Linking Plants and Food

A Fresh from the Farm
Middle School Curriculum
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Introduction

In the United States, obesity rates are rising among children. In many parts of the country, a lack of access to fresh, healthy foods is an increasing problem. Consequently, many people wrestle with misnutrition. Nutritionists define misnutrition as an abundance of empty food calories and a lack of nutrient-dense foods. In recent decades, convenience and fast foods have replaced whole, healthy foods in many diets—a trend which leads to obesity, diabetes, heart disease, and other chronic diseases.

An essential part of teaching children how to lead healthy and sustainable lives is helping them to learn what real food is, where it comes from, and why it is an important basis for their diets. Seven Generations Ahead’s *Fresh from the Farm* curriculum teaches first through fourth grade students about the nutritional benefits of fresh, locally produced food. As they learn, they may begin to develop questions and curiosities about how food grows, what is in soil, and how food arrives on their plates. They may also question the environmental, cultural and economic impact of their food choices. The *Linking Plants and Food* curriculum helps fifth through eighth grade students investigate these concepts more deeply. This program delineates the connections between healthy foods and healthy soil, describes the plant parts we eat, and explores the various layers of the food system.

Education for Sustainability

*Linking Plants and Food* addresses concepts of soil science, plant science, the food system, and food culture through a lens of sustainability. The curriculum helps students begin to see that their choices and actions have an impact on the world around them. The choices that young people make today, particularly when it comes to food, will affect the lives of children living seven generations from now. Students learn that where they buy food, which foods they buy, and which agricultural practices they support will affect the health of their bodies, the environment, and local economies.

Big Ideas of Sustainability:
*Interdependence* - All living things are connected. Every organism, system or place depends on others.
*Community* - All communities involve nested economic, environmental, and social systems.
*Cycles* - Every organism or system goes through different stages.

Core Concepts

By incorporating several core concepts, *Linking Plants and Food* instills a deep understanding of a sustainable food system. *Linking Plants and Food* teaches the following core concepts:

- Much of the food we eat is grown on farms—complex ecosystems in which many organisms are dependent upon one another to produce healthy plants for food.
- All fruits and vegetables are parts of plants, which are cultivated and harvested before reaching grocery stores, restaurants, and dinner tables.
- Every person has unique preferences for food, but all people need nutritious, varied diets and healthy personal behaviors to thrive.
- Soil is a living organism, and only healthy soil produces healthy plants and foods.
- The waste cycle is an important biological process that can be utilized as a positive asset.
- School gardens provide a variety of benefits for students, teachers, and school communities.
- The food system is a complex system of people, transportation, technology, and procedures.
• Consumer choices of where to buy food and what foods to buy have important effects on society, our health, and the environment.
• Culture and food are interrelated social components influenced by region and globalization.

**Place-Based Education**

*Linking Plants and Food* uses the local environment as a focal point for learning. This place-based education creates a meaningful and culturally relevant framework for learning. By connecting core concept areas and units of study to their classrooms, local communities and regional environments, students have a real-world context for learning. Place-based education opportunities are plentiful in the *Linking Plants and Food* curriculum. Students can investigate the soil within the schoolyard, explore the food available in their neighborhoods, identify local sources for fresh and healthy foods, invite community leaders and neighbors to the classroom, and research different cultures that create the dynamic diversity of their neighborhoods. Through this approach, students will understand that their food choices impact their own health and the health of their local communities and environments.

**Final Assessment**

*Linking Plants and Food* assessments present opportunities for students to make collaborative decisions that affect the classroom community and incorporate student voices. They give students a chance to practice real-world problem solving and make a difference. Examples of activities that will help teachers assess students’ understanding of *Linking Plants and Food*’s core concepts are listed below.

• Write a Good Food Guide for families and friends. This guide could include healthy options for food in local restaurants, farmers markets, grocery stores, and other food vendors, as well as nutritional information and seasonal food choices.

• Research the nutritional information and location of procurement of the foods served in the lunch program. Research other school lunch programs regionally and create a grid of best practices at schools with healthy lunch options, such as daily salad bars, low-fat main dishes, vegetarian options, a high prevalence of less-processed foods, whole grains, whole fruits and vegetables, locally procured foods, and other healthier food options. As an extension, write a letter to the school’s Food Service Director requesting more nutritionally dense and locally-procured foods based on your research.

• Create a month-long Healthy School Lunch Menu to present to the school’s Food Service Director utilizing information about local food procurement, daily nutritional needs, and neighborhood cultural influences while taking the capacity of the school kitchen into account.

• Answer the question, “What is real food?” by producing a video, creating an art project, writing a poem or rap, or using a variety of other mediums.

• Design and build a school garden using skills acquired from *Linking Plants and Food*. Form a garden group to plan and manage the garden. Create a timeline of planning, planting, and harvesting for the full calendar year.
Lesson Objectives

LESSON 1: DECONSTRUCTING YOUR LUNCH
- Students will explore the relationship between the food they eat, where it comes from, and how it gets to their plates.
- Students will learn that most foods originate in soil.

LESSON 2: CYCLES AND SEASONALITY
- Students will identify one task a farmer does on the farm during a particular month.
- Students will understand and articulate which fruits and vegetables can be harvested throughout each month of the year.
- Students will understand the difference between the growing and harvest seasons.
- Students will identify the yearly, cyclical work on farms.

LESSON 3: PLANT PARTS
- Students will identify the six parts of the plant.
- Students will describe how each plant part contributes to the plant’s survival.
- Students will name visual characteristics of each plant part.
- Students will use plant parts to categorize different fruits or vegetables.

LESSON 4: NUTRITION
- Students will understand the concept of Eating the Rainbow and learn about the nutritional benefits of each color group.
- Students will identify food groups and appropriate portion sizes based on MyPlate, the USDA nutrition education program.
- Students will learn how to read and analyze nutrition labels.
- Students will learn the nutrients provided by each plant part.

LESSON 5: HEALTHY SOIL
- Students will describe the amount of fertile soil available on Earth.
- Students will discuss the importance of preserving healthy soil.
- Students will identify the five components of soil.
- Students will describe how organic matter breaks down to form healthy soil.
- Students will understand the connection between healthy soil and healthy bodies.

LESSON 6: THE WASTE CYCLE
- Students will understand the definition of waste.
- Students will learn about composting and be able to link it to the plant cycle.
- Students will learn the meanings of decomposition and compost.
- Students will understand how the waste cycle can be a positive asset.

LESSON 7: SCHOOL AND COMMUNITY GARDENS
- Students will learn that gardens take many forms, indoors and outdoors.
- Students will compare the basic needs of humans to those of plants.
- Students will learn what to consider when designing, planting, and maintaining a garden.
- Students will learn about the benefits of school gardens.
LESSON 8: FARM TO FORK

• Students will understand the process involved in the farm-to-consumer cycle.
• Students will identify where various fruits and vegetables grow.
• Students will identify a farm close to their school.
• Students will discuss the economic impact of food purchased from local versus distant farms.
• Students will understand the impact of distance and transportation on the food supply in terms of quality loss, nutrient loss, and increased energy consumption.
• Students will define conventionally grown, organic, and fair trade certified.

