UNIVERSITY OF WISCONSIN-LA CROSSE

Graduate Studies

CHANGING EATING HABITS, TIME SPENT OUTSIDE AND FOOD SECURITY WITH A GARDEN CURRICULUM

A Graduate Project Submitted in Partial Fulfillment of the
Requirements for the Degree of Masters of Community Health Education.

Jamie Klonowski

College of Science and Health
Community Health Education

May, 2012

CHANGING EATING HABITS, TIME SPENT OUTSIDE AND FOOD SECURITY

WITH A GARDEN CURRICULUM

By Jamie Klonowski

We recommend acceptance of this project in partial fulfillment of the candidate's requirements for a degree of Community Health Education.

The candidate has completed the oral defense of the project.

Dr. Gary D. Gilmore, MPH, Ph.D., MCHES
Project Advisor

April 25, 2012
Date

Dr. Gary D. Gilmore, MPH, Ph.D., MCHES
Graduate Program Director

April 25, 2012
Date

Robert Hoar, Ph.D.
Associate Vice Chancellor for Academic Affairs

6-6-2012
Date

ABSTRACT

Klonowski, J.M. Changing eating habits, time spent outside and food security with a garden curriculum. MS in Community Health Education, May 2012, 129pp. (G. Gilmore)

Research shows children are not eating the daily recommended number of fruits and vegetables, spending enough time outside and have an increased chance to be in a food insecure environment compared with 1999. Time spent in gardens and outdoors has been shown to reverse these trends and improve the health of children.

The purpose of this project was to create a garden curriculum for connecting health, food and the environment to improve children's eating habits, boost time spent in natural outdoor areas and increase food security. A ten-week curriculum was written and used at Clearwater Farm in the summer of 2011 and ninety-nine students took part in one or more lessons. The author recommends that other organizations use the curriculum for target group enlightenment, feedback, and the cultivation of collaboration.

ACKNOWLEDGEMENTS

There were many individuals that helped make this project possible and that I would like to thank for support. President of Clearwater Farm, Gerry Henley, gave me this opportunity to create a curriculum by using the knowledge I have learned from the Community Health Education Master's program, the UW-Extension Master Gardener's course and my undergraduate degree of education. This experience really helped unify my studies and solidify more understanding. Additionally, Dr. Gary Gilmore offered much guidance which helped expand what I learned from the project. Troy Hess, a member of the Clearwater board, helped with ideas and education theory for the lessons. Leaders at the Family and Children's Center and the YMCA were invaluable for their feedback and testing the lessons with the children. The children that participated also really helped enhance this curriculum. Additionally, I would like to thank Heidi Luna and Eric O'Neill for their help with editing.

TABLE OF CONTENTS

PAGE

LIST OF APPENDICES

APPENDIX PAGE

SECTION I

INTRODUCTION AND OVERVIEW

Statement of Purpose

The purpose of this project was to create a garden curriculum for Clearwater Farm connecting health, food and the environment to improve children's eating habits, boost time spent in natural outdoor areas and increase food security.

Rationale for Conducting the Project

Clearwater

Clearwater Farm's mission is to "demonstrate, teach and advocate the sustainable use of natural, architectural, historical, and agricultural resources" (Clearwater Farm Foundation, n.d.). Although teaching is a main part of the mission, the President of Clearwater, Gerry Henley, has not seen many students coming to learn due to the lack of available time from board members (Personal communication, April 17, 2011). All board members and staff at Clearwater are volunteers and help with many different tasks to keep Clearwater functioning. Troy Hess, a board member, believes Clearwater needs a prepared curriculum to allow future volunteers or staff to teach lessons without having to spend time researching and creating their own lesson plans (Personal communication, January 31, 2012).

The unique setting and mission of Clearwater could help make it the hub to curb the impact of health problems in the La Crosse area. Situated in a neighborhood in Onalaska, Clearwater Farm is easily accessible to schools, organizations and camps nearby. The land currently hosts animals, gardening area, flower beds, barns, pastures and hiking trails.

Clearwater has the space and resources to support a full curriculum on our food system and the natural environment (T. Hess, personal communication, January 31, 2012).

A premade curriculum that is readily available reduces the time and work for education group leaders. Prepared lessons also will allow prospective farm visitors to preview and pick which activities best fit their group if they cannot come for all ten weeks. Groups coming weekly will know what will be covered in advance if their leaders want to cover any material in class. For Clearwater, a curriculum makes it possible to teach volunteers and leaders from many organizations how to implement the lessons and then come to Clearwater and self-lead these sessions. Therefore, even when Clearwater representatives are not available, the farm can serve as a great resource.

Beyond Clearwater

Utilizing outdoor resources to help create healthier lifestyles is a goal that reaches much farther than Clearwater Farm. A group in La Crosse is striving to make La Crosse County the healthiest county by 2015 (La Crosse Medical Health Science Consortium, n.d.) and has four objectives. The first objective is to support healthy food and active environments since there is enough evidence to believe healthy food and activity improve the quality of life (La Crosse Medical Health Science Consortium, n.d.).

The U.S. Department of Health and Human Services and Centers for Disease Control and Prevention (CDC) set forth similar goals in *Healthy People 2020* as Clearwater's curriculum goals. First off, one topic listed in *Healthy People 2020* is improving our nation's health by reducing the consumption of added sugars and calories from solid fats (n.d.). Therefore, this group recognized the need for healthy diets. Second, they also list that having communities create environments that support healthy diets is essential to attaining a healthy futures

(HealthyPeople.gov, n.d.). Lastly, another strong focus area listed on HealthyPeople.gov is educational and community-based programs and food safety (n.d.). Therefore, Clearwater's goals of increasing healthy eating, boosting time spent in outdoor natural areas, and improving food security overlap with the county and nation.

Relevant Literature

The purpose of this research is to examine whether current problems facing today's youth can be solved through garden education. The author will focus in on the current status of children's eating habits, the effects of time spent indoors and the harm of food insecurity. Each of these areas were then investigated to determine if garden education, time spent outside and increased food security had an impact on them.

Current Findings of Children's Eating Habits

The rate of children overweight and obese doubled from 1980 to 2002, which makes it a critical public health problem in the United States (Health and Human Services, n.d.). To reduce the amount of overweight children, the Health and Human Services listed focusing on nutrition and eating habits as the top priority (n.d.). The author found the following trends in literature describing the negative impacts on nutrition and eating habits of children: eating out more regularly, increased sugar intake, bigger portion sizes and not enough servings of fruits and vegetables.

Eating Out

According to the National Restaurant Association, restaurant food accounts for 49 cents out of every dollar we spend on food (2012). Table 1 organizes six articles involving eating out and children's health. Many of these articles found eating out positively associated with intake of energy-dense food and negatively associated with nutrient consumption.

Table 1. Scholarly Research Finding Eating Out Associated with Energy-dense Food, Nutrition Intake and/or BMI.

	Eating out is positively associated with intake of energy-dense food	Eating out is negatively associated with nutrient intake	Eating out is positively associated with BMI
Bezerra, Curioni, and Sichieri (2012)	N/A	N/A	Half of the cross-sectional analyses and six out of seven cohort studies
French, Story, Neumark-Sztainer, Fulkerson, & Hannan (2001)	x	x	No
Hung-Hao & Nayga (2010)	N/A	N/A	x
Kim, D., & Leigh, J. (2011)	x	x	Yes for low income, no for high income
Nestle, M. (2005)	x	x	x
Young, L. R., & Nestle, M. (2007)	x	x	x

x means association was found
Note: Bezerra, Curioni, and Sichieri (2012) was a comprehensive study

Research varied a bit more when looking at findings regarding fast food's association with BMI. In some research an association between eating out and weight was found. For instance, Hung-Hao and Nayga (2010) did an empirical analysis drawn from data in the National Health Interview by the National Health Research Institute of Taiwan in 2001. After reviewing the 3,977 children surveyed, the authors found consumption of fast food positively correlated with BMI (Hung-Hao & Nayga, 2010). Bezerra et al. (2012) did a comprehensive quality assessment in which 20 cross-sectional studies and 8 prospective cohort studies were reviewed. Half of the cross-sectional analyses and seven of the prospective cohort studies found a positive

association between body weight and eating out. However, some articles discussed whether fast food was actually contributing to obesity or if it was a confounding variable. Kim and Leigh found people in the high income bracket frequent restaurants just as much as lower income households visit fast food places. Even though meals from restaurants also had high portions of dietary fat (2011), the obesity rates of the upper class are less than the lower class. Therefore, the authors suggested that income was a confounding variable of eating out and it's relation with obesity.

Sugar Intake

Sugar is also taking a significant role in diets in the United States and the United Kingdom. Consuming soda has increased roughly 135% between 1977 and 2001 (Nielsen & Popkin, 2004 as referenced in Gibson & Neate, 2007). Yet, sugar consumption has been found to have a negative effect on children's health (Collison, Zaidi, Subhani., Al-Rubeaan, Shoukri, & Al-Mohanna, 2010; Gibson, 2010; Hung-Hao, et al., 2010; Lu , 2010; Sharkey, Johnson, & Dean, 2011). A study which surveyed children in Saudi Arabia found that sugar-sweetened beverages consumed by boys ten to nineteen years old was positively correlated with their BMI (Collison et al., 2010). The study done by Collison et al. also found that students who consumed more sugar-sweetened drinks made other poor eating choices including eating more fast food, eating more salty snacks and eating fewer fruits and vegetables (2010). Similarly, Lu (2010) found that removing soda machines from school settings, as they did in California, both decreased sugar consumption and obesity rates in the children within those schools.

Bigger Servings

Young and Nestle (2007) did a comparison of sizes in popular food restaurants and found huge increases in proportion sizes over the years. For instance, McDonalds first hamburger,

introduced in 1955, weighed 1.6oz. A large hamburger at McDonalds in 2007 was 8.0 oz (Young & Nestle, 2007). Large sodas were 457% larger in 2007 than they were in 1955 and the French fries, 250% larger (Young & Nestle, 2007). Another study done by Young and Nestle (2002) found that even in the marketplace food portion sizes grew in the 1970's, rose sharply in the 1980s and continued rising into the 1990s to exceed federal standards. Another significant finding was that serving sizes have increased parallel to the rise in percentage of persons overweight (Young & Nestle, 2007).

Nielsen and Popkin (2003) also compared the portion sizes consumed by children two years of age and older both in 1977 and 1996, finding that portion sizes of salty snack foods, sugary beverages, desserts, fruit drinks and energy dense foods all increased both inside and outside the home. Over the nineteen years, the intake of salty snacks went up by 93 kcal, French fry intake increased by 97 kcal, Mexican entries went up by 133 kcal, soft drinks by 49kcal and hamburgers, 97 kcals (Nielsen & Popkin, 2003). Most notably, Neilsen and Popkin stated, "an added 10 kcal per day of unexpended energy is equivalent to an extra pound (0.45 kg) of weight per year, it is easy to see the potential impact of large increases in portion sizes that ranged from 49 to 133 kcal" (2003).

Fruits and Vegetables

Fruits and vegetables provide essential nutrients and fiber while also naturally low in calories. The U.S. Department of Health and Human Services (HHS) and U.S. Department of Agriculture (USDA) reports that people who eat more fruits and vegetables have a reduced risk of chronic diseases like stroke, cancer, and Type II diabetes (HHS, n.d. & USDA, n.d.). The minimum recommendation of vegetables for children ages four to eight is one and a half cups, and for nine to eighteen year olds, two to three cups is the minimal recommendation (USDA,

n.d.). For fruit, the daily recommended minimal intake is 1-1.5 for children and 1.5-2 cups for 9-18 year olds. Yet, according to the CDC, in 2008 fewer than one in four students are getting this recommended amount, which could be attributing to the 17% of children 6-19 that are obese.

Research Finding Garden Education Improves Children's Eating Habits

Increasing the number of fruits and vegetables children consume has been a noted way to positively impact children's eating habits. Studies have found that one way to increase the amount of fruits and vegetables children consume is having them participate in gardening and garden education (Blair, 2009; McAleese & Rankin, 2007; McLennan, 2010; Oxenham, 2007). The following two studies show how garden-based education increased students' consumption of fruits and vegetables. McAleese and Rankin (2007) did a study consisting of control group, a group that received nutrition education and a group that received nutrition education plus hands-on garden-based experience. The 122 sixth grade students from Idaho did three 24-hour food recall activities from a booklet both before and after the twelve-week program (McAleese et al., 2007). McAleese et al. reported that students in nutrition education plus hands-on garden education group increased their fruit consumption by 1.13 servings and their vegetable consumption by 1.44 servings a day (2007). Thus, in their subjects, a twelve-week garden education program resulted in a doubling of the amount of fruits and vegetables these children were eating. Also notable is that the control group saw no change and the nutrition group without garden education also did not result in a significantly significant change in fruit and vegetable consumption (McAleese et al., 2007).

A very similar study done with sixth graders was written by Parmer, Sallsbery-Glenno, Shannon and Stuempler in 2009. These researchers also used a control group, a group getting one hour of nutrition education a week and a group doing one hour of nutrition education and

one hour of garden education opposing weeks (Parmer et al., 2009). The participants were assessed by a fruit and vegetable questionnaire, a survey, and a lunchroom observation form (Parmer et al., 2009). The results from this study found that there was no significant observed change in the control group; the group receiving nutrition education actually ate fewer vegetables at the posttest compared to their pretest; and the group receiving garden education ate significantly more vegetables, $t= 3.19$ and $p < .01$ (Parmer et al., 2009). These results suggest that nutrition education alone does not positively influence eating behavior in children, but garden education does show a significant change in vegetable consumption.

Other studies showed similar benefits for healthy eating habits in children. For example, a study done with elementary students showed that preference for vegetables as snacks increased after children took part in garden education (Lineberger & Zajicek, 2000 as referenced in Blair, 2009). Similarly, having students growing their own food showed that the desire to eat locally grown food increased (McLennan, 2010). Lastly, a study done by Blair reported that garden education made children more familiar with eating local and cool-weather vegetables which gives them alternatives to the more common, but sometimes far traveled, food in supermarkets (Blair, 2009).

Current Findings on Time Spent Indoors

Children in the United States are spending on average over eighty percent of their time indoors doing sedentary activities (Bukowski, Lewis, Gamble, Wojcik, & Laumbach, 2002; Dowdell, Graya & Malone, 2011). Sedentary activity and the quality of air indoors can have negative effects on children (Clausen and Petruka, 2009; Barnes, Fisher, Postma, Harnish, Butterfield, & Hill, 2010; Buckley, 2005; EPA, 2011; Toftager, Ekholm, Schipperijn, Stigsdotter, Bentsen, Grønbœk, & ... Kamper-Jørgensen, 2011)

Indoor Air Quality

Over one-fourth of the global disease burden is attributed to environmental exposures, and children disproportionately harmed (Barnes, Fisher, Postma, Harnish, Butterfield, & Hill, 2010). The EPA found that on average homes and buildings are two to five times more polluted than outdoor air (2012). Children are more vulnerable to environmental contaminants due to their unique physical and behavioral characteristics (Barnes et al., 2010). Specifically, Bukowski et al. found indoor environmental exposures of mold, radon, and carbon monoxide impact children's wellbeing and health (2002). These indoor air pollutants can cause aggravation and exacerbate symptoms of allergies and asthma in children, and can be a factor in causing headaches, nausea, fatigue, hormonal imbalances, and damage to the central nervous system, kidneys, and liver (Bukowski et al., 2002). Children who spend at least 80% of their time indoors are especially vulnerable to diseases and symptoms (Buckley, 2005).

Sedentary Indoor Activities

As mentioned earlier, children are spending more time indoors (Bukowski et al., 2002). Melkevik, Torsheim, Iannotti, and Wold (2010) found hours spent playing games and watching television to be negatively associated with time spent on moderate or vigorous physical activity for children in the United States and Australia. Instead of getting the required amount of physical activity, the Bureau of Labor Statistics (2011) suggests that families with children are spending more time in front of screens. Children under six years of age spend an average of two hours per day watching television, where families with children six to seventeen years of age spent an average of 47 minutes a day watching television in the year 2010 (Bureau of Labor Statistics, 2011).

Research finds that children's health habits are negatively influenced by television viewing (Melkevik, Torsheim, Iannotti, and Wold, 2010). Food being advertised on television is mainly in the 'use sparingly' section suggested by the USDA Food Guide Pyramid (Harrison, 2006). Harrison (2006) reviewed 426 food ads taped during a five-week period on family friendly stations. Among these commercials, twelve were of vegetables and fruit, compared to 308 that were of snack foods. The average item contained 124% of the daily recommended amount of fat, 135 % of the daily recommended amount of sodium 135% and roughly 100 grams of sugar (Harrison 2006). The most frequently played commercials were of fast food and high-sugar items (Harrison, 2006).

Research Finding Time Spent in Natural Outdoor Areas Benefits a Child's Wellbeing

Clausen and Petruka related plants to people in saying that just like plants need the right environment of water, sunlight and temperature to grow strong and healthy, so do people (2009). When reviewing literature on exposure to natural environments, resources highlighted many ways in which the outdoors was beneficial to a child's health. Articles listed physical and psychological health benefits derived from children being outside.

Physically, studies have shown time outside positively associates with being active (Cleland, Crawford, Baur, Hume, Timperio and Salmon, 2008; Litt et al., 2011; Taylor & Kuo, 2011). Cleland et al. (2008) did a prospective examination by using the CLAN study done at nineteen elementary schools in Melbourne, Australia. The cross-sectional findings indicated that spending time outdoors positively correlated with moderate to vigorous physical activity and was negatively associated with being overweight (Cleland et al., 2008). Litt et al. (2011) collected survey data in the Denver area and found that households that had a garden or a community garden reported more hours of physical activity than those that did not. On average, households

that gardened also reported being more active and having a lower BMI at a statistically significant level (Litt et al., 2011). This research suggests that time spent outdoors, and especially in gardens, may provide more opportunities for children to be active and avoid putting on excess weight.

