and basic supplies.

Thank you in advance for your generosity.
Sincerely,

Tiffany B. Hunter

Appendix I: List of Comptencies Met in CE

Tier 1 Core Public Health Competencies

Domain #1: Analytic/Assessment Skills
Describes factors affecting the health of a community (e.g., equity, income, education, environment)
Identifies quantitative and qualitative data and information (e.g., vital statistics, electronic health records, transportation patterns, unemployment rates, community input, health equity impact assessments) that can be used for assessing the health of a community
Applies ethical principles in accessing, collecting, analyzing, using, maintaining, and disseminating data and information
Uses information technology in accessing, collecting, analyzing, using, maintaining, and disseminating data and information
Collects valid and reliable quantitative and qualitative data
Describes public health applications of quantitative and qualitative data
Uses quantitative and qualitative data
Describes assets and resources that can be used for improving the health of a community (e.g., Boys & Girls Clubs, public libraries, hospitals, faith-based organizations, academic institutions, federal grants, fellowship programs)
Contributes to assessments of community health status and factors influencing health in a community (e.g., quality, availability, accessibility, and use of health services; access to affordable housing)
Describes how evidence (e.g., data, findings reported in peer-reviewed literature) is used in decision making
Domain #2: Policy Development/Program Planning Skills
Contributes to state/Tribal/community health improvement planning (e.g., providing data to supplement community health assessments, communicating observations from work in the field)
Contributes to development of program goals and objectives
Contributes to implementation of organizational strategic plan
Identifies current trends (e.g., health, fiscal, social, political, environmental) affecting the health of a community
Gathers information that can inform options for policies, programs, and services (e.g., secondhand smoking policies, data use policies, HR policies, immunization programs, food safety programs
Implements policies programs, and services
Explains the importance of evaluations for improving policies, programs, and services
Describes how public health informatics is used in developing, implementing, evaluating, and improving policies, programs, and services (e.g., integrated data systems, electronic reporting, knowledge management systems, geographic information systems)
Domain #3: Communication Skills
Identifies the literacy of populations served (e.g., ability to obtain, interpret, and use health and other information; social media literacy)
Communicates in writing and orally with linguistic and cultural proficiency (e.g., using age-appropriate materials, incorporating images)
Solicits input from individuals and organizations (e.g., chambers of commerce, religious organizations, schools, social service organizations, hospitals, government, community-based organizations, various populations served) for improving the health of a community
Conveys data and information to professionals and the public using a variety of approaches (e.g., reports, presentations, email, letters)
Facilitates communication among individuals, groups, and organizations
Describes the roles of governmental public health, health care, and other partners in improving the health of a community
Domain #4: Cultural Competency Skills
Describes the concept of diversity as it applies to individuals and populations (e.g., language, culture, values, socioeconomic status, geography, education, race, gender, age, ethnicity, sexual orientation, profession, religious affiliation, mental and physical abilities, historical experiences)
Describes the diversity of individuals and populations in a community
Describes the ways diversity may influence policies, programs, services, and the health of a community
Recognizes the contribution of diverse perspectives in developing, implementing, and evaluating policies, programs, and services that affect the health of a community
Addresses the diversity of individuals and populations when implementing policies, programs, and services that affect the health of a community
Describes the effects of policies, programs, and services on different populations in a community

Domain #5: Community Dimensions of Practice Skills
Describes the programs and services provided by governmental and non-governmental organizations to improve the health of a community
Recognizes relationships that are affecting health in a community (e.g., relationships among health departments, hospitals, community health centers, primary care providers, schools, community-based organizations, and other types of organizations)
Suggests relationships that may be needed to improve health in a community
Supports relationships that improve health in a community
Collaborates with community partners to improve health in a community (e.g., participates in committees, shares data and information, connects people to resources)
Engages community members (e.g., focus groups, talking circles, formal meetings, key informant interviews) to improve health in a community
Provides input for developing, implementing, evaluating, and improving policies, programs, and services
Uses assets and resources (e.g., Boys & Girls Clubs, public libraries, hospitals, faith-based organizations, academic institutions, federal grants, fellowship programs) to improve health in a community
Informs the public about policies, programs, and resources that improve health in a community
Describes the importance of community-based participatory research
Domain #6:Public Health Sciences Skills
Describes how public health sciences (e.g., biostatistics, epidemiology, environmental health sciences, health services administration, social and behavioral sciences, and public health informatics) are used in the delivery of the 10 Essential Public Health Services
Retrieves evidence (e.g., research findings, case reports, community surveys) from print and electronic sources (e.g., PubMed, Journal of Public Health Management and Practice, Morbidity and Mortality Weekly Report, The World Health Report) to support decision making
Contributes to the public health evidence base (e.g., participating in Public Health Practice-Based Research Networks, community-based participatory research, and academic health departments; authoring articles; making data available to researchers)
Domain #7: Financial Planning and Management Skills
Describes public health funding mechanisms (e.g., categorical grants, fees, third-party reimbursement, tobacco taxes)
Operates programs within budget
Describes how teams help achieve program and organizational goals (e.g., the value of different disciplines, sectors, skills, experiences, and perspectives; scope of work and timeline)
Domain #8: Leadership and Systems Thinking Skills
Incorporates ethical standards of practice (e.g., Public Health Code of Ethics) into all interactions with individuals, organizations, and communities
Describes public health as part of a larger inter-related system of organizations that influence the health of populations at local, national, and global levels
Contributes to development of a vision for a healthy community (e.g., emphasis on prevention, health equity for all, excellence and innovation)
Identifies internal and external facilitators and barriers that may affect the delivery of the 10 Essential Public Health Services (e.g., using root cause analysis and other quality improvement methods and tools, problem solving)
Describes needs for professional development (e.g., training, mentoring, peer advising, coaching)

Concentration Specific Competencies

Global Health:
Identify strategies that strengthen community capabilities for overcoming barriers to health and well-being
Exhibit interpersonal skills that demonstrate willingness to collaborate, trust building abilities, and respect for other perspectives
Identify and respond with integrity and professionalism to ethical issues in diverse economic, political, and cultural contexts
Apply the health equity and social justice framework for the analysis of strategies to address health disparities across different populations
Conduct evaluation and research related to global health
Enhance socio-cultural and political awareness
Apply systems thinking to analyze a diverse range of complex and interrelated factors shaping health at local, national, and international levels