LESSON 9: LOCAL ACCESS

• Students will identify places in their neighborhood that offer healthy foods.
• Students will plan a meal of healthy foods sold at neighborhood food establishments.
• Students will compare their neighborhood food establishments to those available in surrounding areas.
• Students will consider effects that healthy food options have on the overall health of their community.

LESSON 10: MY FOOD CuLTuRE

• Students will explore and explain their own food culture.
• Students will tie their own food culture back to the broader community.
• Students will understand the link between food culture and what is grown in different regions of the country and the world.
• Students will learn the impact of globalization on food cultures around the world.
Lesson 1:
Deconstructing Your Lunch
**Background**

Almost all the food we eat is brought to us by one of Earth’s most important resources: soil. Each food we eat can be traced back to soil. For example, the meat in a hamburger comes from a cow, which eats grass or corn grown in the soil. Apples come from trees, which grow in soil. Healthy soil is responsible for almost 100% of the diet humans consume (with a few exceptions, including fish and mushrooms). This lesson focuses on the relationship between people, food, and soil.

**Method**

This lesson is an introduction to the basic origins of our food. Knowledge of the origins of food instills in students a better understanding of why some foods—such as whole, minimally-processed foods—are healthier than others. Before starting the activities, begin the lesson with a basic discussion of what the students ate for lunch and how they felt physically after eating it. Explore the difference between “whole” and “processed” foods. Whole foods include fruits, vegetables, and whole grains. Processed foods are foods that have gone through multiple stages of modification to make one food. For example, a potato goes through many steps before becoming a bag of potato chips. Typically, processed foods are higher in fats, salts, and sugars and carry fewer nutrients. Students can explore the connection of eating more heavily-processed foods to fatigue and increased hunger hours after eating.

**Discussion/Verbal Exploration**

1. *What did you eat for lunch today? Why did you choose what you chose?*
2. *Did your lunch consist of whole foods or processed foods?*
3. *Think about how you feel after lunch. Are you fatigued, still hungry, thirsty, or irritable after eating certain foods?*
ACTIVITY

**Time Allotted**
15 Minutes

**Target Audience**
Grades 5-8

- Students will learn that most foods originate in soil.
- Marker board or large chart paper
- Activity 1.1.1 Dirt Made My Lunch Worksheet

**Summary**
Students learn that almost every food they eat can be traced to soil.

**Background**
Every day students eat a variety of fruits, vegetables, grains, meat, and dairy and sometimes do not have a sense of where those foods came from. There is a gap in knowledge of where our food originates and how it gets to our plates. Exploration of the origin of the foods we eat creates a better understanding of what those foods provide for us, where those foods are grown, and how they get to our plate.

**Method**
1. On the left hand side of the board or poster, draw a picture of a food that you ate for lunch. On the right hand side of the board or poster, draw a picture of soil.
2. **Ask:** *How can we connect this food back to the soil?*
   Use arrows to make a representational diagram. For example, orange juice comes from oranges, which come from trees, which grow in the soil.
   A diagram would look like this:
   Juice ➔ Orange ➔ Tree ➔ Soil
   A diagram for cheese would look like this:
   Cheese ➔ Milk ➔ Cow ➔ Grass or Grains ➔ Soil
3. Repeat this exercise for several foods that students ate for lunch, until students demonstrate a solid understanding of the concept.
4. Tell students to think of a food that does not come from the soil. Point out how difficult this task is, emphasizing the point that soil is responsible for almost 100% of our diet. The few exceptions include fish and mushrooms.
5. Hand out the Dirt Made My Lunch worksheet. Have students draw one item they ate for lunch in the left side box, and draw soil in the right side box. Instruct them to use arrows to connect their food back to its origins in the soil.

**Extensions**
- Have students record the foods they eat for dinner while at home, keeping a tally of how many originate in soil.
- Encourage students to plant their own seeds to grow food in the soil.
Dirt Made My Lunch

Name __________________________
Lesson 2:
Cycles and Seasonality
Background

Cycles shape our lives every day: the life cycle, the seasons, the school year, an ordinary day. Whether we realize it or not, we are all part of a living, breathing cycle of daily routines, relationships, consumption, and work. People typically associate farms with summer bounty and fall harvests, but farmers are actually cyclical workers as well. Farmers perform various tasks at different times of the year to produce the fruits and vegetables we eat. Drawing parallels between everyday cycles we experience to yearly cycles on a farm can create a deeper understanding of how our food is grown from seed to harvest (and back to seed again). Learning more about how our food is grown helps students understand why fresh and whole foods are healthier physically, emotionally, and environmentally.

Method

In this lesson, students will learn the definition of a cycle, including the daily cycles they experience and the cycles that occur on a farm. They will understand the difference between growing season and harvest season and the various tasks assigned to each of these seasons. By investigating the cycle of a farm and the seasons and drawing parallels to their own lives, students will begin to appreciate the structure, consistency, and importance of every month on a farm.

Discussion/Verbal Exploration

1. What is a cycle? Name three cycles that occur in your everyday life.
2. Have a short discussion on what the students think “growing season” and “harvest season” mean.
3. In our geographic location, what do you think farmers are doing this time of year? Prompt students to think of off-season tasks.
   Ask students: What do you think farmers are doing in February and March when there is snow on the ground? When do they prepare for planting seeds?
Summary

Students learn that farmers work year-round to grow the foods we eat.

Background

We associate farms with summer bounty and fall harvests, but farmers work year-round to produce the fruits and vegetables we eat. This lesson introduces students to what takes place on farms each month in the growing year. Students will be instructed to form a circle and position themselves in the circle according to their birth months. This arrangement will help demonstrate that the work of a farmer does not end, but is instead a cycle that repeats each year.

This activity requires teachers to make a sign for each month of the year that features the fruits and vegetables that can be harvested that month. Climates vary in each region of the world, and climate determines what foods can grow in each region. In the United States, regions are defined by hardiness zones. Each hardiness zone is identified by a number that indicates climate tendencies and plant needs. To find out your zone, search for your region on the USDA’s hardiness zone map, available at usna.usda.gov/Hardzone/ushzmap.html. Then search for a local harvest calendar for your zone which tells what fruits and vegetables can be grown during particular times of year.

Method

1. **Tell students:** Food in our area is growing on farms almost year-round. When food is not growing, farmers are still busy working to prepare for the upcoming season. We’re going to make a human calendar that displays what is going on at the farm each month.

2. Have students stand in groups according to their birthday month. Assign each group the sign displaying their birthday month. On the back of each sign, list the fruits and vegetables that can be harvested in Illinois during that month. If no fruits and vegetables can be harvested that month (for example, in January, when winter weather prevents food growth), list tasks that farm workers are performing to prepare for the next season.