Research also has found that the environment surrounding a child is an important indicator of their behavior (Dowdell, Graya and Malone, 2011; Litt et al., 2011; Taylor & Kuo, 2011). Dowdell et al. did a study of children in a natural setting and compared them to children in an unnatural play structure (2011). Outdoor gardens, grassy areas and sandpits were areas counted as natural in the study and areas inside including a bike track, a sandpit and plastic play structures were considered unnatural. The researchers found that children in the natural environments spent more time learning, reported more new findings in the ever-changing natural environment, had more positive interactions with peers and displayed less behavior problems (Dowdell et al., 2011). Improved concentration was another advantage found after children spent time outside (Taylor & Kuo, 2011). Overall, these findings suggest that being in a natural environment has benefits for children, both physically and psychologically.

Current Findings on Food Security

Food security means having access to enough food so that all family members can lead a healthy, active life (United States Department of Agriculture, 2011). Nisbet et al. (2011) and Rutten, Yaroch, Colón-Ramos, Johnson-Askew and Story (2010) found that food insecurity was linked to poor health in children. In 2011, in the United States, 14.6% of the population was food insecure and compared to 10.6% in 1999 (Rutten et al., 2010). This percentage is expected to worsen as oil becomes more expensive (Neff et al., 2011). Young children, people with chronic conditions, the elderly and people living in poverty are the ones most vulnerable to the

negative health impacts from food insecurity (Neff et al., 2011). This research indicates that many children are already in food insecure environments, meaning they do not have enough food to allow them to lead healthy, active lifestyles, and this is expected to worsen in the future.

Granner and Evans (2011) researched variables that affect adolescents' healthy eating by surveying 736 adolescents in two middle schools and having them complete a self-reported, paper-and pencil questionnaire. The factor they found associated most strongly to hinder fruit and vegetable intake was the amount to which vegetables and fruit were available in the home (Granner & Evans, 2011). Furthermore, Granner and Evens found income to be a statistically significant factor on whether an adolescent had healthy food in the home (2011). Additionally, lower-income is associated with eating fewer nutrients (Granner & Evens, 2011). This research suggests that children are more likely to consume healthy food if they have access to healthy food.

Research Finding Gardening Improving Food Security

While researching food security, it seems that one of the best teachers may be the past. Previously, the United States has gone through periods of heightened food insecurity and turned to small farms. For instance during WWI and WWII, many male farmers went off to war and the government promoted ways for women to earn money by producing food (Ferris, Norman & Sempik, 2002). A group called the Women Land Army Coalition recruited women to create gardens around the city, which increased the food that was available for consumption in time when food was scarce (Ferris et al., 2002). Likewise, the Federal Bureau of Education started the USSGA (United States School Garden Army) during World War I. Due to the concern that our food system was highly reliable on agriculture and gardening, the federal government tried to nationalize a curriculum by getting state and local governments to make amendments to

education codes and work laws that would allow gardening during the school day (Hayden-Smith, 2007). The USSGA program also worked to spread a school-based garden curriculum that used gardening to help teach other topics including math and sciences that were already taught (Hayden-Smith, 2007). Youth were looked at as an answer to help the food system and "Soldiers of the soil" was the name given to the two million youth that served in the USSGA (Hayden-Smith, 2007).

Other countries also used garden education to heighten food security in times of trouble. A half a century ago, Cuba politicians had researchers search for the best ways to cope if a total blockade of the island happened (Koont, 2007; Stricker, 2010). The researchers realized urban gardening would be beneficial to boost local food (Stricker, 2010). A few urban gardens projects were started to start testing best techniques. The citizens that worked on the gardens improved their lifelong gardening skills which helped food security as the USSR collapsed in 1991 (Stricker, 2010). Cuba was cut off, almost overnight, from 80% of their petroleum since the USSR was their main supplier (Koont, 2007). Sticker (2010) states that during this period, referred to as their "special period", radical transformations took place as the Cuban society prioritized locally grown food.

Due to their poor international relations with non-communist countries, Cubans were forced to shift to become a less petroleum-dependent society (Koont, 2007). They, like many current counties, depended on oil for transporting, fertilizing and doing large-scale agriculture. After this abrupt switch, they created groups that educated the public on organic, urban gardening. Koont reports that from 1994 to 2005 there was roughly a one-thousand-fold increase in produced fruit and vegetable urban agriculture (2007).

To lessen the effects of food insecurity here in the United States, Neff et al.(2011) and Winch and Stepnitz (2011) are predicting there will be some major changes to the way we currently operate the food system in the next few decades. For instance, shifting to small-farm, local food production with an increase in renewable energy, decrease of fertilizer and pesticide use, and decrease in transportation of goods are the predicted less petroleum-based practices for the future (Neff et al., 2011; Winch & Stepnitz, 2011). To ensure that people know small-farm techniques and practices, it is important that today's youth are educated on how to supply food for themselves in the future (Neff et al, 2011).

Summary

Children are not eating the daily recommended number of fruits and vegetables (CDC, 2011), spending much time outside (Bukowski et al., 2002) and have an increased chance to be in a food insecure home compared to 1999 (Rutten et al., 2010). Time spent in gardens and outdoors has been shown through the included research to improve the health of children. For instance, recall the sixth grade classes studied in the United States by McAleese et al. that did gardening to supplement their nutrition education and the students ate twice as many fruits and vegetables daily after the gardening program (2007). Furthermore, Dowdell et al. (2011) found that children in natural areas had statistically significantly more positive interactions with peers and less behavior problems than children in unnatural settings. Lastly, Cuba's ability to increase the amount of produce grown in their country by a thousand times more shows the power of teaching people to grow their own food and its impact on food security. Since children are our future, it is important that we create opportunities for them to discover and learn in a place that will help them be happier and healthier human beings.

SECTION II

METHODS

Scope and Sequence

The Clearwater garden curriculum included ten lessons because that is the length of a typical summer program. Thus, if a group like the Boys and Girls Club camp wanted to send out a group every week, there would be a different lesson for each week. In the La Crosse Area, elementary and middle school students typically get out of school the first week in June and start summer camps the second week. Many La Crosse area camps take days off during the week that includes the Independence Day (S. Torres, YMCA Camp Director, Personal communication, January 23, 2012). Also, some classes get cancelled for inclement weather. Therefore, a ten week program allowed camps to engage in one lesson a week.

Creating experiences was one of the main components in this curriculum. The author would like to note the purpose of this was to solidify the learning objectives. As Bloom's Taxonomy displays, the highest level of learning occurs when a learner is asked to create (Overbaugh & Schultz, 2012). Therefore, the knowledge and skills were coupled with having students do hands-on activities that would show in the end the creation of something special.

Curriculum Layout

There were four parts to the curriculum: an introduction, lesson plans, assessments and a conclusion. The introduction of the curriculum explained the mission of Clearwater Farm, the specific topics were covered, and an overview of the lessons. Each lesson plan consisted of the

following parts: Learning Objectives, Materials, Background, Warm-up Activity, Discovery Activity, Garden Activity and Reflection Activity. The learning objectives at the beginning of each lesson reflected awareness, attitude, knowledge and behavior outcomes. The assessments tested for the learning objectives and goals of the curriculum which are getting children to eat more fruits and vegetables, have children spend more time in natural, outdoor areas, and increase food security. Lastly, the conclusion summarized what was learned while creating the curriculum and future expansions on the lesson.

Lesson Sequence

The lesson sequence was carefully chosen to match stages of gardening and the size of the plants. First, to match the stages of the garden from early summer to late, the first lessons in the curriculum were best done in June, while the last are best done in August. This was indicated in the introduction of the curriculum by including one sun icon to indicate early summer, two to indicate lessons best done in mid-summer and three sun icons to indicate ones best done in late summer. The first lessons focused on the early season steps in gardening: preparing the soil, organizing the garden and planting the seeds. The next steps in gardening including tending to the plants and learning about helpful and harmful qualities of bugs are suggested lessons for mid-summer. The last lessons look at harvesting, where the excess produce goes, seed saving for future years and food travel.

The lessons also progress through the lifecycle. They follow the plants from soil and seeds, to investigating the plants as they grow and to harvesting when they are ready. This was done with the intent for students to see the whole process.

The focus of each lesson also progresses from narrow to broad. The lessons start by mainly focusing on everything right at the farm, but then move into topics that include the entire food

system and discuss items such as food pantries, fast food, grocery stores, world food, food travel and food policy.

Audience

The curriculum was geared towards 4nd through 8th graders. Groups from the greater La Crosse area that would be prime participants are summer schools, the YMCA summer camps, Boys and Girls Club camps, Park and Recreation camps and Family and Children Center. The ideal would be that children would get to come for each week's lesson to get a full overview of growing and our food system. These frequent-visiting learners will be able to see the progress in the garden, take more ownership and gather a more complete understanding of growing cycle. However, if groups could only come to one or a few lessons, they would be able to pick out which lesson best matches their interest or learning objectives and the time of the summer they would be coming to the farm. The instructors can pick out individual lessons by seeing their descriptions in the introduction or by contacting the author.

Pilot Group

Family and Children Center (FCC) is a non-profit organization that educates children which have been kicked out of school or taken out of a home environment due to social service requests. In the summer of 2011, the author organized for four groups from FCC to visit Clearwater on a weekly basis. Two groups were from the day facility and two groups were from the group home residential facility. The author met with leaders from FCC to discuss the partnership. Our agreement was that we would offer space and a curriculum for their groups to learn if they would get trained to lead groups through the lessons and have the children volunteer to help with tasks in the garden like weeding, planting, watering and harvesting. Once the agreement was reached, the author met with each education leader to show them the layout of the

farm and garden, get them familiar with the first three lesson plans and answer any questions. With the exception of one leader, the teachers were given the lesson plans and materials and they implemented the lessons upon arriving at Clearwater each week. One group leader requested that a volunteer education leader would be out at the farm each week to meet them and do the lesson with them. Since the author was anxious to see the curriculum in action, she interviewed and trained a University of La Crosse student minoring in Nutrition to lead the Thursday morning group in which the FCC leader did not want to be the educator.

Leaders sometimes reported covering the topics that were the focus of that week's lesson in class prior to coming to Clearwater each week. This was an unforeseen benefit to giving the teachers a few lessons at a time. This exposed children to the topic and information more.

Additional Groups

There were three YMCA groups that were out to the farm for one visit each. They participated in the "Where does our food come from?" lesson. They chose this lesson due to the time of the year they were coming and the goals of the YMCA Summer Camp program (Steven Torres, YMCA Camp Director, Personal communication, January 23, 2012).

Goals

The goal of this project is to affect children's eating habits, time spent in natural outdoor areas and increase food security. To assess these specific goals, more information will be discussed in the evaluation section. Quantitatively, however, the goal is to get more students, organizations, lessons and retention at Clearwater Farm. In the summer of 2011, two organizations within the range of 4-8th grade visited, totaling 99 students. Twenty-nine of these students were weekly returners. Twenty-nine lesson sessions occurred during the summer. A lesson session is defined as a group coming out and going through one of the lessons. There

were a few groups from FCC that missed a few lessons due to weather or dwindling attendance near the end of summer. The goals for 2012, is to have 350 students visit from grades forth through eight. Ideally, there would be at least five groups that brought children to Clearwater on a weekly basis. The goal for retention rate is sixty percent. Seventy-five is the goal for number of lesson sessions the author would like this year.

Evaluation

Multiple forms of evaluation took place last summer to evaluate the curriculum. One form of evaluation was done through lesson feedback. After each lesson, leaders would fill out an assessment and return it to the author. The questions to this assessment can be viewed in Appendix A. The author then used these assessments in two ways. First, since the lessons were created month by month, the author had time to implement any alterations in the next month. For example, if a leader said the lessons were not lasting long enough, the author could ensure the next month's lessons had more content or lengthy activities. Secondly, suggestions that were specific to any of the lessons were used to make final edits to the curriculum for use in the future. An example is if a worksheet needed more directions, more directions were added.

For groups coming each week, an assessment was given at the beginning of the summer and then again at the end of the summer. This paper and pencil survey can be found in APPENDIX B. This survey was designed to retrieve baseline data around the overarching goals of the curriculum which were eating healthier, being outside and increasing food security. The questions "Do you enjoy eating fresh food?" and "Do you think food from the garden is better tasting than store bought food?" attempted to test for how much fresh fruits and vegetables they were willing to eat. The questions "Do you believe that you can help grow fresh food?" and "How much do you feel you know about gardening?" attempted to test for their self-efficacy

relating to food security. Furthermore, at the end of each lesson was a time allotted for reflection in which the leaders were to get an understanding of how well the students absorbed the learning objectives of each individual lesson.

Timeline

March 1 - Finish Introduction and Curriculum

March 14 - Finish Evaluations and Conclusion

March 28-Finish Sections III and IV of project paper

April 11th-Oral Defense

May 1st- Finish any suggested modifications

SECTION III

FINDINGS

The author found that Clearwater Farm was a good place to host this curriculum and that garden education matched community need. There were also indications that the goals of the curriculum, increasing food and vegetable intake, time spent outdoors and food security, were met.

Clearwater Curriculum Fits Community Needs

The Family and Children Center and the YMCA both grew gardens on their own property in the summer of 2011. Yet, the leaders of both groups wanted the Clearwater experience for enrolled children because of the education component (Personal discussion, Leader of Residential Treatment at FCC, E. Jackson, May 7, 2011; Personal discussion, S. Torres, YMCA Camp Director , April 17, 2011). In the past, Steven Torres said, the children had been exposed to gardening, but had not learned much about the growing cycle (Personal discussion, April 17, 2011).

Education leaders, Kristen Kingery from FCC and Nicole Mayer, University of Wisconsin-La Crosse volunteer, both commented on the importance of the curriculum for the children they were teaching. After teaching from the curriculum for one month, Kristen Kingery commented that they had learned a lot from the curriculum and had many memorable experiences (Personal communication, July 6, 2011). Nicole Mayer in her video wrap-up interview (see Appendix E) commented that "A lot of kids do not get opportunities like this. They worked hard and learned a lot too" (Interview, August 17, 2011).

Both groups that attended Clearwater this summer, FCC and the YMCA, were highlighted in local newspapers. FCC was given publicity for offering health options for their children. The YMCA was noted in the *La Crosse Tribune* for partaking in farm life and learning in the garden. Links to these articles can be found in Appendix E.

Increasing Fruits and Vegetable Intake

Although there was no direct measure of fruit and vegetable intake with students at Clearewater Farm in the summer of 2011, there are indications that their intake increased. First off, when looking at the pre and post survey results in Appendix C, it is important to note the results and comments. At the beginning of the summer, six children out of nine children marked that they thought garden food was better tasting than grocery store food. However, at the end of the summer, 7 out of 8 children agreed to that statement. Tasting the food was noted twice as favorite parts of the lessons and eating was noted once. Secondly, from the research stated in Section II on garden education, there were two studies that found 12-week garden education programs increased the amount of fruits and vegetables consumed by children. This curriculum covered the same general topics as the ones in the studies. Therefore, it is possible that this project had similar results.

Increasing Time Spent Outside

In the summer of 2011, 99 students within the range of 4-8th grade visited Clearwater farm for education sessions. Twenty-nine lesson sessions were taught during the summer. Each lesson lasted for an average of an hour and a half. The number of hours spent at Clearwater in the summer of 2011 was 194 hours, counting the time of each student. Therefore, there was a substantial amount of time spent outside. Pictures in Appendix IV show children outside for their lessons.

Increasing Food Security

University of Wisconsin-La Crosse Education Leader volunteer Nicole Mayer, said when discussing the Clearwater curriculum, "This is just what kids need to become life-long enthusiasts of the garden" (Interview, August 17th, 2011). In the Discovery Survey shown in APPENDIX B and results shown in Appendix C, three students indicated they knew "A lot" about gardening, four answered "Some" and two marked "Not much". However, four students said they knew "A lot" and four knew "Some" on the survey at the end of the summer.

Reviewing Evaluation Criteria

The evaluations filled out by the children at the beginning and end of the summer are seen in APPENDIX B and explained in Section II. The intent of these assessments was to measure the overarching goals of the curriculum which is improving children's eating habits, boosting their time spent in natural outdoor areas and increasing the learner's food security. These evaluations did offer good baseline and follow-up data. However, questions with a Likert-scale would have allowed for more measurability and the results would have been more reputable if the sample size would have been larger. One area which could have been documented more in the assessments was enjoyment of the outdoors.

The lesson feedback evaluations done by teachers in Appendix A helped to determine if lessons were of good length, were appropriate for the age level visiting the farm and helped identify favorite and least favorite parts of the lesson. The responses proved to be very helpful in assuring the lessons could be used for that age and lasted an appropriate amount of time. The author also used the favorite and least favorite parts mentioned early in the summer to design activities in later lessons. This was done by assessing common themes in favorite and trying similar styled activities. For example, the teachers noted that students really enjoyed the "No

teeth, no laughing game" done for the warm-up in Lesson 1. This warm up requires the learners to each pick a different fruit and vegetable; therefore, they are using produce vocabulary. The game proceeds with learners having to call others by their fruit or vegetable name they picked without showing their teeth. The hard part comes when children want to laugh, but laughing makes you show your teeth. Therefore, when this was noted as the favorite part of the lesson in three out of the four teacher surveys, the author incorporated games that mixed garden terms with a fun challenge for warm-ups in July and August lesson plans.

The assessments filled out by the teachers and education leaders were very helpful in fine-tuning the lessons. However, these assessments from this point forward will attempt to measure the learning objectives specific to each lesson and the overarching garden curriculum goals: improve children's eating habits, boost their time spent in natural outdoor areas and increase the learner's food security. This will be done by asking questions in the evaluations that directly address the objective and curriculum goals.

Difficulties Encountered and Their Effects on the Project's Final Results

While implementing the curriculum and evaluations the author noted a few difficulties. The exposure of these difficulties can help future garden curriculum implementers from having the same issues.

Attendance

One of the main difficulties encountered during the process was children fluctuating in and out of the FCC groups during the summer. Fluctuating attendance makes it hard to track progress in the children and for them to get the full scope of the lessons. A good amount of data from children was collected at the beginning of the summer, but not as much the last week of

summer. The author was only able to compare and contrast results for the one group since that was the only group that filled out both the beginning and end of summer evaluations.

Evaluations

The evaluations done by teachers at the end of each lesson were turned in to the author either by email or by hand. The assessments done by the student were turned into the author when exchanging the next set of lessons with the teacher and at the end of the summer. The hardest part was getting the teachers to fill out the weekly evaluations consistently. Some of the leaders did turn them in each time without much prompting, while others struggled to turn in more than a handful. The main disconnect may have been that there was not a person onsite at Clearwater to collect the surveys every week, making the teacher responsible to turn it in at a later time. With the hectic schedules of teachers and volunteers, turning in the evaluations at a later time seemed to become a barrier. Furthermore, pencil-and-paper student evaluations were not done every week; thus, if they did not fill out the beginning and end of summer ones, the evaluation data regarding their experience was not available.

Weather

Weather made a huge impact on whether groups were able to come out to the farm. Clearwater does not have a physical building which includes bathrooms and a well-lit space. Leading discovery sessions can become a huge challenge when the weather is unfavorable. In the summer of 2011, there were some windy and rainy days in which groups did not show up. Therefore, this created a gap in their learning and did not allow some groups to finish all ten of their lessons.

Garden Upkeep

The main focus of the children coming to the farm was to enjoy the garden education. Although the children partook in garden activities during the lesson, the author found that they cannot be the sole ones responsible for the planting, preparing the soil, harvest and upkeep of the garden. Therefore, there had to be a volunteer base that helped with the larger tasks.

The author had a difficult time getting volunteers to come on a regular basis or to show up for work days. Clearwater's philosophy in the summer of 2011 was that most excess produce should go to the food pantry (Personal communications, G. Henley, March 7, 2011). This could have been a factor in what made it hard to obtain consistent volunteers. Ben Depies, a community garden advocate, was going to join Clearwater until he learned he was not able to take home the fresh grown produce that he helped plant (Personal communication, June 4, 2011).

Finances

To be a part of the Clearwater Farm Foundation, one is required to pay a yearly membership fee. Clearwater itself survives on member fees and financial support from a few donors within the surrounding area. However, students coming to Clearwater do not need to be members. The two groups, FCC and the YMCA did not pay any fees for the classes last summer. In initial planning stages, this seemed to make the most sense since both groups helped test the curriculum, did volunteer duties in the garden and did not have much financial giving freedom. However, as the summer progressed, the author realized that this was not sustainable. There were supplies that were used for the classes that were out of pocket expenses for the author or for the farm. Additionally, there was no way to finance leaders.

Leading the Leaders

Each education leader in the summer of 2011 received a tour of Clearwater Farm, if they had not been there already, and were given an orientation of the curriculum by the author. Although this helped get the groups started, leaders commented that they occasionally would have liked more direction at the farm. For instance, Nicole Mayer noted after making nametags in the first lesson, that they were not sure where each of those plants were to be planted (Personal communication, June 18, 2011). Although they had a map, it would have been more helpful to show them exactly where each plant was going to be planted. Furthermore, there are some very small, unique, amazing changes that went unnoticed.

The author was not able to be onsite most days due to having a full-time job. To the author's knowledge, no one was available or able to volunteer to be at the farm four days a week every week who was equipped to handle questions on the curriculum and farm.

SECTION IV

DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

Discussions

Children are our future and research presented in Section II suggests that children are more likely to consume healthy food if they have access to healthy food. Education and hands-on experience are vital to getting children connected with their food and building confidence in their growing power. As children become more involved and familiar with gardens, they can become a vital role in paving the path to a healthier tomorrow. They can help spread what they learned in the garden to their families, schools and communities when leading by example in choosing healthier options when given a choice and advocating for healthier food. Children can help their families incorporate more local fruits and vegetables into their diets. Therefore, there is potential for a huge impact in the community if children are engaged in the food growing process.

Parents and schools initially may not see the value in garden education since entry exams into college do not include this subject. However, the perks seen from eating healthier, spending time outdoors and having increased food security seems to be shown in research to ensure that optimal learning takes place. Parents may see the benefits of this education by instructors including them in the process. Giving parents updates and inviting them to partake in garden activities can help them feel and believe in the benefits of gardening.

Hopefully, community appeal continues to grow and funders realize the need for garden education. Even when schools and camps are onboard with wanting garden education, funding

for the sites, seeds, personal and materials is needed. Therefore, we need community stakeholders to understand the real value in garden education and put money behind it. Garden education has been shown in studies to increase fruit and vegetable consumption and increase food security. Therefore, this should be something that donors want to put their money behind since it has been shown to work.

Personal and Professional

The author gained a further understanding of the growing cycle and how it can best be presented to children. While putting together each topic, the author learned more about every aspect of the growing cycle. The author also learned about how to create assessments that evaluate learning objectives and goals. Most importantly, the author found that it is possible to change eating habits, get children in nature more and increase their life security using gardening.

The interworking of a garden organization was also explored during this process. The author was able to learn about how small organizations operate and the purpose of a Board of Directors. Although this is not the same way all non-profit gardens run, it is valuable to see how this organization operates to witness the pros and cons of their system.

Conclusions

Expansion

As a health educator, the author developed an even more profound importance for gardening education while creating the Clearwater Curriculum. The author feels that garden education should be expanded to more organizations to broaden the impact. Connecting kids with their food needs to be a public health focus since an overwhelming amount of research showed a trend of unhealthy eating habits, increase of indoor activity and food insecurity.

Currently, many area schools are working to get gardens at their sites, but lack a curriculum to follow. If students are only told to do chores in the garden, that can hinder the amount of enjoyment and learning taking place. Since it was very hard to find garden curriculum available on the internet or in books which follows the growing lifecycle, the Clearwater Curriculum should be used at more sites.

Collaboration

If groups doing garden education collaborate, there would be a much greater benefit. According to the matrix designed by A. Himmelman (as referenced in Gilmore, 2012) regarding working together, groups can start at networking and being mutually benefited from sharing information. As this group of garden leaders and enthusiasts evolves, the goal would be to increase time, investment and trust to not only share resources, but also to alter activities and enhance each other's capabilities to achieve a common purpose (Gilmore, 2012). Thus, getting people on board can end up benefiting all parties and the communities served. Gilmore notes that it is important for all individuals and groups to know, from the beginning, the degree of involvement they are willing to share and what is desired from the group (2012).

Planning

The curriculum would not have been successful without advanced preparation of the following: garden materials, garden layout, planting, staff, weather plans and finances. Each one of these areas needed time and attention in the preparation stages in order to support the curriculum.

Evaluations

Assessments, evaluation and documentation helped see the learning progression that occurred last summer on the farm. The assessments now included in the curriculum have been

modified from the original ones. The new assessments allow instructors to better test for evidence that the three main goals of the curriculum and the learning objectives of each individual lesson are addressed directly.

Conclusions for Other Fields

Garden education can be used as a helpful health intervention by many professionals. The health benefits of gardening education were seen throughout this project. Policy makers, public health officials, the food industry and educators are urged to encourage garden education to enhance the lives of today's youth. Examples would be, but are not limited to, requiring garden education in the school curriculum, advocating for community and school gardens and funding for garden education.

There are also implications for other age ranges. There is not one special age in which education within the garden should take place. The younger you get children started, the longer they have to benefit and grow their knowledge. However, garden education also can have benefits for elderly, disabled and at-risk youth.

Recommendations

Expansion

The author recommends that organizations or groups who are able to garden with children do so and incorporate the curriculum as presented. Following the execution of lessons, the author encourages instructors to fill out the Process Evaluation Form in Appendix F and return it to the author. From these evaluations, the author will look to enhance future lessons and update the material by integrating techniques that other gardens found helpful.

Additionally, the author strongly suggests that similar curricula with additional foci, components and target audiences are created. The garden curriculum should be expanded to

include more cooking and better coverage of animals as part in the food system. The garden program should expanded to include hiking in order to get more physical activity and a wider understanding of the outdoors. The curriculum should be modified to benefit additional audiences including at-risk youth, diversity groups, other age populations, special needs, trauma recovery patients and veterans.

Collaboration

The author recommends that passionate leaders and groups engaged in garden education within the surrounding area met biannually to mutually benefit from collaboration. Nearby schools and organizations are especially recommended for this collaboration. Joining together to discuss what is going well, what can be changed and what can be added to the curriculum is needed to ensure the curriculum stays current and evolves. If groups are willing to alter activities and enhance each other's capabilities, then this can lead to maximized benefit.

Planning

It is strongly recommended that in preparation to use a curriculum like this, the leaders plan in advance where the garden will be, what will be planted and who will be in the garden at what time. Also, funding and inclement weather back-up plans for the garden program should be determined early in the planning phase.

Staffing

Since Clearwater had a difficult time maintaining volunteers who were instructed to give excess food to the food pantry, trying another system is strongly recommended. It would be advisable to identify a person to garden that is knowledgeable and can get a mutual exchange for growing the food such as money, class credit or a portion of the food.

Make sure a full-time leader is on staff to provide consistency and knowledge. This leader needs to show groups what is new, help gather data, lead sessions, attract funders, market to new groups, correspond with groups and volunteers, recruit volunteers and fill in gaps. Also, carefully choose leaders implementing the curriculum to ensure they display passion for gardening and pass along a good attitude to the learners. Leaders have the power to inspire young learners into tomorrow's food producers.

Funding

Funding of the curriculum should be done by implementing fees for participation. The author of this project attended the *Growing Power Workshop* February 18-19, 2012, and presented what Clearwater did last summer and where they were planning to go in the future. One main suggestion by the Project Vision session leaders was to ensure that the programs are financially sustainable by requiring every class to pay a fee or be financial supporters of the organization (Personal communications, E. Allen, February 19, 2012). They explained that fees attach value to a service and allow the program to continue even if grants run dry. They still suggested applying for grants while remembering that grant funders like to see programs that could continue if their contributions came to an end. Therefore, if organizations implementing the curriculum are similar to Clearwater financially, it is recommended that they charge per student or per organization to participate in the programs.

Weather

It is recommended to have a building to house discovery sessions in the chance of inclement weather to help prevent gaps caused from cancelling sessions. Additionally, such a facility could host host cooking demonstrations, house a staff member and keep journals, if appropriate.

Evaluations

In order to track the impacts of the curriculum, it is recommended that evaluation procedures include initial and follow-up surveys to the students, individual assessments to the students after each lesson, and evaluations to the instructors after each lesson. A large amount of useful data will help accrue funding and support if there is evidence of growth and meeting community needs. Ensure that all participants, teachers and leaders are filling out these evaluations to maximize the survey numbers and strengthen the accuracy of the results. Data collection should be done onsite to make easier for the leaders to turn in the completed forms.

It would be of value to increase the anecdotal evidence of children's learning progressing by taking photos and videos of the children, with permissions. Imagery also should show the progress of what the children are doing in the garden and help to showcase different activities.

Overall Advice

Timing

All curriculum implementers should note their location and its similarity to Southwestern Wisconsin. If individual in an area farther south than Wisconsin uses the curriculum, the author suggests starting the lessons near the time of planting. Southern areas may be able to use this as a spring curriculum. For areas north of Central Wisconsin, leaders may want stretch out the lessons in the first part of the curriculum until they match what is happening in the garden.

Definition of Terms:

BMI is a number that is calculated using an individual's height and weight to estimate a person's body fat (CDC, 2012).

Eating out includes consumption of food outside the home including fast food establishments, restaurants and/or delis.

Food security is having access to enough food so that all family members can lead a healthy, active live (United States Department of Agriculture, 2011).

Sugar intake includes refined sugars found in soda, candy and processed food.

REFERENCES

Alkerwi, A., Donneau, A., Sauvageot, N., Lair, M., Scheen, A., Albert, A., & Guillaume, M. (2011). Prevalence of the metabolic syndrome in Luxembourg according to the Joint Interim Statement definition estimated from the ORISCAV-LUX study. *BMC Public Health, 11*(1), 1-9. doi:10.1186/1471-2458-11-4

Armitage, K. (2010). What studying nature has taught us. *Solutions Journal, 1*(6), 74-78.

Barnes, G., Fisher, B., Postma, J., Harnish, K., Butterfield, P., & Hill, W. (2010). Incorporating environmental health into nursing practice: A case study on indoor air quality. *Pediatric Nursing, 36*(1), 33-40.

Bezerra, I., Curioni, C., & Sichieri, R. (2012). Association between eating out of home and body weight. *Nutrition Reviews, 70*(2), 65-79. doi:10.1111/j.1753-4887.2011.00459.

Blair, D. (2009). The child in the garden: an evaluative review of the benefits of school gardening. *Journal of Environmental Education, 40*(2), 15-38.

Buckley, T.J. (2005). It's winter: Beware the indoor air pollution. John Hopkins Bloomberg School of Public Health News Center. Retrieved from http://www.jhsph.edu/PublicHealthNews/articles/2005/buckley_indoor_air.html.

Bukowski, J. A., Lewis, R., Gamble, J. F., Wojcik, N. C., & Laumbach, R. J. (2002). Range-finding study of risk factors for childhood asthma development and national asthma prevalence. *Human & Ecological Risk Assessment, 8*(4), 735.

Bureau of Labor Statistics. June 22, 2011. *America Time Use Survey Summery*. Retrieved from http://www.bls.gov/news.release/atus.nr0.htm

Center for Disease Control and Prevention (CDC). Retrieved from http://www.cdc.gov/

Clausen, K. W., & Petruka, D. R. (2009). Tending the garden: Case studies in school stress. *Clearing House, 82*(4), 187-191.

Clearwater Farm Foundation. *Mission/Vision Statement.* Retrieved February 5, 2012 from http://www.clearwaterfarmfoundation.org/Newsletters.html.

Cleland, V., Crawford, D., Baur, L., Hume, C., Timperio, A., & Salmon, J. (2008). A prospective examination of children's time spent outdoors, objectively measured physical activity and

overweight. *International Journal of Obesity, 32*(11), 1685-1693. doi:10.1038/ijo.2008.171

Collison, K. S., Zaidi, M. Z., Subhani, S. N., Al-Rubeaan, K., Shoukri, M., & Al-Mohanna, F. A. (2010). Sugar-sweetened carbonated beverage consumption correlates with BMI, waist circumference, and poor dietary choices in school children. *BMC Public Health,* 10234-246.

Davis, B. E. (2011). Rooftop hospital gardens for physical therapy: A post-occupancy evaluation. *Health Environments Research & Design Journal (HERD), 4*(3), 14-43.

Dowdell, K., Graya, T., & Malone, K. (2011). Nature and its influence on children's outdoor play. *Australian Journal of Outdoor Education, 15*(2), 24-35.

Ferris, J., Norman, C. & Sempik, J. (2002). People, land and sustainability: Community gardens and the social dimension of sustainable development. *Social Policy and Administration. 35* (5), 559-568.

French, S., Story, M., Neumark-Sztainer, D., Fulkerson, J., & Hannan, P. (2001). Fast food restaurant use among adolescents: Associations with nutrient intake, food choices and behavioral and psychosocial variables. *International Journal of Obesity & Related Metabolic Disorders, 25*(12), 1823.

Gibson, S. S. (2010). Trends in energy and sugar intakes and body mass index between 1983 and 1997 among children in Great Britain. *Journal of Human Nutrition & Dietetics, 23*(4), 371-381. doi:10.1111/j.1365-277X.2010.01059.

Gibson, S., & Neate, D. (2007). Sugar intake, soft drink consumption and body weight among British children: Further analysis of National Diet and Nutrition Survey data with adjustment for under-reporting and physical activity. *International Journal of Food Sciences & Nutrition, 58*(6), 445-460.

Gilmore, G. (2012). *Needs and Capacity Assessment Strategies for Health Education and Health Promotion* (4th ed.). Burlington, MA: Jones and Bartlett Learning.

Granner, M. L., & Evans, A. E. (2011). Variables Associated With Fruit and Vegetable Intake in Adolescents. *American Journal of Health Behavior, 35*(5), 591-602.

Harrison, K. (2006). Fast and sweet: Nutritional attributes of television food advertisements with and without black characters. *Howard Journal of Communications, 17*(4), 249-264.

Hayden-Smith, R. (2007). "Soldiers of the soil": The work of the United States School Garden Army during World War I. *Applied Environmental Education & Communication, 6*(1), 19-29. doi:10.1080/15330150701319453

HealthyPeople.gov. *Topics & Objectives Index - Healthy People.* (n.d.). Retrieved from http://www.healthypeople.gov/2020/topicsobjectives2020/default.aspx

Hung-Hao, C., & Nayga Jr., R. M. (2010). Childhood obesity and unhappiness: The influence of soft drinks and fast food consumption. *Journal of Happiness Studies, 11*(3), 261-275. doi:10.1007/s10902-009-9139-4

Jendrysik, M. S. (2011). Back to the garden: New visions of post human futures. *Utopian Studies, 22*(1), 34-51.