3. Lay images of foods and farming tasks on the table. Have students read the back of their group’s sign. Tell students to choose the food that grows or the activity that takes place on the farm in their birthday month.

4. Tell students to arrange themselves in a circle, starting with January and going through December. Next, have the students describe the typical weather in that month, and then share with the class what is happening on the farm, what is growing, and what crops are being harvested.
5. Engage students in conversation by asking the following questions:
   - In what months do most fruits and vegetables grow? Why?
   - Why are we standing in a circle?
   - What are the farmers doing during the winter months?

**Sources**

Kelly Joslin, Green Earth Institute

**Extensions**

- Invite a farmer to speak in your class. Have students create a list of questions for the farmer prior to the presentation as well as think of questions during the presentation.
- Discuss seasonality and why tomatoes purchased in January are probably not local to your region. What are the pros and cons to purchasing foods in season?
**Instructions:** Cut out the following images and descriptions of the eight stages of a plant’s life cycle. Arrange them in the correct order on the board.

**STAGE 1: Seed**

Seeds are mature and distributed.
STAGE 2: Seed Germination

Seed absorbs water and begins to swell, root emerges.
STAGE 3: Shoot

Shoot penetrates the soil toward the light, root continues to grow downward.
STAGE 4: Leaf
Mature leaves develop, taproot and main roots develop.
STAGE 5: Stem

Stem and true leaves develop, roots continue to penetrate the soil in search of nutrients.
STAGE 6: Bud

Leaves grow outward, roots extend outward to support the plant’s growth, *rhizo-sphere* or bud develops.
STAGE 7: Flower

Flowers pollinate, roots take up more nutrients from soil.
STAGE 8: Fruit
Fruit and seeds develop.
Lesson 3:

Plant Parts
Background

Almost all the fruits and vegetables we eat come from plants. Mushrooms, a fungus, are one of the only types of food that does not come from plants. Even the snacks and non-plant foods we eat have ingredients that originate from plants. Corn and soy, for example, are major ingredients in the snacks, baked goods, prepared meals, and packaged goods we consume. Comparing the foods we eat to the plant parts from which they originate can make it easier to understand the nutritional value and integrity of certain foods. Exploration of basic botany can help students draw on their science and investigation skills while encouraging them to discover where their food comes from.

Method

Plants consist of six parts: roots, stems, leaves, flowers, fruits, and seeds. Each of the fruits and vegetables we eat can be categorized as one of these parts. This lesson requires teachers to provide at least one example of each plant part we eat. Some examples include carrots, the roots of a carrot plant; celery, the stem of a celery plant; and spinach, the leaf of the spinach plant. Each of these plant parts has a different function for helping plants grow and survive. This lesson will ask students to identify the functions of each plant part using symbols.

See the list below for definitions of each plant part function and the suggested corresponding symbols to represent each function. Lead a short discussion on the parts that compose a plant and identify the symbols used to understand the function of each.

- **Roots** absorb nutrients and water from the soil and anchor the plant in the soil, which provides support for the stem. *(Symbol: anchor, straw)*
- **Stems** carry nutrients and water from the roots to other parts of the plant. *(Symbol: delivery truck)*
- **Leaves** absorb sunlight and transform it into food, a process called photosynthesis. *(Symbol: sponge)*
- **Flowers** enable sexual reproduction through production of seeds. *(Symbol: babies)*
- **Fruits** store and protect seeds and attract animals to eat and disperse seeds. *(Symbol: storage bin, armor)*
- **Seeds** provide materials for new growth. *(Symbol: a growing plant)*
Note: The definition of “fruit” can often be confusing. Botanical scientists consider fruits to be the ripened, seed-bearing parts of plants. Thus, any food that contains seeds is considered a fruit. This includes apples, pears, and oranges. Fruits also include tomatoes, cucumbers, and squash—foods commonly referred to as vegetables. In the culinary world, the term “fruit” is used to describe a plant food with high levels of sugar; “vegetable” is used to describe a plant food that contains lower levels of sugar. Linking Plants and Food uses the botanical definition of fruit.

Sources


**Activity**

**Time Allotted**
30 Minutes

**Target Audience**
Grades 5-8

- Students will identify the six parts of the plant.
- Students will describe how each plant part contributes to the plant’s survival.
- Students will name visual characteristics of each plant part.
- Students will use plant parts to categorize different fruits or vegetables.

**Summary**

Students learn the six parts of a plant and their functions.

**Background**

Plants consist of six parts: roots, stems, leaves, flowers, fruits, and seeds. Each of the fruits and vegetables we eat can be categorized as one of these parts. This activity requires teachers to provide at least one example of each plant part we eat. Some examples include carrots, the roots of a carrot plant; celery, the stem of a celery plant; and spinach, the leaf of the spinach plant. Each of these plant parts has a different function for helping plants grow and survive. This activity will ask students to identify the functions of each plant part using symbols.

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- **Flowers** enable sexual reproduction through production of seeds. (Symbol: babies)
- **Fruits** store and protect seeds and attract animals to eat and disperse seeds. (Symbol: storage bin, armor)
- **Seeds** provide materials for new growth. (Symbol: plant growing up)

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ACTIVITY

• Activity 3.1.1 Plant Parts Poster
• Labels for roots, stems, leaves, flowers, fruits, and seeds (teacher made)
• Images to represent the functions of plant parts (delivery truck, anchor, sponge, baby, straw, storage bin, a growing plant)
• Vegetables that represent different plant parts (one vegetable per part)
  – Roots – carrots
  – Stems – celery
  – Leaves – spinach or lettuce
  – Flowers – broccoli
  – Fruits – cucumbers, tomatoes, bell peppers
  – Seeds – garbanzo beans
• Plant Parts Functions worksheet (Activity 3.1.2)

Method

1. Tell students that they will be discussing the six different parts of a plant. Explain that, believe it or not, we actually eat all of these plant parts. Ask if they can name any of the parts.

2. Display the Plant Parts Poster. Hand out labels for parts to random students. Ask the student with the “roots” label to attach his label to the poster. Repeat for the next five plant parts.

3. As students label each part, discuss visual characteristics that each plant part displays. Leaves are often green, broad, and flat; fruits contain seeds; flowers are bunched up with petals and are often brightly colored; stems are often long and skinny; roots have leaves or other greens attached on the top; seeds are small and numerous. Ask students to brainstorm foods that match these characteristics.

4. After each part is labeled, ask students to consider why the plant needs each part.
   Ask: How does this plant part help the plant survive?
   Have students choose a corresponding image to place next to that plant part. For example, the stem delivers nutrients and water from the roots to other parts of the plants. Students should place the image of the delivery truck next to the stem vegetable (celery).

5. Last, have students fill out the Plant Parts Functions worksheet.

Extensions

• Keep track of the plant parts you eat throughout one day.
• Hold a Plant Parts relay race in which students sort pictures of fruits and vegetables into plant part categories.
• Connect human and plant biology by exploring functions of different parts of plants and how they are similar to parts and functions of the human body, particularly the vascular, respiratory, and reproductive systems.
TEACHER KEY

1. Roots
The roots are the foundation that holds a plant in the ground. Roots also have tiny hairs that soak up water and minerals, and some plants have enlarged roots that serve as storage for the plant’s food or sugar.