Jorgensen, A., & Gobster, P. H. (2010). Shades of green: measuring the ecology of urban green space in the context of human health and well-being. *Nature & Culture, 5*(3), 338-363. doi:10.3167/nc.2010.050307

Khan, S., G, Keeney, D., Frankowski, B., & Carney, J. (2011). Prevalence of food insecurity and utilization of food assistance program: an exploratory survey of a Vermont middle school. *Journal of School Health, 81*(1), 15-20. doi:10.1111/j.1746-1561.2010.00552

Kim, D., & Leigh, J. (2011). Are meals at full-service and fast-food restaurants 'normal' or 'inferior'? *Population Health Management, 14*(6), 307-315. doi:10.1089/pop.2010.0071

Koont, S. (2007). Urban Agriculture in Cuba: Of, by, and for the Barrio. *Nature, Society & Thought, 20*(3/4), 311-326.

La Crosse Medical Health Science Consortium. *Healthiest County 2015- Focus Areas* (n.d.). Retrieved from http://www.lacrosseconsortium.org/content/healthiest_county/focus_areas

Litt, J. S., Soobader, M. J., Turbin, M. S., Hale, J. W., Buchenau, M., & Marshall, J. A. (2011). The influence of social involvement, neighborhood aesthetics, and community garden participation on fruit and vegetable consumption. *American Journal of Public Health, 101*(8), 1466-1473. doi:10.2105/AJPH.2010.300111

Lu, S. (2010). The association between the availability of sugar-sweetened beverage in school vending machines and its consumption among adolescents in California: A propensity ScoreMatching approach. *Journal of Environmental & Public Health*, 1-5. doi:10.1155/2010/735613

Maas, J., Verheij, R. A., Spreeuwenberg, P., & Groenewegen, P. P. (2008). Physical activity as a possible mechanism behind the relationship between green space and health: A multilevel analysis. *BMC Public Health*, 8206-218.

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.

McVittie, C., Hepworth, J., & Schilling, B. (2008). The Select Committee Report on Obesity (2004): The significant omission of parental views of their children's eating. *Critical Public Health, 18*(1), 33-40. doi:10.1080/09581590701660399

Melkevik, O., Torsheim, T., Iannotti, R. J., & Wold, B. (2010). Is spending time in screen-based sedentary behaviors associated with less physical activity: A cross national investigation. *International Journal Of Behavioral Nutrition & Physical Activity*, 746-55. doi:10.1186/1479-5868-7-46

National Restaurant Association. Trends and forecasts. Retrived January 30, 2012 from http://www.restaurant.org/research/forecast/

Neff, R. A., Parker, C. L., Kirschenmann, F. L., Tinch, J., & Lawrence, R. S. (2011). Peak oil, food systems, and public health. *American Journal of Public Health, 101*(9), 1587-1597. doi:10.2105/AJPH.2011.300123

Nestle, M. (2005). Preventing childhood diabetes: The need for public health intervention. *American Journal of Public Health*. pp. 1497-1499. doi:10.2105/AJPH.2005.069120

Nielsen, S.J. & Popkin, B.M. (2003). Patterns and trends in food portion sizes, 1977-1998. *JAMA, 289*(4):450-453. doi:10.1001/jama.289.4.450

Overbaugh, R. C. & Schultz, L. (2012). Bloom's Taxonomy. *Old Dominion University.* Retrieved April 13, 2012 from http://www.odu.edu/educ/roverbau/Bloom/blooms_taxonomy.htm

Oxenham, E., & King, A. D. (2010). School gardens as a strategy for increasing fruit and vegetable consumption. *Journal of Child Nutrition & Management, 34*(1).

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

Pecaski McLennan, D. (2010, March). "Ready, Set, Grow!" Nurturing young children through gardening. *Early Childhood Education Journal*. pp. 329-333. doi:10.1007/s10643-009-0366-4.

Rutten, L., Yaroch, A. L., Colón-Ramos, U., Johnson-Askew, W., & Story, M. (2010). Poverty, food insecurity, and obesity: A conceptual framework for research, practice, and policy. *Journal of Hunger & Environmental Nutrition, 5*(4), 403-415. doi:10.1080/19320248.2010.527275

Sharkey, J. R., Johnson, C. M., & Dean, W. R. (2011). Less-healthy eating behaviors have a greater association with a high level of sugar-sweetened beverage consumption among rural adults than among urban adults. *Food & Nutrition Research,* 551-9. doi:10.3402/fnr.v55i0.5819

Stricker, P. (2010). Bringing social justice back in: Cuba revitalizes sustainable development. *Local Environment*, *15*(2), 185-197. doi:10.1080/13549830903542380

Taylor, A., & Kuo, F. (2011). Could exposure to everyday green spaces help treat ADHD? Evidence from children's play settings. *Applied Psychology: Health & Well-Being, 3*(3), 281-303. doi:10.1111/j.1758-0854.2011.01052

U.S. Department of Agriculture (USDA). *Dietary Guidelines for Americans, 2005.* Retrieved January 19, 2012 from http://www.usda.gov/wps/portal/usda/usdahome

U.S. Department of Health and Human Services (HHS). Retrieved January 20, 2012 from http://www.hhs.gov/

Winch, P., & Stepnitz, R. (2011). Peak oil and health in low- and middle-income countries: Impacts and potential responses. *American Journal of Public Health, 101*(9), 1607-1614. doi:10.2105/AJPH.2011.300231

Young, L. R., & Nestle, M. (2002). The contribution of expanding portion sizes to the U.S. obesity epidemic. *American Journal of Public Health*, 92(2), 246-249.

Young, L. R., & Nestle, M. (2007). Portion sizes and obesity: Responses of fast-food companies. *Journal of Public Health Policy*, *28*(2), 238-248. doi:10.1057/palgrave.jphp.3200127

APPENDIX A

END OF LESSON ASSESSMENT

END OF LESSON ASSESMENT

Please take time to fill this out to help strengthen this lesson and future lessons. Thank you.

- How long did the lesson take?

- What was the favorite part of the lesson?

- What was the least favorite part of the lesson?

- Suggestions for modifications:

- Was this lesson age appropriate? Yes No Explain if answer was no:

APPENDIX B

INITIAL AND FOLLOW-UP SURVEYS

STUDENT'S INITIAL SURVEY

Discover's Survey

Have you worked in Clearwater garden before? Yes No

Have you worked in other gardens? Yes No

Do you believe that you can help grow fresh food? Yes No

Do you enjoy eating fresh food? Yes No

Do you think food from the garden is better tasting than store bought food? Yes No

Do you think food from the garden is healthier than food bought in the store? Yes No

How much do you feel you know about gardening?

A lot Some Not much Nothing

What would you like to learn this summer about growing food?

STUDENT'S FOLLOW-UP SURVEY

Discover's Survey

Do you believe that you can help grow fresh food? Yes No

Do you enjoy eating fresh food? Yes No

Do you think food from the garden is better tasting than store bought food? Yes No

Do you think food from the garden is healthier than food bought in the store? Yes No

How much do you feel you know about gardening?

A lot Some Not much Nothing

What was your favorite thing you learned this summer in the garden?

What was your favorite activity this summer?

What was your favorite activity this summer?

Would you like to come back next summer?

APPENDIX C

SURVEY RESULTS

Table 2. 2011 Clearwater Discovery Survey Results from the Beginning and End of Summer

Discovery Survey Results - June 2011	Yes	No	A lot	Some	Not Much	Nothing	Total
Have you worked in Clearwater garden before?	2	7					9
Have you worked in other gardens?	7	2					9
Do you believe that you can help grow fresh food?	8	1					9
Do you enjoy eating fresh food?	8	1					9
Do you think food from the garden is better tasting than store bought food?	6	3					9
Do you think food from the garden is healthier than food bought in the store?	8	1					9
How much do you feel you know about gardening?			3	4	2	0	9

What would you like to learn this summer about growing food?	Comments
	Where to put the seeds in the garden
	How to know when food is ripe
	IDC
	I already know a lot
	How to put seeds in the garden

Discovery Survey Results August 2011	Yes	No	A lot	Some	Not Much	Nothing	Total
Do you believe that you can help grow fresh food?	8	0					8
Do you enjoy eating fresh food?	7	1					8
Do you think food from the garden is better tasting than store bought food?	7	1					8
Do you think food from the garden is healthier than food bought in the store?	8	0					8
How much do you feel you know about gardening?			4	4	0	0	8

What was your favorite thing you learned this summer?	Comments
	How to plant stuff
	No teeth, no laughing is my favorite game ever!
	How to plant vegetables.
	About the animals

Learning what different things tasted like
I liked learning about bugs and what they do in the garden.

What was your favorite activity this summer?	Comments
	No teeth, no laughing is my favorite game ever!
	Planting and bean activity
	Tasting stuff in the garden
	Apples and strawberries
	Tasting food
	Games
	Eating

What was your least favorite activity this summer?	Comments
	Compost
	Anything that was a lot of work
	Working

Would you like to come back next Summer	Yes	No
	8	0

APPENDIX D

PHOTOS

Photos of Education Sessions

Above photos are of YMCA education sessions. In the left photo, the children are noticing a chicken out of the fence. In the right, children are reflecting with leader Nicole about the day's lesson.

Educational leader Kristen Kingery from FCC describes the outline of the day's lesson. On the right is the voted best looking Kohlrabi by FCC.

APPENDIX E

MEDIA

News Articles:

Larsen, J. (2011, June 16). *Family & Children's Center promotes education, healthy lifestyles.* Courier Life. Retrieved from http://lacrossetribune.com/courierlifenews/lifestyles/article_ecaf4c58-983a-11e0-9e54-001cc4c03286.html#ixzz1nmpqJx2L

(2011, July 6). *Clearwater Farm Goat.* La Crosse Tribune. Retrieved from http://lacrossetribune.com/image_0c794a9e-adc0-11e0-aefe-001cc4c002e0.html#ixzz1TL53u5CF.

(2011, August 17). *SA Clearwater Farm Barn.* La Crosse Tribune. Retrieved from http://lacrossetribune.com/sa-clearwater-farm-open-barn/image_194a315c-c922-11e0-b905-001cc4c03286.html

Videos:

Video of Education Leader Nicole Mayer's Wrap-up Interview. Retrieved from http://www.youtube.com/watch?v=kAMTBoSMzVM&feature=related

Video of Education Leader Nicole Mayer's Overview of Farm Activities. Retrieved from http://www.youtube.com/watch?v=d1TgEr9dqUs&feature=related

APPENDIX F

PROCESS EVALUATION FORM

Process Evaluation Form

Name of Organization:_____

Contact Person's Name:_____

Phone Number: _____

Email: _____

Check Programs You Completed With Children

- ☐ Get Growing!
- ☐ What's in a name?
- ☐ The Food Cycle
- ☐ Are you bugging me?
- ☐ Roots and Stems are quite the gems
- ☐ Is It Time?
- ☐ Where does food come from?
- ☐ Food Pantry
- ☐ Where in the world?
- ☐ Seeds of Health

Number of children_____ Number of adults_____

What went well?

What suggestions do you have for improvement?

What are other lessons you feel should be added?

To what degree did the assessment tools help measure the individual lesson learning objectives?
Not at all Not much Somewhat A good deal

Comments:
To what degree did the did the assessment tools help measure the three curriculum goals of getting children to eat healthier, spend time outside and increase food security?
Not at all Not much Somewhat A good deal

Comments:

Did you the results show favorable findings?

What have you done at your garden that would be an asset to this curriculum?

Please email your completed Process Evaluation Form to jamieklonowski@gmail.com.

Thank you.
Jamie Klonowski

APPENDIX G

CURRICULUM

Education Discover Program

Clearwater Farm

TABLE OF CONTENTS

Education Discovery Program Information

Mission of Clearwater

The Clearwater Farm Foundation will demonstrate, teach and advocate the sustainable use of natural, architectural, historical, and agricultural resources

Education Discovery Program

A healthy-hearted community requires empowered people sustainably utilizing the natural recourses. Clearwater Farm offers green space right in the center of Onalaska to connect us to our roots. The place-based education provided empowers people to learn, connect and grow right in our own community.

Research has found connecting with the natural environment essential for a thriving quality of life. Since children are our future, it is crucial that they have a chance to get their hands dirty and learn irreplaceable lessons. Our objectives are to have fun; increase fruit and vegetable consumption; increase time spent in natural areas; and empowers learners.

Garden Activities

Each session starts with a fun warm-up activity; examples include a mini-scavenger hunt, drawing vegetables blindfolded, or trying to say produce names without showing their teeth. In the Discovery session, children will do hands-on exploring of which topic is chosen below. Then they will be able to get some experience with the garden. At the end of each session, we have children do a reflection cool-down to help them process what they learned.

Season Key
Each lesson has sun icons next to the title to indicate what time during the summer the lesson would fit the best.
☼ Early Summer
☼☼Mid-summer
☼☼☼ Late Summer

All sessions last for an hour and a half and are modified to fit any grade from 4-8.

Get Growing! ☼ (check Season Key for details)
Seed Matching
A better life for the plants means a tasty life for us. We discover what is essential to help a seed grow. Then we see if you can you pick out a pepper seed from a carrot seed while helping along the way.

What's in a name? ☼
Plant Identification
Does it matter what you call each plant? Why is it helpful to label plants in the garden? And what do their names tell us about them?

The Food Cycle ☼
Making a Compost Salad
Get ready to get your hands dirty and explore what compost is all about. You will discover what is needed for really good compost and what does good compost does for your food and garden.

Are you bugging me? ☼☼
Bug scavenger hunt
Growers will seek out bugs in the garden and observe them to discover the helpful or harmful things these creatures do in the garden.

Roots and Stems are quite the gems ☼☼
Plant Investigation
Learn what part of the plant we're eating and what each part does for the plant.

Where does food come from? ☼☼
Garden Activity Stations
Why is garden food better than fast food? Where do French fries come from? Is fresh apple pie good for you? We'll answer these questions and more while moving through garden activity stations.

Is It Time? ☼☼☼
Reporting on the progress of the produce
Growers will find the prime time to pick each vegetable or fruit. Then they'll choose a plant to do a live report to the group on the status of that plants progress.

Food Pantry ☼☼☼
Touring the Onalaska Food Basket on 731 Sand Lake Road, Onalaska
Find out where excess food from Clearwater Farm goes. During your tour, we'll explain why fresh food is important for food pantries.

Where in the world? ☼☼☼
Mapping out how far it takes food to get to our grocery stores.
Where does the grocery store get its food? Which foods travel the furthest? How can we cut down on the distance our food travels? Learn this and more during this session.

Seeds of Health ☼☼☼
Finding seeds that will grow into plants next year

Before humans planted gardens, seeds would naturally travel and grow. Learners figure out where seeds in each plant are located and how they naturally travel. Then we will look at how we can save them for the next summer.

Education Discovery Program Sign-up Sheet

Clearwater Farm

Name of Organization: _____

Contact Person's Name: _____

Phone Number: _____

Email: _____

Program(s) Interested In:
(Please check one box for every day you are registering for)

- ☐ Get Growing!
- ☐ What's in a name?
- ☐ The Food Cycle
- ☐ Are you bugging me?
- ☐ Roots and Stems are quite the gems
- ☐ Is It Time?
- ☐ Where does food come from?
- ☐ Food Pantry
- ☐ Where in the world?
- ☐ Seeds of Health

Number of children_____ Number of adults_____

Dates and Times: Please pick the day of the week and time you are looking to come. We will talk with you to pick a date that is available.

- ☐ Monday
- ☐ Tuesday
- ☐ Wednesday
- ☐ Thursday
- ☐ Friday

- ☐ AM session (10-11:30)
- ☐ PM session (1:00-2:30)

Specific Date Request:

Are there any other specifications that you want us to take into consideration?

☐ I understand that a waiver needs to be signed for each child by their guardian prior to visiting Clearwater and that the fee is $3 per child, with a minimum of $30.

_____
Signature

A member from Clearwater will be contacting you shortly. Thank you!

Please return to garden@clearwaterfarmfoundation.org.

Waiver and Release of Liability Form

Clearwater Farm

I hereby give permission for my child, _____, to attend classes/field trip at Clearwater Farm located on Green Coulee Road, Onalaska, Wisconsin. My child will accompany an adult representative of Clearwater Farm at all times while visiting the Clearwater Farm property. I will advise my child to adhere to all rules and guidelines set forth by Clearwater Farm, its agents, members and employees.

I recognize and acknowledge that there are certain risks involved in these programs including but not limited to property damage, personal injury or death. I further certify that I am of legal age and freely sign this document on behalf of my minor child. I also certify that I have read this document and fully understand its terms.

I HEREBY WAIVE ALL CLAIMS AND RELEASE FROM ALL LIABILITY CLEARWATER FARM FOUNDATION, ITS BOARD OF DIRECTORS, RESPECTIVE AGENTS AND EMPLOYEES, FROM ALL DAMAGES AND PERSONAL INJURY ARISING OUT OF OR BASED UPON ACTS OF NEGLIGENCE SUFFERED BY MY CHILD WHILE PARTICIPATING IN ANY ACTIVITIES ON CLEARWATER FARM PROPERTY. THIS WAIVER OF LIABILITY DOES NOT APPLY TO CLAIMS ARISING OUT OF INTENTIONAL ACTS OF THE AGENTS OR EMPLOYEES OF CLEARWATER FARM FOUNDATION. I UNDERSTAND THAT I MAY REFUSE TO SIGN THIS WAIVER AND RELEASE OF LIABILITY AND, IN THAT EVENT, I WILL NOT BE ALLOWED TO ATTEND ANY EVENT OR PROGRAM AT CLEARWATER FARM.

I have read and understand the foregoing Waiver and Release of Liability form.

Dated this _____ day of _____, 2010.

_____ Parent

_____ Child

_____ Parent Phone Number during class

_____ Where should child be taken to in the event of injury?

This Waiver and Release pertains to the following classes held at Clearwater Farm in which my child is participating:

Date Time Class Name

_____

_____

Curriculum & Lesson Plans

For the Implementer:

Components of Each Lesson:

Objectives This is what the learners should know when they are done with each lesson.

Materials Make sure you bring these along. All should be included with the binder.

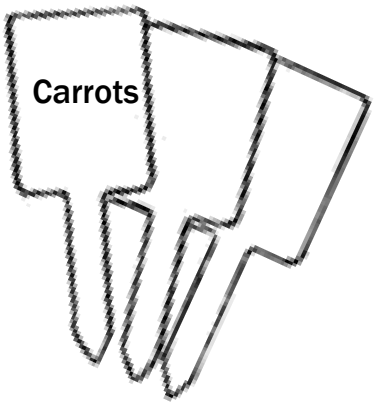
Background This is for you personally to get you acquainted with the lesson material. You do not have to (although you can) read this to the group.

Warm-up Activity This is a game or activity intended to get the learners warmed up and ready to learn.

Discovery Activity This helps the learners discuss, explore and discover concepts related to the objectives.

Garden Activity Garden activity can help further the discovery activity. If the suggested garden activity is not available, you can substitute it with another including weeding, watering, or harvesting. You can take as little or as long as you want on this. This is also a way your group can earn points.

Reflection Activity You can have the students use their journals to reflect. Also, feel free to change the reflection questions if something during the lesson seemed to grab their attention.



What's in a name?

Plant Identification

Learning Objectives

Awareness: Learners will gain awareness as to the importance of names
Behavior: Learners will create name tags for plants.

Materials

Popsicle sticks
Steel wire
Sharpie and journal or paper.
Example of Discovery Activity (See Appendix I)

Background

Scientists have paired each variety of vegetable and fruit with a scientific name. This lesson's purpose is to generate discussion as to the purposes of names. One purpose is for identification. If we do not make names for certain plants, we cannot communicate about these plants.

Warm-up Activity

No teeth, no laughing
Have everyone sit or stand in a circle. Have them go around the circle and say aloud the name of a vegetable or fruit. No two can be the same. That is now their "name". Pick a student to start. They start by saying their "name" and then someone else's. So, it might go, "carrot...broccoli". Then broccoli could say "broccoli..strawberry". The catch is you cannot show your teeth or laugh during the game. If you do, you can have them sit in the middle or the group can pick out another name for them. They also must remember someone else's name. If they cannot think of anyone's "name" when they are called, then it would be the same as getting out.

Discovery Activity

"Quotation marks" indicate questions the leader can ask. *Italicized words* are possible answers if students are having a hard time creating a discussion.

Ask the group, "Do names matter?" Allow for wait time.

"Imagine no one in this group had a name. How would that make things different?"
Hard to get someone's' attention if you cannot call them. Might be hard to tell someone who you're looking for or who helped you if no one had a name.

Would it be okay if we called carrots "Hooper-bubble-scoopers" or "Green googoos"?
Maybe. Would others call them by that name too? If so, then it probably doesn't matter as long as we're consistent.

"How are name tags helpful in a garden?"

They help people know what is planted there. They can make sure they get the right amounts of water.

Make name tags with metal wire by molding the wire around the popsicle sticks. If you have more than 6 present, you can make duplicates and place at opposite ends of the rows. Then label with a sharpie marker, write on the plates: beans, beats, broccoli, cabbage, carrots, celery, sweet corn, cucumbers, kale, sugar snap peas, peppers, potatoes, pumpkins, spinach, zucchini, squash, lemon balm, anise and tomatoes.

Garden Activity

Place nametags (if you know where to place them) and plant a row of seeds.

Reflection Activity

At the end of every lesson, it is good to have the students reflect. Have them take their journal or a blank sheet of paper and write the date on the top. Then have them invent an imaginary plant. Have students draw it and make a name for it.

Get Growing!

Seed Matching

Learning Objectives

Knowledge: Students will identify seeds with the corresponding plant
Behavior: Students will be able to care for the plant by giving plants what they need to grow

Materials

4 seeds of different sizes
Seed identification pieces: To make, glue 8 different seeds on 8 different pieces of cardstock (Example in Appendix I)
Answers to the seed identification
2 pieces of blank paper per child
4 plastic bags
4 bean seeds
Soil around garden
Water from hose

Background

Proper care of seeds is essential. It is important for growers to learn what a seed needs and what it looks like when seeds are not getting those things. This way if they notice a saggy plant in the garden, they will know what it is missing.

Warm-up Activity

Pass the seed relay
Divide group into two equal teams. Have each team line up in a row with players about 10 feet from each other. Give the first person in the row a seed and have them pass it to the next player on the team. The object is to get the seed to the last player on the team first. Every team member must pass the seed. Have them do it with multiple seeds. Smaller seeds will be much harder. To make it even more difficult, you can have each player run around a tree before passing it, have them do it with their eyes closed or have them spin 3 times each time they get a seed.

Discovery Activity 1

Have them fold a piece of paper so it has 8 parts (fold in half twice and then in half the other way). Number the sections from 1 to 8. In each box, they should find the corresponding seed, draw it, and then guess what plant it belongs to. You can set the seed cards out a fair distance from each other so that they must walk to each station. When everyone is done, come back and show them the correct answers.

Then discuss the following:
"Were you surprised by any of the seeds"
"Which ones were easy? Why do you think they were easier?"

Discovery Activity 2

As a group, discuss "What does a seed need to grow?".
They may say sun, soil, water

Prepare 4 plastic bags with bean seeds (or however bags and seeds to match the number of needs the group came up with). Then prepare one bag and seed to lack one of the

"needs" you came up with. For instance, if you decided sun was a need, place a seed, water and soil in a plastic bag and find a secret place somewhere at Clearwater where it will not get sunlight. You will be checking these in weeks to come.

Garden Activity

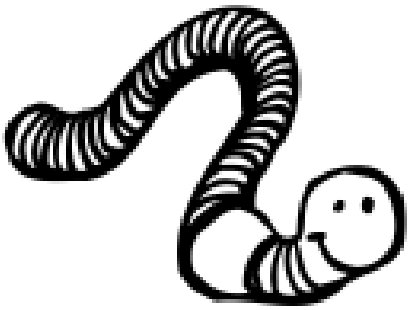
Plant or water a row of seeds

Reflection Activity

Have them predict on a piece of paper (fold twice to make 4 squares) what will happen without each of these elements your group came up with in Discovery Activity 2 by drawing pictures and writing.

You can also have students add to their last journal activity. What does the seed of their plant look like and what are special directions they would tell the planter of the seed.

Trivia question: Where do carrot seeds come from?
Answer: Carrot seeds develop by letting the top of the carrot grow and flower. It waits until its second year to mature those seeds for planting. Thus, if you eat all the carrots every year, you will have to keep buying new seeds.



Worms Eat My Garbage?

Composting

Learning Objectives

Knowledge: Identify the three main ingredients that the bacteria in compost needs to breakdown.

Knowledge: Students will identify why compost is a part of the lifecycle of plants.

Behavior: Students can create a mixture of compost which is made up of the main three ingredients needed for composting.

Materials

Shovels
Journal(or blank paper)
Compost Web (Appendix I)

Background

Compost is essentially decomposing (breaking down) organic material. In order for decomposing to happen, bacteria must be present. Bacteria is present on materials like leaves, grass and even the air. Bacteria needs the same three things that humans do: oxygen, food and water. As the materials or "food" decomposes, organisms and bugs help break it down. This allows it to become food for plants.

Warm-up Activity

Revisit the last lesson

Have students look at their plastic bags with beans seeds from last week. Have them divide a sheet of paper into four sections and record the progress on each seed, they should draw a picture for each.

Discovery Activity

Take learners to the field behind the garden or by the compost piles. Ask them to pick up a few pieces of nature without stopping anything from growing (rocks, sticks, leaves).

Ask “What will happen to these things in 5 years? 10 years? 50 years? “

Have them sort their handfuls as a group into piles that will decay fast, medium and slow.

After they realize that they start to break down, ask what happens to all the broken up material?
Lead them into discovering that some things turn into plant food and plant food becomes animal and people food.

Ask students "why did we list soil as one of the main things that seeds need to grow?"
Soil has food in for the plants

"What happens if you grow crops in one area for many years?"
Less food for the plants

"Yes, overtime, the plants use up the nutrients or "food" in the soil. We're going to look today

at how to make more food for the plants. More nutrients for them, means better tasting and faster growing food for us. “

Read the “Background” section to the learners.

Then ask:
Water: "How do you think the compost piles get water?"
Rain

Oxygen: "What about oxygen?"
From air, but also we help it by turning the piles. When we turn the piles it fluffs it up to increase the flow of oxygen.

Food: "Bacteria needs both brown, dried plant materials and some green plant (or other nitrogen) materials to thrive. The brown gives the pile carbon and the green gives it nitrogen.”

Have learners look at the food web. "What is helping the materials break down?"

Go to the compost piles behind the animal fence. If you have time, turn a pile of compost. Note any organisms or animals you see. If you do not have time, take one scoop from each pile, look at it, not creatures, then put it back. Are there bigger organisms as the compost gets done more?

Note: You can also discuss which piles are bigger and smaller. They typically get smaller as the materials start to break down.

Garden Activity

Have learners turn a pile or two of compost.

Reflection Activity

What are some things that you through away that would decompose quickly? What are things that would take a long time to break down that you use? What items that you throw away would make good plant food after it decomposes?

Are you bugging me?

Bug scavenger hunt

Learning Objectives

Awareness: Learners will discover bugs around the garden
Awareness: Learners will discover ways that bugs help and harm plants
Attitude: Learners will decide what their attitude towards bugs

Materials

Paper for scavenger hunt
Bug info sheet (Appendix I)

Background

There are many animals, big and small, that can be found around the garden. Every garden has both "good" and "bad" creatures, yet few are destructive. By searching for what animals and bugs we can see around Clearwater, we can look at what they do that might help and might harm the plants.

Warm-up Activity

There are three levels to this game: larva, caterpillar, butterfly. Larva is the lowest and butterfly the highest. Everyone starts as a larva by putting their hands on their head. Then people go around and play rock, paper, scissors with others. If you win, you move up to the next level. So, from the larva you become a caterpillar. When you are a caterpillar you put your hands in front of you and make a caterpillar motion when going from person to person. The highest level is the butterfly in which you flap your wings. Whenever you lose you go down a level. Play for about 4 minutes or until most people are butterflies.

Discovery Activity

Scavenger hunt. "Find 3 insects in the garden. When you find one, observe it for 2 minutes. What do you think it is doing and why? Do you think this insect could be helping or hurting the garden?"

Have them draw or write their responses in their journals. Remind them to look at the plants very closely if they are having troubles. When they are done have them come back together as a group.

Discuss what they believe could be the benefits and negatives of some of the animals. Depending on time, have each learner pick out one or two of the creatures they found and discuss. Reference the animal guide if needed.

Then, if there is still time, have the group list other animals that might be in the garden that they did not see. You can have them start with bugs and then move on to larger animals.

Be sure to add some of the following if the group does not discuss:
Bugs http://umaine.edu/publications/7150e/

Extra note: Certain plants repel certain bugs and animals. Thus, one does not need to buy lots of money on chemicals, but instead can grow things to help keep any unwanted animals

away.

Garden Activity

Have students weed a few rows while keeping their eyes open for more bugs.

Reflection Activity

Draw and explain your favorite animal or bug that you saw today and how it interacts with the garden.

Also, you can continue to check on the bean plastic bag plants.

Roots and Stems are Quite the Gems

Plant Investigation

Learning Objectives

Knowledge: Learners will identify parts of the plant and what each part does
Awareness: Learners will gain awareness that each part is what makes the whole
Awareness: Learners will gain awareness that we eat different parts of each plant

Materials

Clipart pictures (Appendix I)
Paper/pencils
Part of the Plant Diagram (Appendix I)
Parts of a Plant Info Sheet (Appendix I)

Background

Most plants contain four basic parts: stem, flower, roots and leaves. Each of these parts has a function to help the plant grow. However, some roots look way different than others. This is true for stems, flowers and leaves too.

Warm-up Activity

If you have only a few people: The object of the warm up activity is to have students guess what vegetable is drawn on their back (modification: top of their hand) by another student. Have one pair of the student face you and the other one face away. Show partner #1 the picture. They will turn around and draw it on partner #2's back. That person draws it on a piece of paper in front of them and labels it if they know what vegetable or fruit it is. After 3 revile answers and switch partners.
If you have 6 or more students, you can have teams where one person looks at the produce and draws it on the others back. The person whose back they draw on can then draw what they felt on a piece of paper and then try to have the third person guess what it is.

Discovery Activity

1. Look at the "part of a plant" diagram. Tell them that there are typically these four parts to every plant.

2. "What does each part of the plant do? The leaves, for instance, what do they do?" Come up with a few helpful things each part does. If you need help, refer to the "Parts of a Plant" sheet.

3. Hand out a plant investigation sheet to each student. Have them find plants and check off which parts on the plant they can find. You can do this as a group or individually. For roots, see if they can see the start of them.

4. As a group discuss what they found. What do we eat the most of? Which one the least? What was the easiest to

find? Hardest?

5. Lastly, why doesn't every plant they looked at have a flower? How do they grow more without the flower? Answer: Most of the time, we eat the plant before it flowers. The trivia question for "Get Growing" describes that carrots will flower if you keep letting them grow. The same goes for many other plants.

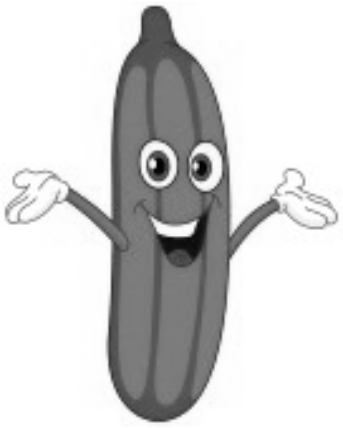
Garden Activity

If there are things to harvest, feel free to do that. If there is more than what the students can eat, let us know so we can bring it to local food pantries.

Reflection Activity

Go back and look at the plant you created week one. Describe its roots, stem, flower and leaves.

Challenge: Discuss what parts of the plant were affected for each of the seeds you planted in bags (week #2). Can you better describe what happened to each seed?



Where does food come from?

Garden Activity Stations

Learning Objectives

Knowledge: Learners will be able to identify where produce comes from
Awareness: Learners will discover why fresh food is healthier for them than processed food
Behavior: Learners will choose healthy foods over processed foods

Materials

Vegetable Name Cards (Appendix I)
Garden Discovery Activity Sheets (Appendix I)

Background

Today, much of the food that people see on commercials is highly processed. This means that less nutrition. Food grown on farms however, has many nutrients for strong bodies. By being able to identify what food comes from gardens, people are able to make healthier food choices.

Warm-up Activity

Take a vegetable card and tape it to the front or back or forehead of each participant. They have to figure out what is on their card by only asking yes or no questions to others. They can only ask one question in a row to someone else before moving on. Example questions are "Do you eat the roots of the plant?" "Are the fruits red?"

Discovery Activity

Discuss the following in your group or as a whole group:

"What foods do we typically eat that do not come directly from gardens?"
Ex: candy bars, granola bars cereals

"How much do you eat of garden food compared to processed food (mainly things in wrappers)?"

"What are benefits of getting food from a garden?"

Summarize what the students said. Also, point out if they did not that:

- The more processing (so, like making potatoes into French fries) that goes on with your food, the less nutrients there are left. Whole fruit is more nutritious than juice because it didn't have to go through a machine and get broken up before you eat it.
- Fresh food tastes better
- Fresh food does not have a bunch of

ingredients that are made in a factory, so it is better for you.

- Garden food travels less if you get it nearby, so you're cutting down on how far it's transported, so it cost less.

- Fresh food has more nutrients because there is typically less time between it being picked and you eating it; thus, less nutrients die.

Explain "today we're going to get a closer look at some of the whole food growing in the garden."

Go to the apple trees and discuss what foods you can make from apples (applesauce, pies, jam, juice)

Ask "Do you know how they make these things?"

Explain "Typically there is a lot of added sugar in these products which makes them less healthy."

Then remind them that "eating apples before they are processed or sugar is added will give you the most nutrients"

Next, learn about potatoes, 3 sisters and herbs with the attached Discovery Activity sheets.

If there is time, have students create commercials to promote eating one of the healthy items grown in the garden.

Garden Activity

Please harvest, water or weed depending on what is needed most. To make it fun, tell students to pick out a vegetable that is the most colorful, nicest shaped or would be best for the bugs if they are weeding or harvesting.

Reflection Activity

Have the students' journal about their own food choices and ways they could make healthier choices.

Also consider discussing ways school food or family meals could be healthier.

Is It Time?

Reporting on the progress of the produce

Learning Objectives

Knowledge: Learners will be able to identify when plants are ready to harvest
Behavior: Students will pick ready to harvest crops

Materials

Blindfolds
Ruler

Background

Produce is best when it's ripe. How do you know if it is ready before you break it off or pull it out of the ground? In this lesson, the students will investigate a plant and decide whether it's ready to be picked. They can make this decision based on what they find in their investigation and the qualities listed on the reference sheet for that product.