2. Stems
The stem acts as a support for the plant and contains the plant’s vascular system, which transports food or sugar, minerals, and water. The system has two parts: xylem and phloem. The xylem carries the water and minerals up from the roots to the rest of the plant, while the phloem carries food or sugars from the leaves down through the rest of the plant.

3. Leaves
The primary purpose of leaves is to absorb sunlight for making food or sugar in a process called photosynthesis. During photosynthesis, carbon dioxide is also absorbed by the leaves and turned into oxygen, a by-product or waste of the process.

4. Flowers
The primary purpose of flowers is reproduction. The flower contains the plant’s reproductive organs. Their showy appearance is intended to attract insects and other animals to them as part of the seed-producing pollination process.

5. Fruits
The fruit of the plant is the part that holds and protects the seeds. Animals often eat the fruit, helping the plant spread its seed to other areas through waste elimination.

6. Seeds
Seeds are composed of three parts: the embryo (a miniature, dormant plant); the endosperm (the built-in food supply); and the seed coat (a protective layer).

Sources
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Summary

Students try to match a selection of seeds to the corresponding fruit or vegetable.

Background

The intention of this activity is to draw the students’ attention to the origin of fruit and vegetable plants. Students will learn there are many similarities and differences among seeds. Characteristics of the seed do not necessarily transfer to the plant. Many students—and even adults—may not be surprised to learn that all plants begin as seeds, but can they identify the seeds? This activity should include a diverse selection of seeds both familiar and unfamiliar to students. Prompt the students to approach the method from different angles:

- Think of your kitchen at home: Do any of these seeds look familiar to something you have seen in your own kitchen?
- Think of the shape, color, and texture of the seed: Do any of these characteristics relate to any plants you know?
- Compare a fuzzy tomato vine and its fuzzy seed counterpart to the very similar pepper seed.

Method

1. Gather all materials needed for this activity.
2. Number the plastic bags and place about a teaspoon of each seed in each bag (one type per bag). Create an answer key of type of seed in each numbered bags. Seal bags and lay them out in numerical order. Display the corresponding food items or photos with their names on the same table or space. Hand out paper and writing utensils to students, instructing them to number their sheets from 1 to 10.
3. Explain to the students that they have ten minutes to match the plants to their seeds. Have them gather around the seed activity, and encourage them to discuss their ideas about which seeds match which item. Allow roughly five minutes for the explanation and setup and ten minutes for the actual matching. You may need more time if working with more than ten varieties of seeds.
4. When the students have matched all the items—or ten minutes have passed—have them return to their seats and present the correct answers to the class. Holding up each bag of seeds in order, ask the students what they thought it was. Correct their responses if necessary.

Extensions

Create seed snacks or seed art including a variety of seeds such as sunflower seeds, almonds, peanuts, sesame seeds, or walnuts.
ACTIVITY

30 Minutes

Grades 5-8

• Students will identify the six parts of the plant.
• Students will use plant parts to categorize different fruits or vegetables.

• Activity 3.3.1 Edible Plant Parts (one per student)
• Activity 3.3.2 Plant Parts We Eat Chart (one per student)
• Pita bread or pita pockets (one per student)
• Ranch dressing, small bottle
• Shredded cheddar cheese, one package
• Plates (one per student)
• Vegetables that represent different plant parts (one vegetable per part, plus enough for all students to eat in a pita later)
  – Roots – Carrots
  – Stems – Celery
  – Leaves – Spinach or lettuce
  – Flowers – Broccoli
  – Fruits – Cucumbers, tomatoes, bell peppers
  – Seeds – Garbanzo beans

Summary

Students observe and classify vegetables then build and eat a Plant Parts Pita.

Background

Almost all the fruits and vegetables we eat come from plants. Plants consist of six parts: roots, stems, leaves, flowers, fruits, and seeds. Each of the fruits and vegetables we eat can be categorized as one of these parts. This lesson requires teachers to provide at least one example of each plant part we eat. Some examples include carrots, the roots of a carrot plant; celery, the stem of a celery plant; and spinach, the leaf of the spinach plant.

Method

1. Pass around different fruits and vegetables for students to observe. Make sure samples are cut open so seeds are evident. Have students work together to fill out the Plant Parts We Eat chart. Ask them to give evidence for why they chose their answers (Example response: I think spinach is the leaf of the plant because it is flat and green. I think tomato is the fruit because it has seeds). Describe one fruit or vegetable as a class.

2. Review student answers to the Plant Parts We Eat chart. Explain that these fruits and vegetables will be included in a plant part pita they will eat.

3. If appropriate, pass out knives and cutting boards. Assign one vegetable to each student and demonstrate how to use a knife safely to chop.

4. Set up a table with all chopped vegetables, pita pockets, dressing, cheese, and plates.

5. Students who work diligently on their Plant Parts We Eat chart will be allowed to come up first. As students take food from the “buffet” of plant parts, ask them to identify which plant parts they are adding to their pitas.

Extensions

Give students a sample meal, say vegetable lasagna, and have them list all plant parts involved in recipe. Try to challenge students with the use of multi-item ingredients such as pasta (grain/flour).
<table>
<thead>
<tr>
<th>ROOTS</th>
<th>STEMS</th>
<th>LEAVES</th>
<th>FLOWERS</th>
<th>FRuIT</th>
<th>SEEDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parsnips</td>
<td>Asparagus</td>
<td>Broccoli Rabe</td>
<td>Artichoke</td>
<td>Squash</td>
<td>Sunflower Seeds</td>
</tr>
<tr>
<td>Radishes</td>
<td>Celery</td>
<td>Radicchio</td>
<td>Broccoli</td>
<td>Bell Pepper</td>
<td>Pumpkin Seeds</td>
</tr>
<tr>
<td>Carrots</td>
<td>Rhubarb</td>
<td>Turnip Greens</td>
<td>Cauliflower</td>
<td>Eggplant</td>
<td>Fava Beans</td>
</tr>
<tr>
<td>Beets</td>
<td>Hearts of Palm</td>
<td>Spinach</td>
<td>Calendula</td>
<td>Cucumber</td>
<td>French Beans</td>
</tr>
<tr>
<td>Daikon</td>
<td>Bamboo Shoots</td>
<td>Lettuce</td>
<td>Squash Blossoms</td>
<td>Tomato</td>
<td>Pigeon Peas</td>
</tr>
<tr>
<td>Turnip</td>
<td>Broccoli Stems</td>
<td>Cabbage</td>
<td>Zucchini</td>
<td>Tomatillo</td>
<td>Snow Peas</td>
</tr>
<tr>
<td>Celeriac</td>
<td>Ginger</td>
<td>Swiss Chard</td>
<td>Sweet Corn</td>
<td>Zucchini</td>
<td>Bamboo Shoots</td>
</tr>
<tr>
<td>Rutabaga</td>
<td>Potato*</td>
<td>Bok Choy</td>
<td>Chili Pepper</td>
<td>Tomato</td>
<td>Broccoli Stems</td>
</tr>
<tr>
<td>Jicama</td>
<td>Taro</td>
<td>Kale</td>
<td>Melon</td>
<td>Cucumber</td>
<td>Cabbage</td>
</tr>
<tr>
<td></td>
<td>Nopales</td>
<td>Collard Greens</td>
<td>Citrus Fruits</td>
<td>Tomato</td>
<td>Sweet Corn</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Leek</td>
<td>Berries</td>
<td>Eggplant</td>
<td>Chili Pepper</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Beet Greens</td>
<td>Apples</td>
<td>Cucumber</td>
<td>Melon</td>
</tr>
</tbody>
</table>