Warm-up Activity

Fruity Freeze Tag. First, establish boundaries for the game. Choose one or two people to be "it". They will try and tag others. Once others are tagged, they must freeze in that spot. They must stay there until 1) the leader calls a color and they can say a fruit or veggie that is that color or 2) one player can serve as a "rescuer" and go around to un-tag people. To do this, the rescuer must call out the color while crawling under the frozen person's legs and the frozen one must call out a vegetable or fruit of that color.

Discovery Activity

1. Have students pick one plant in the garden that is listed in the "Harvesting Vegetables in the Home Garden" pages.
2. Have them create a "Harvest Report for this plant by answering some of the following questions
    a. How tall is the edible part of the plant?
    b. Is the plant showing signs of being ready to pick?
    c. If it is ready to pick, how many items to you think you'll get from the plant? (10 ears of corn, 30 tomatoes?)
    d. Is the plant showing any sign of disease?
3. After the learner has done a full investigation, have them draw a picture of the plant and point out key details.
4. Have each child give a "Harvest Report" to the group.
5. Check the group for understanding by asking questions like "Julie, how can we remember the sign of a ripe potato?"
6. If the group get done rather quickly, have them do 2 or 3 different plants.

Garden Activity

If Shari is there, feel free to harvest some ripe vegetables. There is also a white board inside the barn that Shari is updating with job duties.

Reflection Activity

Tell the learners, "Extra food harvested will go to the food pantry". Have them journal about their thoughts or questions they have about that.

Food Pantry

Touring the Onalaska Food Basket on 731 Sand Lake Road, Onalaska

Learning Objectives

Awareness: Learners will see where the excess Clearwater produce goes
Knowledge: Learners will learn about why fresh food in food pantries is important

Materials

Transportation

Background

When there is excess food at the farm, it will go to food pantries. It is important for students to see where this produce is going and who is benefiting from it.

Warm-up Activity

On the way, have them remember a time when they were really hungry. What did that feel like? Then generate a discussion and see if they remember the benefits to fresh food (more nutritious, tastes better, doesn't travel as far, etc.)

Discovery Activity

1. While touring the facility, make sure students ask any questions they thought of last week during reflection.

Garden Activity

If there is extra time, feel free to come back to Clearwater garden and harvest produce.

Reflection Activity

Have learners reflect on:

What's one of the best gifts you've ever received? What's the best meal you've ever had? Why can fresh food be a good gift for someone?

Where in the world?

Mapping out how far it takes food to get to our grocery stores.

Learning Objectives

Awareness: Students will discover how far we transport food to get it to grocery stores
Awareness: Students will become aware of financial aspects of farming
Attitude: Students will discuss the benefits of local food.

Materials

Spoons
Large blank map (Appendix I)
Distance Sheet (Appendix I)
Pens or pencils
Monopoly money (Appendix I)
Harvest, transport, packaging, and marketing cards. (Appendix I)

Background

When you buy food from the grocery store, up to 75% of the cost goes to packaging, advertising, and transportation. Thus, many times less than 25% is actually going to the farmer to help pay for the seeds and labor to produce the food. Food from farmers markets has 95% going to the farmer.

Reference: www.justfood.org/csa/press

Warm-up Activity

Traveling Spoons. Find items for students to balance on the spoon while they race each other or in teams. This could be small rocks or leafs. They have to keep the items on the spoon. If an item is dropped, they have to take 5 big steps backwards before starting again. Modification: Do it blindfolded or backwards.

Discovery Activity

1. Take out the big map and place where everyone can see.
2. Have them find on the map where you currently are. Feel free to mark that point.
3. "How many of you have been to Festival Foods, the grocery store?" Allow them to raise their hands. "We're going to look at how far food travels to get to that store.
4. Pick out a vegetable or fruit. Have everyone draw that fruit on the map where they think Festival gets it from. For instance, if the fruit is a banana, someone might think they come from Mexico, then they would draw a banana there. Modification: if you have too many kids to make this time efficient, bring up a few kids to the front for each one.
5. After each vegetable or fruit, tell the answer and show them where it comes from. Mark the correct place.
6. Discuss: What item traveled the

furthest? The shortest? What are advantages of having food close to home? Does flying and driving the food cost money?

Discovery Activity 2

1. Everyone is a farmer, except for 1 person is needed to be the banker. You can be the banker if you want everyone to play. "We are going to see what happens to a farmer's money when they go to sell food." If you have a large group, you can have them work in pairs or threes.
2. First have everyone pick a harvest card. Have them read it aloud and then have the banker give them this amount of Monopoly money.
3. Then have everyone pick a transportation card.
4. Have them read it aloud and have them pay for their transportation.
5. Do the same with the packaging and marketing cards.
6. Have them pick a question card and answer it in front of the group.
7. Read the Background paragraph of this lesson to the students.
8. Lead a discussion about what was learned in this activity. Example questions:
    - "What do you feel were good choices for where to sell your food? *Somewhere local is less expensive*
    - "Why do you think some farmers do send their food far away?" *People cannot grow that food in that area so people will pay more to get that food.*
    - "If we were to sell food from Clearwater and FCC, how would you advise us to advertise, market and package it?"

Garden Activity

Harvest, water or weed. Check the white board to see if there are any new activities listed.

Reflection Activity

In their journals, have the learners reflect: If they were to sell the plant they came up with the first day this summer, where would they sell it? Would they make any packaging for it? And how far would they send it to be sold? Why?

Seeds of Health

Finding seeds that will grow into plants next year

Learning Objectives

Knowledge: Students will explore how plants reproduce
Behavior: Children will eat many different colored plants since they know it is part of a healthy life.

Materials

Seed & color chart sheet

Background

Plants reproduce by spreading their seeds. A grower wants to make sure they have good, organic seeds to have for the next year. Organic and local produce will be the most chemical free and nutrient dense food one can find.

Warm-up Activity

I'm going on a picnic. Stand or sit in a circle. The first person starts by saying "I'm going on a picnic and I'm going to bring an ____" They can choose any fruit or vegetable that starts with an" a". Then the next person goes and says "I'm going on a picnic and I'm going to bring an (whatever the first person says) and ____. This player chooses something that starts with the letter "b". The next players would do c, d, e and so on. You keep going until someone messes up. Feel free to start more rounds and have them not pick the same fruits and vegetables as the round before.

Discovery Activity

1. Tell learners, "Healthy seeds can grow into healthy plants. Here at Clearwater, we planted seeds and grew them organically. Refresh my memory on what it means to be organic*?" Organic products are free of harsh chemicals and additives and are grown in rich, natural soil. Aside from the health benefits, the advantages to the environment are plentiful.*

2. "What happens if you spray chemicals on the food? Did you know traces of those chemicals seep into your food? Therefore, if you don't grow your own food or buy food that says "organic" on it at the grocery store, most of the foods were grown with chemicals."

3. "Besides eating local and organic, it's important that you eat vegetables of many different colors. Do you know why that is?"

4. Read learners the following: Fruits and vegetables come in terrific colors and flavors, but their real beauty lies in what's inside. Fruits and vegetables are great sources of many vitamins, minerals and other natural substances that may help protect you from getting sick and not feeling well.

   To get a healthy variety, think color. Eating fruits and vegetables of different colors gives your body a wide range of

valuable nutrients, like fiber, folate, potassium, and vitamins A and C. Some examples include green spinach, orange sweet potatoes, black beans, yellow corn, purple plums, red watermelon, and white onions. For more variety, try new fruits and vegetables regularly.

Fruits and vegetables are a natural source of energy and give the body many nutrients you need to keep going.

Recent research has shown that spinach leafs that look fully alive and vital have greater concentrations of vitamin C than spinach leaves that are pale in color.

Colors found in processed food like chips and soda is done by food coloring. Food coloring does not have any nutrients that are helpful for your body. In fact, they have shown to harm the body.

5. Have them summarize what they just heard.

6. Then chart the colors of the foods in the garden on the color chart sheet provided.

7. Discuss what they found. Do they have any suggestions on what should be planted next year to balance the garden?

8. Discuss how plants reproduce (remembering back from the "Parts of a plant lesson", through seeds). "Some of the plants in the garden and around the farm are going to seed. We're going to look at seeds and how they naturally travel."
9. Read aloud, "If seeds were human, they'd need a passport. They love to travel. They need to travel in order to get to spread and survive. There are 5 main ways they travel.
   STICKERS-These are seeds like burrs that stick to you or other animals
   DRIFTERS- These are plants that would travel by water.
   FLOATERS-These are seeds that float in the air.
   ANIMAL FOOD-These are seeds (like raspberries that an animal would eat and then poop out at a later time.
   POPPERS-These seeds travel when the flower "pops" open and releases the seeds.

10. Hand out the seed chart. This exercise is best done around the perimeter of Clearwater and on the hiking trail. Feel free to try and categorize the garden seeds as well.

11. Discuss and allow students to share some of their favorite findings.

Garden Activity

Harvest, weed or water.

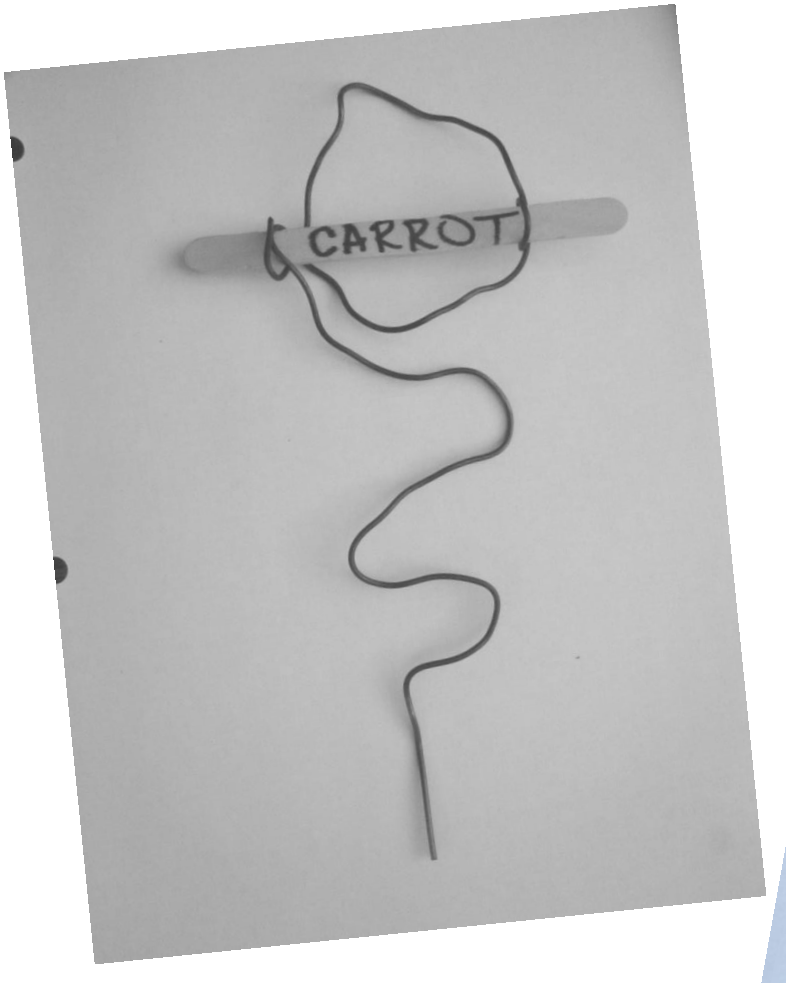
Reflection Activity

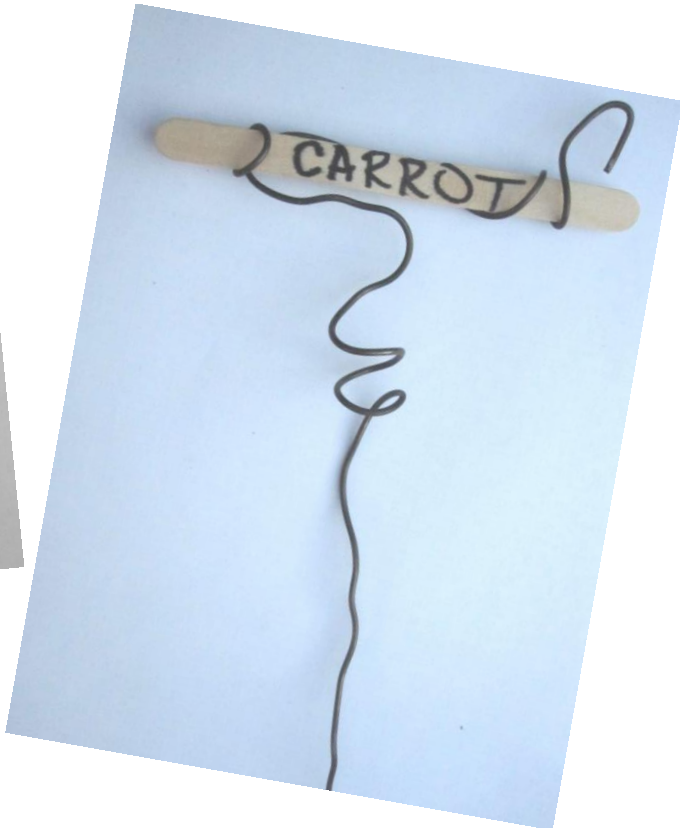
What were some of your favorite things you did in the garden this summer? What were some of the most helpful things you learned?

Appendix I: Handouts and Extensions

Lesson 1-What's in a Name? -Discovery Activity Examples

Examples of Label Activity

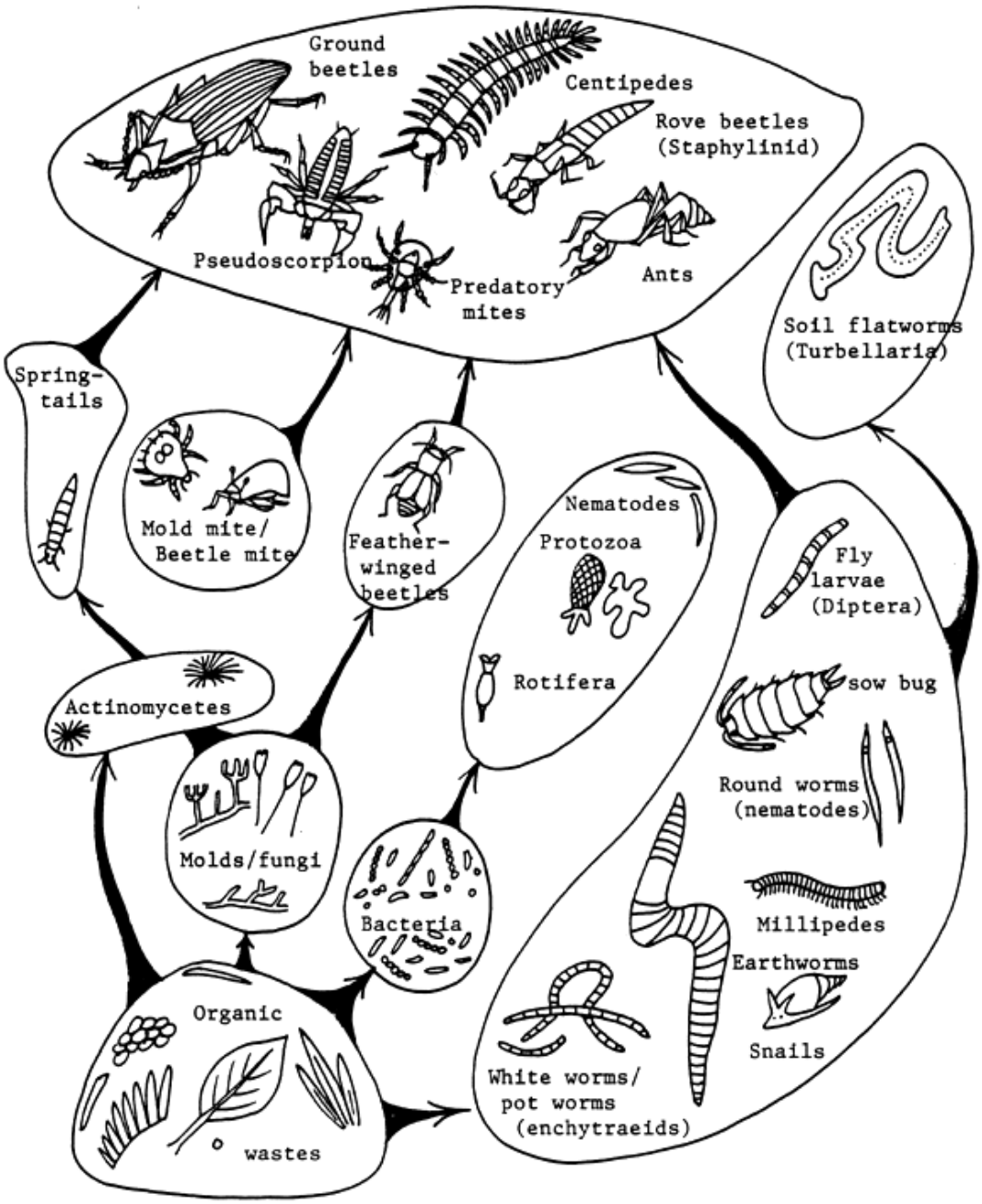




Lesson 2-Get Growing! -Discovery Activity Examples

Compost Web

At the bottom of the chart, you can see the organic materials (leaves, branches, etc). As bacteria, mold and worms take control, it breaks down more. Then, bigger organisms like mites and beetles can help. Lastly, beetles, ants and centipedes help out.