Carbohydrates | Fiber | Vitamins/Minerals | Carbohydrates, Vitamins | Protein |
---|---|---|---|---|

*Although a potato is often considered a root vegetable, it is in fact a tuber. There are tiny hair-like roots that grow from the stem underground.

The emphasis with plant part nutrients should not necessarily be that certain parts contain certain nutrients, because those relationships vary from plant to plant. Instead, the emphasis should be that consuming a variety of plant parts will give maximum health benefits.
## Plant Parts We Eat

<table>
<thead>
<tr>
<th>ROOT</th>
<th>STEM</th>
<th>LEAF</th>
<th>BARK</th>
<th>FLOWER</th>
<th>FRUIT</th>
<th>SEED</th>
</tr>
</thead>
<tbody>
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<td></td>
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<tr>
<td><strong>HOW DO YOU KNOW?</strong></td>
<td><strong>HOW DO YOU KNOW?</strong></td>
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<td><strong>HOW DO YOU KNOW?</strong></td>
<td><strong>HOW DO YOU KNOW?</strong></td>
<td><strong>HOW DO YOU KNOW?</strong></td>
</tr>
</tbody>
</table>
Lesson 4:

Nutrition
Background

Obesity rates are soaring in the United States. Educating our youth on nutrition and healthy choices is critical to the health of present and future generations. Nutrition education is a valuable part of whole-body wellness, disease prevention, community health, and social responsibility. Every day, kids are bombarded with numerous advertisements for empty-calorie foods and snacks in the media, in their communities, and even at school. The exploration of basic nutrition education and the USDA’s MyPlate program can empower students to make healthier choices. Encouraging students to share what they learn with their families can provide motivation to improve their eating habits at home.

Method

In this lesson, students will begin to explore the basics of nutrition while focusing on portion control, the nutritional benefits of different food groups, and how to decipher what constitutes good dietary choices. Students will also begin to understand the importance of a varied diet. Along with variety in type, students will learn that different colors of fruits and vegetables provide slightly different nutrients. For example, white foods such as bananas and potatoes are high in potassium. Red foods such as strawberries and grapes are high in vitamin C. The nutrient differences are caused by the color pigments in the plants themselves.

Discussion/Verbal Exploration

1. Lead a short discussion on what students know about USDA’s previous nutrition education program, MyPyramid. Tie their observations in with the lesson and discussion of new program, MyPlate, asking students to point out the similarities and differences between the programs.

2. Discuss what students eat on a daily basis. Break down their responses into the different food groups on the board. As a class, determine which food groups might be lacking in their communal diet.

Sources

Summary

Using the USDA’s nutrition education program, MyPlate, students will begin to investigate the basics of how food is categorized nutritionally while learning what types of foods are best for their bodies.

Background

The MyPlate program is a new nutrition education program created by the USDA to educate children and adults about the five food groups, what foods go into those categories, why it is important to eat a variety of foods, and how to live in a healthy way. MyPlate focuses on different colors to represent each food group to encourage people to eat a variety of colors and types of foods. This program should not replace a doctor’s suggestions but is a good baseline for education on how to eat and live healthy.

Method

1. Split students into groups of threes or fours and begin discussion about the image of MyPlate. Write students’ initial thoughts of what the image is trying to convey on the board. Why does this program use a plate? What do the different size sections mean? What do the different colors mean? Encourage students to discuss within their group.

2. Have students brainstorm three types of food in each food group. If they have studied MyPyramid before, remind them that the names of the food groups have changed to encourage a broader range of foods. Be sure to remember that meat and beans are now protein. Ask students what foods they ate that day in each of the food categories, list on board.

3. On their paper plates, have students write or draw an example of a healthy dinner that includes at least one food from every group. Within their groups, have students decide which student’s dinner is the healthiest and why. Present the healthiest version to the class and explain why it is healthier than the others in the group.

4. Now that students have an idea of what types of foods go into each food group, the class will analyze a nutrition label of a box of cereal. Provide each group with box of cereal with nutrition label. Begin discussion about initial thoughts on the nutrition label. Why is it on the side of the box? What kind of information does it tell us? How often do we see this label? What numbers on the label do you think are most important?
5. After initial discussion, students should be more familiar with the label and have specific questions. Allow them a few minutes to ask questions about the label and discuss with their groups. If necessary, have students write down their questions and research online.

6. Discuss with students %DV located on the far right side of the nutrition label. This means Daily Value and gives a percentage of how much of that nutrient is appropriate for one day. *Ask students why this number might be different for everyone. Why would an active teenager need more calories than an inactive elderly person?*

7. Discuss with students three main nutrients on the nutrition label to be aware of when choosing a food: calories, fat, and sodium. Depending on the meal or snack the student is eating, they should stay below 20% of daily value in each category. This will depend on how many meals and snacks the student eats each day. For example, if the student has three meals and two snacks, they should stay below 20% DV for calories, fat, and sodium given that they are consuming food five times during the day.

**Sources**


**Extensions**

Research the health and economic ramifications of a healthy versus unhealthy diet. *What kinds of chronic diseases does a poor diet lead to? What kinds of costs are associated with a poor diet versus a healthy one? What are the annual health care costs of people your age regarding diet-related illnesses?*
Summary

Students learn that the nutrients a food contains are connected to the color of the food.

Background

Eating a varied diet means making sure our plates contain a rainbow of food colors. Fruits and vegetables actually contain natural plant pigments that provide both color and various nutritional benefits. For example, orange and yellow fruits and vegetables contain carotenoids, which are natural pigments that are converted to vitamin A in the body. Vitamin A helps the body maintain healthy skin, eyes, and hair. The anthocyanins in blue and purple fruits and vegetables act as powerful antioxidants that boost the immune system and assist memory. The Color Group Newsletters provide information on each color group and its nutritional benefits.

This lesson discusses antioxidants, which are especially present in blue and purple foods. Antioxidants in the body act as defense agents, protecting healthy cells from free radicals. Free radicals are incomplete molecules that roam the body hoping to attach themselves to cells and tissue. Once attached, free radicals cause deterioration of these cells.