Food web of the compost pile (Dindal, 1978; reproduced by permission of the JG Press)

Bugs in the Garden

Spiders

Description: Spiders have no antennae and two body parts: the cephalothorax, containing the eight legs, eyes, and mouth; and the abdomen, containing the digestive organs, genitals, and spinnerets. Spiders are an incredibly diverse group with roughly 3,000 described species in North America. While most have venom glands of some kind, spiders rarely bite people. Brown recluse and black widow spiders are not normally found in Maine.

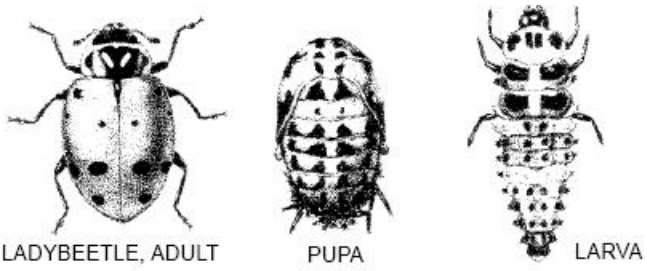
Value in the home landscape and garden: All spiders are predators, and most feed on insects caught in a web. Others, such as jumping spiders and wolf spiders, are active hunters relying on excellent vision to kill their prey. Crab spiders, another commonly encountered group, ambush their prey. A recent study[1] indicates that spiders are often the most abundant predators, as a group, on a wide range of plant material in the home landscape.

Green and brown lacewings

Description: Lacewings lay their eggs at the end of long stalks, presumably to protect them from ants and other lacewing larvae. The larvae of both green and brown lacewings are alligator-like with sickle-shaped mandibles. Adult green lacewings are approximately three-fourths of an inch long and pale green, with large copper-colored eyes. They are attracted to lights at night, and can produce a noxious odor when handled. Brown lacewing adults are tan or brown and about half the size of green lacewing adults.

Value in the home landscape and garden: Green lacewing larvae are called "aphid lions" for good reason; they attack and consume large numbers of aphids, mites, lace bugs, and other small insects. Pollen, nectar and even honeydew sustain the generally nonpredaceous

adults. Green lacewing larvae can be purchased commercially and offer a safe, though sometimes costly, nonchemical alternative for controlling aphids and lace bugs.



Lady beetles

Description: Most people recognize the dome-shaped, often brightly colored adults, also known as "ladybugs" and ladybird beetles, that range in size from one-sixteenth to three-eighths of an inch long. Colors are highly variable and include orange, black, pink, or yellow. Spots may or may not be present.

The adult female beetle lays groups of 10–50 orange, football-shaped eggs, usually on upper leaf surfaces or twigs. The eggs hatch into spiny, black and orange, alligator-like larvae. Some lady beetle larvae that feed on mealybugs have a white, waxy covering (similar to that of mealybugs). After feeding, the larvae pupate, usually on the underside of the leaf near their prey, and emerge as adults. Lady beetles spend the winter as adults in protected areas and can live for 11 months or longer, some as long as two to three years.

The multi-colored lady beetle, (*Harmonia axyridis*), also known as the Halloween lady beetle, while beneficial, often enters homes in large numbers. You can prevent their entry by carefully examining the exterior of the house, sealing cracks and crevices, and screening vents using 20 mesh screen or smaller.

One of the few pests in this group is the Mexican bean beetle (*Epilachna varivestis*), which in its adult stage is yellow with 16 black spots on its wing covers.

Value in the home landscape and garden: Both the larvae and adult lady beetles are voracious predators that can eat hundreds of aphids in their lifetime. They also eat insect eggs, mealybugs, and other soft-bodied insects and mites. Some species of lady beetles have favorite prey, as indicated by the names given to the "mealybug destroyer" and the "spider mite destroyer." Flowering, pollen-producing plants in the landscape attract lady beetles.

Ground beetles

Description: Most of these are shiny brown, black, or blue-black insects ranging in size from one quarter to over one inch long, with long legs and long antennae. Most ground beetles are nocturnal and have prominent jaws used to kill caterpillars (including armyworms, cutworms, and grubs) and other insects, as well as small snails and slugs. Both adults and larvae are predators. One species, *Calosoma sycophanta*, is a climber.

Value in the home landscape and garden: One *Calosoma sycophanta* larva can consume 50 large gypsy moth caterpillars in two weeks, while a pair of adults can devour over 300 gypsy moth caterpillars and pupae per year. Ground beetles typically have one generation per year, and some adults can live for two to four years.

Praying mantids

Description: This large, highly distinctive insect is tan, green, or gray, may be up to three inches long, and has large, bulging eyes on the sides of its head. A distinctive feature is its enlarged first pair of legs, which are held out in front of its body as though it were praying. There is one generation per year. Females deposit a tan, bubbly egg mass on branches near the end of the summer. The egg mass, which hardens, contains over 200 eggs.

Value in the home landscape and garden: Because these insects feed on anything they can catch, including honey bees, each other, and other beneficial insects, their value in reducing the numbers of key pests in the garden and landscape is questionable. Contrary to popular belief, they are not protected by any state or federal laws.

FLOWER FLY

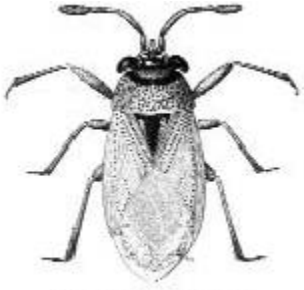
Hover flies (syrphid flies or flower flies)

Description: These nonbiting and nonstinging flies closely resemble wasps and bees, in that they usually have a yellow abdomen encircled by brown or black stripes. Adults are typically one-half to three-quarters of an inch long. Unlike bees and wasps, these insects have only two wings. The legless larvae, sometimes mistaken for tiny slugs, are pale green, clear, or yellow and are usually found in the midst of aphid colonies. The larvae also deposit tar-like excrement around the feeding site.

Value in the home landscape and garden: The larvae are valuable aphid and adelgid predators, capable of consuming over 400 aphids before pupating. Providing food for the nectar- and pollen-feeding adults by planting flowers will encourage them to lay eggs in the landscape or garden. Hover flies are excellent at detecting and attacking even low numbers of aphids.

Predatory bugs

These predatory bugs also feed on nectar and pollen.

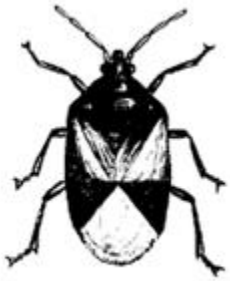


BIG-EYED BUG

Big-eyed bugs are aptly named insects that are about one-eighth inch long, black and white, with silvery wings and large, bulging eyes on the sides of the head. Big-eyed bugs are important predators of chinch bugs (with which they are often confused). They also feed on small caterpillars, mites, insect eggs, and any other insect that they can catch and subdue. Adults are commonly found on flowers.

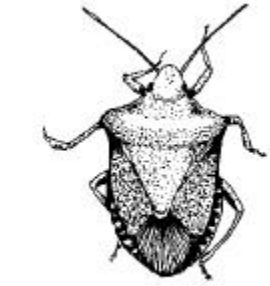
DAMSEL BUG

Damsel bugs are usually one- to three-eighths inch long, and gray, brown, or black. The most common ones are much narrower than they are wide and have long legs, with the first pair thicker than the other two pairs. Damsel bugs' prey include aphids, small caterpillars, leafhoppers, plant bugs, and insect eggs.



MINUTE PIRATE BUG

Minute pirate bugs are tiny (one-eighth to one-quarter inch long) black and white insects that feed on thrips, mites, insect eggs, and any kind of insect that they can catch.



PREDACEOUS STINK BUG

Predaceous stink bugs attack over 100 types of insects, especially leaf beetle larvae and caterpillars. This predator can be distinguished from its plant-feeding relatives by the presence of a distinct spike on each side of its "shoulders" (actually the thorax), just behind the head.

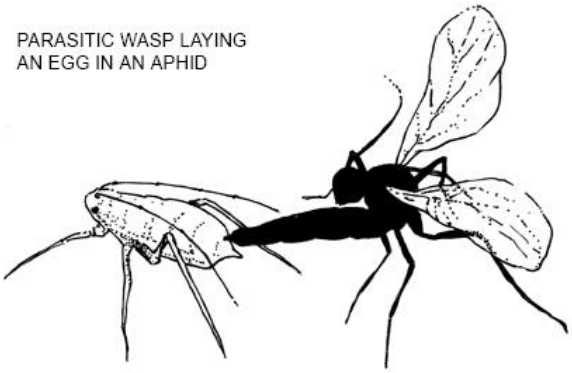
YELLOW JACKET

Predatory wasps

Description: The bald-faced hornet (*Vespula maculata*) is five-eighths to three-quarters of an inch long, with black and white on the head, thorax, and abdomen, and produces large,

enclosed paper nests. Yellow jackets (*Vespula spp.*), the most aggressive wasps in Maine, nest in the ground or in enclosed paper nests, and are one-half to five-eighths inch long, with black and yellow stripes. Paper wasps are one-half to one inch long, brown with black and yellow stripes, and produce open-faced nests. Populations of all three species peak in late summer.

Value in the home landscape and garden: Yellow jackets, bald-faced hornets, and paper wasps are important predators of caterpillars and other soft-bodied insects. Because of this, only destroy nests (taking all appropriate safety precautions) where they pose a hazard to people or pets.



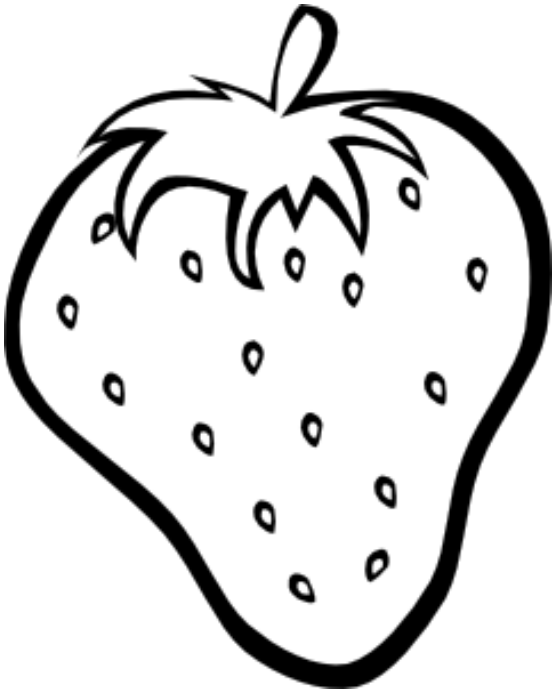
Parasitic wasps

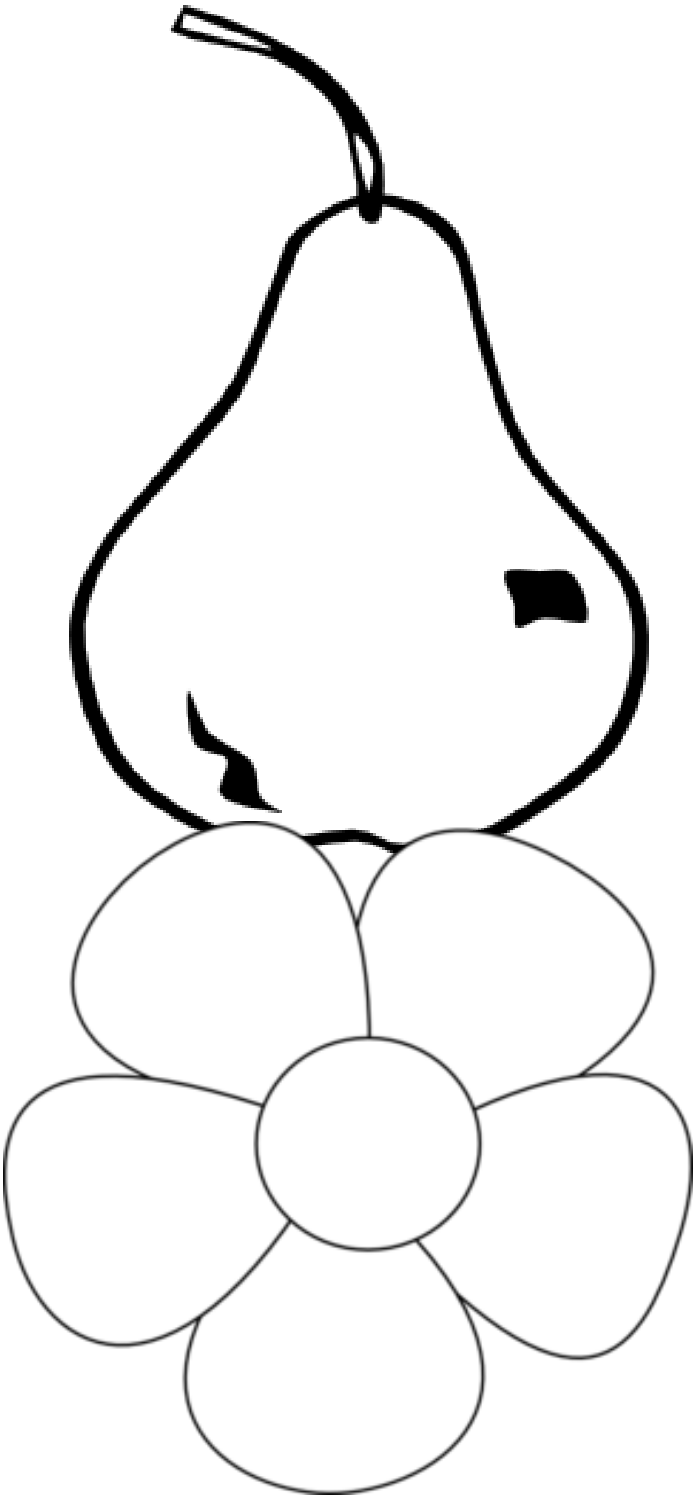
Description: This is a large group of insects with many different families. While some can be as long as 1 5/8 inches (the cicada killer), most parasitic wasps are tiny, black, and less than an eighth of an inch long, and as such, are frequently overlooked.

If you see an aphid that is swollen, puffed out, and tan in color, the chances are that it has been attacked by a parasitic wasp that has placed her egg inside the aphid. Once the egg hatches, the larva eats the aphid from the inside out, pupates, and cuts a circular exit hole from which the adult emerges. Other parasitic wasps lay multiple eggs in a caterpillar or other host. Many times, you'll see a caterpillar such as a hornworm, with white, egg-like structures on its back. These are pupae of parasitic wasps that have completed development inside the severely weakened and soon-to-be-deceased caterpillar.

Value in the home landscape and garden: This is another important, under-appreciated, and poorly understood group. Parasitic wasps attack aphids, many types of caterpillars, cicadas, lace bugs, scale insects, whiteflies, sawfly larvae, ants, leafminers, and insect pupae. They also attack the eggs of insects such as codling moths, tomato hornworms, cabbage loopers, imported cabbageworms, and European corn borers.

Lesson 5-Roots and Stems-Wram-up Activity





Lesson 5-Roots and Stems-Discovery Activity

Parts of a Plant Info Sheet

Functions of the parts of the plant:

(Retrieved from:
http://www.exploringnature.org/graphics/teaching_aids/plant_structure_older_kids.pdf)

Flower - Flowers are often showy because they are designed to attract pollinators like birds and insects who will fertilize them. The flower's job is to make seeds.

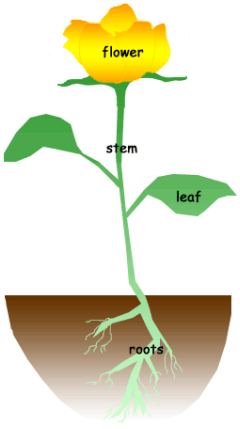
Leaf - A plant's leaves collect sunlight for the process of photosynthesis. Photosynthesis is the process where green plants use sunlight, carbon dioxide and water to make food and oxygen. Little openings in the leaves, called stomata, collect carbon dioxide from the air and release oxygen. Tiny veins in the leaves spread water and nutrients throughout the leaf. The process of photosynthesis occurring in green plants around the world is what produces the oxygen we breathe.

Stem - A plant's stems helps support the weight of the plant and all its leaves. Water and minerals are brought up from the roots. Nutrients made by photosynthesis in the leaves is sent down and all around the plant.

Root - A plant's roots anchor it into the ground. They also collect water and minerals from the soil and transport them up into the plant.

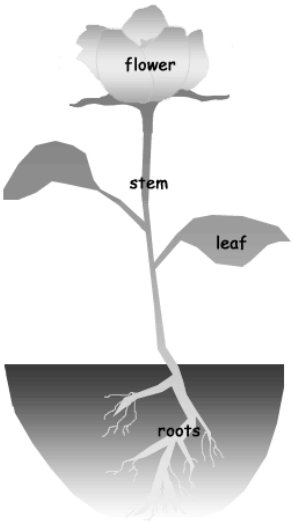
Part of the Plant Diagram:

Parts of a Plant Diagram



Lesson 5-Roots and Stems-Discovery Activity

Parts of a Plant Investigation



Plant Name	I can see…			
	the roots	the leaves	the flowers	the stem

Lesson 6-Where Does My Food Come From-Warm-Up Activity

cucumber

Onion

pepper

potato

apple

lettuce

Carrot

Discovery Activity- Apples

1. Bring group to the apple trees (see map)

2. Ask them "Do you know what is growing here?"
   If not, tell them apples

3. See if you can find a little apple and point it out.

4. "What foods do we make with apples?"
   a. Applesauce, pies, juice

5. Remind them that the healthiest way to get the nutrients from an apple is to eat it whole and not after it has been baked or has sugar added to it.