Method

1. Tell the class that they will be investigating what nutrients different color groups of foods contain. Explain that fruits and vegetables come in many colors. Each color group of foods contains similar nutrients that benefit the body in different ways. When planning meals or shopping at the grocery store, you can keep track of the various colors of foods you are eating or purchasing to make sure you get an adequate amount of a variety of nutrients.

2. Introduce the five color groups for food: 1) red 2) green 3) blue and purple 4) orange and yellow 5) white. Students will brainstorm as many fruits and vegetables that are in each color group as possible.
   a. Brainstorm one color as a whole class. On the board, write as many red fruits and vegetables as students can suggest.
   b. Split students into groups of two or three. Give them two minutes to brainstorm as many green foods as possible. Students should list their responses on paper. Keep track of which groups offer the most responses.
   c. Repeat for each color. Record the winning groups for each color. Provide small prizes such as grapes or Clementine oranges to the winning groups.
3. Divide the class into five groups. Assign one color to each group. Have each group research the nutrients prevalent in one color group. Provide each group with the Color Group Newsletter that matches their color.
   a. Tell students to read the newsletter thoroughly.
   b. After they finish reading, have students fill out the Nutrients Based on Color worksheet to check comprehension.
4. Instruct each group to create a poster advertising the benefits of eating fruits and vegetables from their color group.
   a. Tell students to come up with a slogan for their color group.
   b. Tell students to decide which information in the newsletter is the most relevant for their poster. Remind students that the information on the poster should convey to their peers why they should eat that color group.
   c. Allow student groups 20 minutes to create posters. Have each group present its poster to the class. If possible, hang the posters in the classroom or in the school.

**Extensions**

- Prepare a rainbow fruit salad. Purchase fruits that fit into each color group. Have one group at a time come up to the front of the classroom to add their color fruit to the salad. As students are adding the fruit to the bowl, they should share one nutrient that is in that particular fruit. Each group should add to a class poster—a large class recipe—which reads *Our fruit salad contains ______ which helps your body because...*
- Have students use the Rainbow Food Chart to track the colors they eat for one day.
- Plan a meal with *all* of the colors groups represented, and draw it out on a paper plate.
Blue and Purple Foods

ANTIOXIDANTS: THE BODY’S SUPERHEROES

Blue and purple foods contain antioxidants. Antioxidants are substances that help the cells in the body stay healthy. Antioxidants fight free radicals, which are harmful substances that float around the body and damage cells. This damage can cause diseases such as heart disease and cancer. Antioxidants protect cells from the damage free radicals can cause and they can prevent diseases.

KEEPING THE BODY HEALTHY

Many blue and purple fruits and vegetables contain vitamin C. Vitamin C is important for keeping body tissues such as gums and muscles in good shape. Vitamin C helps wounds and cuts heal. It also helps the body resist infection. Even though you cannot always avoid getting sick, vitamin C makes it a little harder for your body to become infected with an illness.

Purple foods also contain a type of antioxidants called flavonoids. Flavonoids are plant pigments important for heart health. They help reduce harmful blood clotting and help the arteries function properly.
Green Foods

VITAMIN A

Green foods are full of vitamin A. Vitamin A is important for good vision. Vitamin A helps keep eyes strong so that we can see well at night, and have good vision when studying or playing sports. Vitamin A is also good for the immune system and helps keep bodies healthy and fight off diseases and sickness.

IRON

The air we breathe contains oxygen. Muscles in the body need oxygen so that the body can move around and be strong. Iron is a mineral that helps oxygen travel to the muscles. Without iron, the body would feel very weak, so it needs iron to keep the body strong.

CALCIUM

Calcium is a mineral that is found in milk and other dairy foods such as milk, yogurt, and cheese. Some people are not able drink milk because it makes them sick. Luckily, green vegetables have lots of calcium. Calcium also keeps bones strong.

FIBER HELPS IN MANY WAYS

Fiber is the nutrient that the body needs to help move food through the digestive system. Fiber is important because it helps the body know when it is full during a meal. Eating too much food can cause weight gain. However, eating fiber-rich foods helps people maintain a healthy weight.

Fiber also helps to lower cholesterol. If your cholesterol is too high, you might be more likely to have a heart attack. Eating more fiber reduces the likelihood of having heart attacks.
Red Foods

KEEPING YOUR BODY HEALTHY

Many red fruits and vegetables contain vitamin C. Vitamin C is important for keeping body tissues such as gums and muscles in good shape. Vitamin C helps wounds and cuts heal. It also helps the body resist infection. Even though you cannot always avoid getting sick, vitamin C makes it a little harder for your body to become infected with an illness.

Red foods also contain antioxidants. Antioxidants are substances that help the cells in the body stay healthy. Antioxidants protect cells from damage and they can prevent diseases such as heart disease and cancer. Eating plenty of red fruits and vegetables helps you stay healthy.

FIBER HELPS IN MANY WAYS

Fiber is the nutrient that the body needs to help move food through the digestive system. Fiber is important because it helps the body know when it is full during a meal. Eating too much food can cause weight gain. However, eating fiber-rich foods helps people maintain a healthy weight.

Fiber also helps to lower cholesterol. If your cholesterol is too high, you might be more likely to have a heart attack. Eating more fiber reduces the likelihood of having heart attacks.
White Foods

FIBER HELPS IN MANY WAYS

Fiber is the nutrient that the body needs to help move food through the digestive system. Fiber is important because it helps the body know when it is full during a meal. Eating too much food can cause weight gain. However, eating fiber-rich foods helps people maintain a healthy weight.

Fiber also helps to lower cholesterol. If your cholesterol is too high, you might be more likely to have a heart attack. Eating more fiber reduces the likelihood of having heart attacks.

VITAMIN C

Many white fruits and vegetables have vitamin C. Vitamin C is important for keeping body tissues such as gums and muscles in good shape. Vitamin C helps wounds and cuts heal. It also helps the body resist infection. Even though you cannot always avoid getting sick, vitamin C makes it a little harder for your body to become infected with an illness.
Orange and Yellow Foods

BETA-CAROTENE AND VITAMIN A

Orange fruits and vegetables contain a plant pigment called beta-carotene. Beta-carotene is good for the whole body. It keeps the heart healthy and protects against cancer and other diseases.

Beta-carotene also makes vitamin A in your body. Vitamin A is important for the eyes, immune system, and the skin. If you do not get enough vitamin A, you might have a hard time seeing in the dark, you are more likely to get sick, and your skin can become dry and rough.

PHYTOCHEMICALS AND POTASSIUM

Citrus fruits, which are mostly orange and yellow in color, also contain a number of nutrients called phytochemicals that help fight against cancer. Some of these phytochemicals can actually prevent cancer-causing substances from getting into your body.

Some orange fruits are also high in potassium. Potassium is a mineral that helps the heart pump correctly. Potassium also helps muscles move.
1. Read your Color Group Newsletter.
   Make sure everyone in the group has read all the information. Then answer the questions below.