6. "Do you know what other animals like apples?"
   Two main ones are deer and bees

7. "How do you think we keep the deer from eating the apples?"

   Put up the fence

8. "Are bees a good thing or bad thing for the apple trees?"

   Good, they help pollinate the trees which mean that they help start the new apples, without them, the apples wouldn't grow.

9. Talk about any other animals they mentioned.

Discovery Activity- Potatoes

1. Bring group to the potatoes
2. Ask them “Do you know what is growing here?”
   If not, tell them potatoes.
3. Then ask “Where are they?” Have them look around. Then explain “Potatoes grow underground. If they get exposed to the sun, they turn green. Would you like green French fries?”
4. Feel free to dig with your hand down close to a stem without ruining the routes (carefully slide dirt away) and see if you can see any growing. Please make sure the dirt is put back prior to leaving

5. “What are some foods you eat that contain potatoes?”

   If they cannot think of any: hash browns, French fries, some soups, potatoes chips

6. Explain that a baked potato is much healthier than French fries or potatoes chips. French fries or potatoes chips are made with machines that mix the potato with other ingredients that are not good for you.

Discovery Activity- Herbs

Bring group right outside the garden or very carefully walk back by the herb beds (group with wheelchair student should stay just outside the garden).

1. The leader should pick out 6 different leaves from herb plants.
2. Ask group "Does anyone know what herbs are or what they are used for?"

   Answer: Feel free to help them after a minute or two. An herb is a plant that is valued for flavor, scent, medicinal or other qualities. Herbs are used in cooking, in teas and medicine.

3. Explain "Today I got a few samples of herbs and we're going to see what your favorite smelling and least favorite smelling one is." So, when you get one of these, take a little time to smell it and debate if you like the smell and would put it in your cooking or if it is not something you'd like."

4. Pass around the leaves, giving the learners time to smell.

5. When done discuss what they liked best (maybe hold up each one and have them vote) and which one the least.

Discovery Activity- 3 Sisters

Bring group by the 3 sisters planting

1. Ask them to observe the plants.
2. After a minute or two ask “Do you know what any of these plants are?”

   Answer: Corn (tallest ones), beans (wrapping around corn) and squash (big green leaves)

3. “What do you notice about their relationship?”

   Answer: The beans are climbing up the corn!

4. “These are plants act a little like sisters should. They help each other out. In what ways do you think these plants help each other? We mentioned the beans climbing up the corn.”

   Explain if they don’t come up with

   - **Corn** is the oldest sister. She stands tall in the center.

   - **Squash** is the next sister. She grows over the mound, protecting her sisters from weeds and shades the soil from the sun with her leaves, keeping it cool and moist.

   - **Beans** are the third sister. She climbs through squash and then up corn to bind all together as she reaches for the sun. Beans help keep the soil fertile by covering the sun's energy into nitrogen filled nodules that grow on its roots. As beans grow they use the stored nitrogen as food.

5. Ask “How many of you have eaten squash before?” Feel free to look closely at a squash plant and see if there are any little ones yet.

6. “These will be ready to eat in the fall. They are very good for people because they vitamins and minerals that help humans keep from getting sick. “

Lesson 9-Where in the World-Discovery Activity

Map of the World

Lesson 9-Where in the World-Discovery Activity

ANSWER SHEET

Food	The grocery store gets it from..	Distance from Clearwater (in miles)
Lettuce	California	2000
Peppers	Holland	3000
Squash	Mexico	2000
Apples in the fall	La Crescent, Minnesota	6
Apples in the spring	New Zealand	12,000
Bananas in the spring	Ecuador	5000
Bananas in the fall	Mexico	2000
Apricots	Turkey	4000
Ginger	China	8000

I grew 1000 apples and want to sell them for 1 dollar each. If I sell all of them, I should get $1000 (Collect $1000)	I am going to sell my produce at the local Farmer's Market Pay $0 for transportation, you were going to town anyway	I put my products carefully into boxes I am reusing. Pay $0 for packaging	I get ten TV commercials to advertise my product. Pay $100 for marketing.	Do I have any money left to buy seeds and water?
I grew 200 lbs of broccoli since I had great compost. They sell for 4 dollars each. If I sell all of them, I should get $800 (Collect $800)	I am going to sell my produce to a few local grocery stores Pay $50 for transportation	I put my products in individual boxes with color printed cartoons on them. Pay $100 for packaging	I tell my friends, family and neighbors about my product. Pay $0 for marketing.	What if my crop does not do well next year? Do I have any money to save from this year to help get me through that?
I grew 100 pounds of peppers and want to sell them for 7 dollar a pound. If I sell all of them, I should get $700 (Collect $700)	I am going to send my produce to Mexico to be sold Pay $500 for transportation	I put my products in individual boxes with color printed cartoons on them. Pay $100 for packaging	I put ads in the newspaper. Pay $50 for advertising.	If I could change one thing about my harvest, transportation, packaging or advertising, what would it be?
I grew 500 pounds of lettuce, but forgot to water them on dry days. Only 200 pounds survived and they sell for $2 a pound. Collect $400.	I am going to send my produce to Australia to be sold Pay $1000 for transportation	I bunch my product in threes and wrap them together in paper wrap. Pay $50 for wrapping.	I put ads in the grocery store newsletters and coupon books. Pay $100 for advertising.	How could have you saved money along the way?
I grew 2000 pounds of potatoes. Their was a flood in my area and only half made it. I will make $400 (Collect $400)	I am going to send my produce to Iowa to be sold Pay $100 for transportation	I put my product in bunches and tie together with string and rubber bands. Pay $0 for packaging.	I put ads on the radio. Pay $50 for advertising.	What other costs can you think of that you would have as a farmer?

Lesson 9-Where in the World-Discovery Activity

Question	Marketing	Packaging	Transportation	Harvest
Question	Marketing	Packaging	Transportation	Harvest
Question	Marketing	Packaging	Transportation	Harvest
Question	Marketing	Packaging	Transportation	Harvest
Question	Marketing	Packaging	Transportation	Harvest
Question	Marketing	Packaging	Transportation	Harvest

Lesson 10-Seeds of Health-Discovery Activity

Color chart

Find food inside the garden and write it's name under its color. (Example, corn is yellow since the part you eat is yellow.)

Red - strawberries,

Green -

Purple -

Blue -

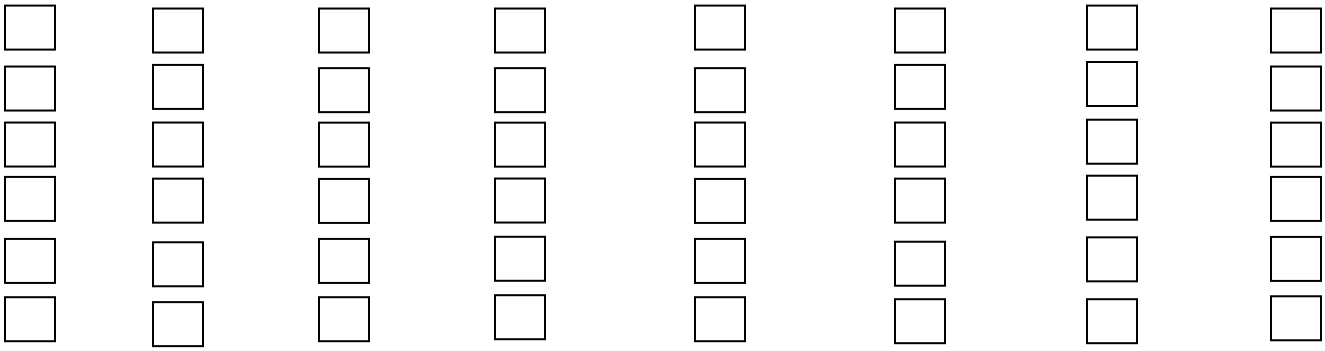
White-

Yellow -

Orange -

Other -

Then make a chart checking the number of boxes for each color as the number of plants you found with that color.



Which color has the most?

Which color has the least?

What should we plant next year to have more of the color we have the least of?

APPENDIX B: Assessments

Lesson 1 –What's in a Name Assessment: For Students

1. Why are names of plants important?
   Comments:

2. Did you create a nametag for a plant today? Yes No
   Comments:

3. How did you enjoy your time outside?
   Comments:

4. How can you use name tags in your own life to help organize?
   Comments:

Lesson 1 - What's in a Name Assessment: For Teachers

1. To what degree do you feel students gained knowledge around the importance of the names of plants?
   Not at all Not much Somewhat A good deal
   Comments:

2. To what degree do you feel the students felt they were taking ownership of the garden by placing the nametags?
   Not at all Not much Somewhat A good deal
   Comments:

3. To what degree do you feel the learners enjoyed their time outside?
   Not at all Not much Somewhat A good deal
   Comments:

Lesson 2 - Get Growing! Assessment: For Students

1. Explain or draw two seeds that you saw today and tell what kind of a seed it is.
   Comments:

2. List at least three things a seed needs to grow.
   Comments:

3. Could you plant and care for a seed?
   No Maybe Yes

4. How comfortable do you feel with planting a garden?
   Not comfortable A little Comfortable Very
   Comments:

Lesson 2 - Get Growing! Assessment: For Teachers

1. To what degree do you feel students gained knowledge around identifying seeds?
   Not at all Not much Somewhat A good deal
   Comments:

2. To what degree do you feel this lesson helped students gain familiarity with seeds?
   Not at all Not much Somewhat A good deal
   Comments:

3. To what degree do you feel this lesson helped students gain skills involved in gardening?
   Not at all Not much Somewhat A good deal
   Comments:

4. To what degree do you feel the learners enjoyed their time outside?
   Not at all Not much Somewhat A good deal

Comments:

Lesson 3 - Worms Eat My Garbage? Assessment: For Students

1. What are three main ingredients bacteria needs to break down?
   Comments:

2. What does compost do for a garden?
   Comments:

3. Do you think you can make compost?
   Not at all Not much Somewhat A good deal

4. How can you use what you learned at home?
   Comments:

Lesson 3 Worms Eat My Garbage? Assessment: For Teachers

1. To what degree do you feel students gained knowledge around what bacteria does for compost?
   Not at all Not much Somewhat A good deal
   Comments:

2. To what degree do you feel students learn the purpose of compost in the lifecycle of plants?
   Not at all Not much Somewhat A good deal
   Comments:

3. To what degree do you feel students can make a healthy mixture of compost?
   Not at all Not much Somewhat A good deal
   Comments:

4. To what degree do you feel the learners enjoyed their time outside?
   Not at all Not much Somewhat A good deal
   Comments:

Lesson 4- Are You Bugging Me? Assessment: For Students

1. Write about or draw a unique bug you found in the garden.

2. What are some harmful things bugs do in the garden?

3. What are some helpful things bugs do in the garden?

4. Do you think bugs should be in a garden?
   Not at all Not much Somewhat A good deal
   Comments:

5. Who is someone you can tell what you learned about bugs today?

Lesson 4 - Are You Bugging Me? Assessment: For Teachers

1. To what degree do you feel students were able to find bugs in the garden?

Not at all Not much Somewhat A good deal
Comments:

2. To what degree do you feel students became aware of helpful and harmful qualities of bugs?
   Not at all Not much Somewhat A good deal
   Comments:

3. To what degree do you feel this lesson helped change the learners' attitudes about bugs?
   Not at all Not much Somewhat A good deal
   Comments:

4. To what degree do you feel the learners enjoyed their time outside?
   Not at all Not much Somewhat A good deal

Lesson 5 – Roots and Stems Assessment: For Students

1. What are the four parts of a plant that you learned about today?

2. Does each part of the plant do something for the plants?
   Not at all Not much Somewhat A good deal
   Comments:

3. Which part of the plant did you find in your chart that we eat the most from this garden?
   Comments:

4. Did you feel that you can plant and maintain a garden?
   Not at all Not much Somewhat A good deal
   Comments:

5. Did you enjoy your time outside today?
   Not at all Not much Somewhat A good deal
   Comments:

Lesson 5 – Roots and Stems Assessment: For Teachers

1. To what degree do you feel students were able to identify the parts of the plant?
   Not at all Not much Somewhat A good deal

Comments:

2. To what degree do you feel students were able to gain awareness that each part of the plant helps the whole plant function?
   Not at all Not much Somewhat A good deal
   Comments:

3. To what degree do you feel students realized that we eat different parts of each plant?
   Not at all Not much Somewhat A good deal
   Comments:

4. To what degree do you feel this knowledge and awareness helps them gain familiarity with plants?
   Not at all Not much Somewhat A good deal
   Comments:

Lesson 6 –Where Does My Food Come From Assessment: For Students

1. Name a few examples of fresh food

2. Name a few examples of processed food

3. Is fresh food healthier than processed food?
   Not at all Not much Somewhat A good deal
   Comments:

4. Do you like fresh foods from the garden?
   Not at all Not much Somewhat A good deal
   Comments:

5. How can you use what you learned today at home?
   Comments:

Lesson 6 –Where Does My Food Come From Assessment: For Teachers

1. To what degree do you feel students were able to identify fresh food vs. processed food?
   Not at all Not much Somewhat A good deal
   Comments:

2. To what degree do you feel students became aware of the health of fresh foods?
   Not at all Not much Somewhat A good deal
   Comments:

3. To what degree do you feel students will choose more fresh foods over processed foods?
   Not at all Not much Somewhat A good deal
   Comments:

4. To what degree do you feel this helped students gain knowledge of healthy food choices?
   Not at all Not much Somewhat A good deal

Lesson 7 –Is It Time Assessment: For Students

1. Name two plants in the garden and how you can tell when they are ready to harvest

2. Can you tell when plants are ready to be picked?
   Not at all Not much Somewhat A good deal
   Comments:

3. Do you feel like you could have your own garden?
   Not at all Not much Somewhat A good deal
   Comments:

4. Where else can you use what you learned today?
   Comments:

Lesson 7 –Is It Time Assessment: For Teachers

1. To what degree do you feel students were able to identify when fruits and vegetables were ready to be picked?
   Not at all Not much Somewhat A good deal
   Comments:

2. To what degree do you feel this lesson will help students make healthier eating choices?
   Not at all Not much Somewhat A good deal
   Comments:

3. To what degree do you feel students enjoyed their time in the garden?
   Not at all Not much Somewhat A good deal

Comments:

Lesson 8 – Food Pantry Assessment: For Students

1. Where does excess produce from Clearwater go?

2. Do you feel that food pantries need fresh food?
   Not at all Not much Somewhat A good deal
   Comments:

3. Do you like fresh food from the garden?
   Not at all Not much Somewhat A good deal
   Comments:

4. What else did you learn today?

Lesson 8 – Food Pantry Assessment: For Teachers

1. To what degree do you feel students understand where excess produce from the garden goes?
   Not at all Not much Somewhat A good deal
   Comments:

2. To what degree do you feel that this help children learn about people in need?
   Not at all Not much Somewhat A good deal
   Comments:

3. To what degree do you feel students learned about why fresh food is beneficial at food pantries?
   Not at all Not much Somewhat A good deal
   Comments:

Lesson 9 – Where in the World Assessment: For Students

1. How far does most food travel to get to grocery stores?

2. What happens when food travels long distances?

3. What are some benefits of getting food close to where you live?

4. Can you help grow food close to where you live?
   Not at all Not much Somewhat A good deal

Lesson 9 – Where in the World Assessment: For Teachers

1. To what degree do you feel students understand how far most food travels?
   Not at all Not much Somewhat A good deal
   Comments:

2. To what degree do you feel this lesson helped children learn about benefits of local food?
   Not at all Not much Somewhat A good deal
   Comments:

3. To what degree do you feel students will decide to eat more local food?
   Not at all Not much Somewhat A good deal
   Comments:

Lesson 10 – Seeds of Health Assessment: For Students

1. How do plants make more plants?

2. Why is it beneficial to eat different colored fruits and vegetables?

3. How will you use what you learned while eating?

Lesson 10- Seeds of Health Assessment: For Teachers

1. To what degree do you feel students learned how plants reproduce?
   Not at all Not much Somewhat A good deal
   Comments:

2. To what degree do you feel this lesson helped children learn about benefits of eating different colored foods?
   Not at all Not much Somewhat A good deal
   Comments:

3. To what degree do you feel students will decide to eat a variety of foods?
   Not at all Not much Somewhat A good deal
   Comments:

Education Discovery Program Conclusion

Use of the Curriculum

The author recommends other garden education sites to present the curriculum as presented. Following the execution of lessons, the author would encourage instructors to fill out the Process Evaluation Form on the next page and return it to the author. From these evaluations, the author will look to enhance future lessons and update the material by integrating techniques that other gardens found helpful.

Process Evaluation Form

Name of Organization:_____

Contact Person's Name:_____

Phone Number: _____

Email: _____

Check Programs You Completed With Children

- ☐ Get Growing!
- ☐ What's in a name?
- ☐ The Food Cycle
- ☐ Are you bugging me?
- ☐ Roots and Stems are quite the gems
- ☐ Is It Time?
- ☐ Where does food come from?
- ☐ Food Pantry
- ☐ Where in the world?
- ☐ Seeds of Health

Number of children_____ Number of adults_____

What went well?

What suggestions do you have for improvement?

What are other lessons you feel should be added?

To what degree did the assessment tools help measure the individual lesson learning objectives?
Not at all Not much Somewhat A good deal

Comments:

To what degree did the did the assessment tools help measure the three curriculum goals of getting children to eat healthier, spend time outside and increase food security?
Not at all Not much Somewhat A good deal

Comments:

Did you the results show favorable findings?

What have you done at your garden that would be an asset to this curriculum?

Please email your completed Process Evaluation Form to jamieklonowski@gmail.com.

Thank you.