   **How does your color group help the body?**

   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________

   **What nutrients does your color group contain?**

   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________

   **Why are you going to tell people to eat from this color group?**

   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________

2. Create a poster with different foods from your color group.
   - Explain on the poster how your color group benefits the body.
   - Include pictures and make sure it is easy to read.
   - Come up with a slogan for your color group, such as “Green gives you great strength!” or “Red: A Delicious Way to Keep Colds Away.” The slogan should name at least one reason why this color is good to eat.
**Rainbow Food Chart**

For one day, pay attention to the colors of the fruits and vegetables you eat. Chart what you ate each time you eat that color.

<table>
<thead>
<tr>
<th>COLOR</th>
<th>WHAT YOU ATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td></td>
</tr>
<tr>
<td>Green</td>
<td></td>
</tr>
<tr>
<td>Blue and Purple</td>
<td></td>
</tr>
<tr>
<td>Orange and Yellow</td>
<td></td>
</tr>
<tr>
<td>White</td>
<td></td>
</tr>
</tbody>
</table>
Summary

Students learn the six parts of a plant and the varying nutrients each provides. Activities 3.1, 3.3, and 4.2 should be completed prior to this activity.

Background

Almost all the fruits and vegetables we eat come from plants. Mushrooms, a fungus, are one of the only foods that does not. Plants consist of six parts: roots, stems, leaves, flowers, fruits, and seeds. Each of the fruits and vegetables we eat can be categorized as one of these parts. Each of these plant parts has a different function for helping plants grow and survive. This activity will ask students to identify the functions of each plant part using symbols.

Note: The definition of “fruit” can often be confusing. Botanical scientists consider fruits to be the ripened, seed-bearing parts of plants. Thus, any food that contains seeds is considered a fruit. This includes apples, pears, and oranges. Fruits also include tomatoes, cucumbers, and squash—foods commonly referred to as vegetables. In the culinary world, the term “fruit” is used to describe a plant food with high levels of sugar; “vegetable” is used to describe a plant food that has lower levels of sugar. Linking Plants and Food uses the botanical definition of fruit.

In this activity, students learn the importance of eating a variety of plant parts. Plants are an essential part of a healthy diet, since they provide vitamins and minerals that can’t be found in animal sources. Students will discuss the different nutrients that each plant part provides for the body. While all fruits and vegetables provide a variety of important nutrients, some have higher amounts of specific vitamins and minerals. Seeds provide extra protein, stems provide fiber, roots provide carbohydrates, flowers provide vitamin A, fruits provide vitamins A and C, and leaves provide calcium and fiber. Consequently, it’s important to eat a variety of plant parts each day.

This activity asks students to analyze the nutrients that each plant part provides, and then play a fun, active game to review what they have learned.
Method

1. Ask students to recall the six parts of a plant. If necessary, display the Plant Parts Poster and have students label the parts. Review Activity 3.1 Plant Parts Functions and Activity 3.3 Plant Parts We Eat.

2. Using Activity 3.3.1 Edible Plant Parts for reference, begin a conversation with students about what nutrients typically (but not always) are represented in certain plant parts.

3. Tell students that they will be participating in a version of the game “Around the World.” One student volunteer will stand next to the student whose desk or table spot is in the front corner of the room. Only these two students can answer the question in the first round. The teacher will read a question or statement, such as “Name one food that provides calcium for our bodies.” The first student to yell out a correct answer wins that round (for example, “spinach”). That person then moves on to the next person’s desk or table spot, and those two students try to answer the next question provided by the teacher.

4. The person who makes it to the last student’s desk and answers the last question correctly is the winner.

Plant Part Nutrient Questions

1. Give an example of a food that provides calcium.
2. Give an example of a food that provides protein.
3. True or false: The stem of the plant provides extra fiber.
4. Give two plant parts that provide fiber for the body.
5. Name two nutrients that fruit provides for the body.
6. Name one food that provides carbohydrates for the body.
7. Which nutrient does celery provide for the body?
8. True or false: Leaves provide us with calcium and fiber.
9. Give an example of a food that provides vitamin A.
10. Give two examples of foods that provide protein for the body.
11. Which plant parts provide carbohydrates for the body?
12. True or false: Asparagus provides extra fiber.
13. True or false: Pumpkins provide extra vitamin A and C.
14. Which nutrient does spinach provide?
15. Which nutrients do tomatoes provide?
16. True or false: Potatoes provide carbohydrates for the body.
17. Which plant part provides calcium and fiber?
18. True or false: Broccoli provides carbohydrates for the body.
19. Name a fruit or vegetable that provides vitamin C.
20. How many plant parts are there?
21. Name all six plant parts.
22. Which plant part provides large amounts of two different vitamins?
23. True or false: Spinach provides calcium for the body.
Extensions

Tell students to imagine that they will be opening a restaurant called “Plant Part Cafe.” Each student is responsible for planning a menu item that includes all six plant parts. This menu item can be one type of food, such as pizza, that incorporates all six plant parts. Alternatively, it can be an entire meal.
Lesson 5:
Healthy Soil
Background

Growing food starts with healthy soil. Soil is the foundation of human nourishment and of life. Fertile, tillable soil is an important resource that must be protected. Understanding the components of healthy soil helps us protect it. People use soil at a much faster rate than the earth can create and replenish it. Only slightly more than 6% of Earth has soil that is suitable for growing food. Water covers 75% of Earth. Deserts, high altitude mountains, barren lands, and areas covered with ice make up much of the rest of Earth’s surface. Human actions can negatively impact what little fertile soil remains. Housing development, urban expansion, and unsustainable agricultural practices are detrimental to healthy soil.

Method

In this lesson, students will analyze the components of healthy soil and understand why healthy soil is important, not only to plants, but also to the broader environment. Students will understand that most foods we eat begin with soil. If that soil is unhealthy, it provides less nutritious food. Exploration of agricultural practices that potentially damage soil and local economies will show students how our food cycle is a dynamic and complex system that needs protection. Students will assess how long it takes for organic matter to break down into soil and study agricultural practices that are beneficial or harmful to healthy topsoil.

Discussion/Verbal Exploration

1. What’s the difference between soil and dirt? What is soil made of?
2. Why is soil important?
3. Why do some regions of the world have better soil than others? Does this make them more or less capable of growing food?
4. What are some things that harm soil? What practices help soil?

Sources


Summary

Students learn about the percentage of fertile soil on Earth.

Background

Soil is one of the most valuable natural resources the earth gives us. Soil provides us food we eat, land we build on, and plants we need to breathe. Soil is also a major “carbon sink,” which means it absorbs harmful carbon dioxide gas from the atmosphere. Unfortunately, soil is not a limitless natural resource; only slightly more than 6% of Earth has soil that is suitable for growing food. Many human practices have done damage to the little fertile soil that remains. For more information on these harmful practices, see Activity 5.3. This lesson gives students a powerful visual that shows just how little soil our earth possesses.

Method

1. Tell students that in this lesson, they will consider how much soil is available on our planet to grow food. Instruct students to partner with another student to consider the following question: How much of Earth’s surface is suitable for growing food? Pairs should make a prediction. Encourage students to use math concepts such as fractions, percentages, and decimals to describe their estimates. After students have had three to five minutes to talk with each other, ask students for their predictions.

2. Next, show students the apple, and explain that the whole apple represents Earth. Do the following demonstration to represent soil available for growing food on the planet:
   - Cut the apple into four equal parts. One slice (1/4) represents the land on Earth, and the remaining three slices (3/4) represent the water present on Earth.
   - Next, cut the land section (one slice) in half. One of these pieces represents mountains, deserts, or land covered with ice or soil on which we cannot grow food. The other piece is soil that we can cultivate.
   - Cut this piece representing the soil we live on into fourths. On Earth, three of these pieces are too rocky, wet, hot, infertile or are covered with cities and roads. There is now 1/32 of the apple left.
   - Slice the skin off this piece. This sliver of skin represents the topsoil which is suitable for growing food, and which must produce enough food to feed everyone on Earth!

3. Engage students in a discussion about what they have just learned. Ask: Why is it important to know how much soil is available for growing food on Earth? What can we do to protect the little soil that we have?
Extensions

• Have students create a pie chart of fertile soil versus infertile soil based on the information they gathered from the activity.

• Have students create a world map of different types of terrain and what types of soil they typically have. *What types of terrain have fertile soil or infertile soil?*
Summary

Students investigate a handful of soil to determine its components.

Note: Activity 5.3 Recipe for Healthy Soil is the follow up activity.

Background

The word “soil” is often used interchangeably with the word “dirt,” but the two do not refer to the same thing. Dirt is the small brown pile of particles that we hold in our hand. Soil, however, is a complex material made up of organic matter (the decaying remains of plants and animals), minerals (sand, silt, and clay), water, and air. Earthworms, beetles, and other small animals are often found in the soil. Lastly, soil contains many microorganisms (organisms that are too small to see with the naked eye), such as bacteria, that help break down organic matter. This activity asks students to investigate the components of soil using a sample from the schoolyard.

Method

1. Tell students that they are going to make their own soil. First, they need to figure out the ingredients that make up soil. Divide students into small groups. Go outside to collect soil from different places such as garden beds and the ground. Students should put the soil in plastic baggies. Tell students to be careful not to disturb plants or creatures that are in the soil.

2. Next, have students dump their soil into the pie tins and examine with their hand lenses. Separate out each type of material they find: rocks, roots, leaves, insects, and other materials. Allow time to discuss what they found and to compare each group’s soil. Students can draw and list the materials they found on the What’s in Soil? worksheet.

3. As a class, make a list of the ingredients that students found in their soil. Be sure that the following five ingredients are mentioned: leaves, sticks, grass, rocks, and earthworms.

4. After the activity is finished, have groups return the soil to the place they found it. Have students discuss the difference between the “soil” they found and the soil that is in a garden bed. Have students research the different components of soil such as clay, silt, sand, decaying matter, and bacteria. Why are these different components important to soil? Why can’t we pick these components out as easily as earthworms and sticks?

Extensions

Have students research the different ratios of clay, silt, and sand in healthy soil. What happens if the ratio is out of balance?
Activity 5.2.1: What’s in Soil?

List the items you found in the soil:

- ____________________
- ____________________
- ____________________
- ____________________
ACTIVITY

20 Minutes

Grades 5-8

• Students will identify the five components of soil.
• Students will describe how organic matter breaks down to form healthy soil.

• Small bowls (one for every 3–4 students)
• Large mixing bowl
• Spare cloth, large enough to cover bowl

Summary

Students attempt to create their own soil, and learn that it takes many years for soil to form.

Note: Activity 5.2 What’s in Soil? should be taught prior to this activity.

Background

Soil is formed through a complicated process that has multiple factors. Soil begins with parent material, which is various sorts of sediment left by glaciers or volcanoes. This material is broken down into finer particles by temperature, water, and wind over a long period of time. As plants and animals die, their remains are added to this material, and as they decay their nutrients are added. Water and air infiltrate the soil as it is moved by wind and living organisms. Eventually, healthy subsoil and topsoil are formed, but this process takes hundreds of years. This lesson asks students to consider the processes that form soil, and pays special attention to the time it takes for these processes to be complete.

Many human practices do much damage to the soil that takes so long to form. For example, housing development and urban expansion have caused much of our topsoil to erode, since the roots of trees and other plants can no longer hold the soil in place. Unsustainable agricultural practices, including pesticide-based farming and the use of monoculture crops, have done irreversible damage to much of our land’s topsoil. Farmers, who cannot always afford to replenish the soil with healthy nutrients, simply move on to another plot of land, or spray more harmful chemicals to help their plants grow. Soil is an invaluable natural resource that cannot quickly be replaced, and these harmful practices are decreasing the amount of fertile soil we have available.

Method

1. Ask students to make a list of at least five components of healthy soil. Listed items should include rocks, sticks, dirt or sand, grass, and worms. Organic versus non-organic matter should be noted.

2. Say: We will now be making our own soil. First, we need to gather all the ingredients, and then put them together in the kitchen.

3. Divide students into small groups. Assign each group one ingredient on the list to collect. Groups should gather ingredients until they fill their bowls.

4. When they are finished collecting, have students put their ingredients in a large mixing bowl. Check the recipe to make sure all the ingredients are present. Then let students take turns mixing the ingredients together.
5. Cover the bowl with a cloth. Have the class repeat after you a magical chant: “Alla-kazam...alla-ka-zoil...turn this mixture...into soil!”

6. Pull the cloth off. Ask the group if the bowl is now filled with soil. (It won’t be.) Ask them what ingredients may be missing. Tell students that important ingredients such as sun, water, nutrients, or bacteria have not been included.

7. Ask the group to imagine what would happen if we added these ingredients. Would this become soil? Show some soil from the garden. Compare it to the bowl of ingredients. What else is needed? Students should conclude that we need time. It takes time for bacteria and other decomposers such as earthworms to break down all these ingredients and create rich, healthy soil. In fact, it takes 50 to 100 years to develop one inch of topsoil.

**Extensions**

- Have students begin a discussion on the damage that is being done to topsoil throughout the world because of harmful agricultural practices and urban/suburban development (such as the use of pesticides and chemical fertilizers that are killing helpful microorganisms and increasing erosion). Ask students to make connections between these harmful practices and the amount of time it takes for new soil to form.

- Have students research decomposers such as earthworms. Students can create a poster of a decomposer’s anatomy and describe how the shape and size of the body helps break down organic material.
ACTIVITY

60 Minutes
(requires additional weeks to observe growth)

Grades 5-8

• Students will describe how organic matter breaks down to form healthy soil.
• Students will understand the connection between healthy soil and healthy bodies.

• Plastic bags or jars, numbered, and filled with one of five different soils: potting soil, cactus soil or sandy soil, construction site soil or clay-heavy soil, compost, and schoolyard soil. If using jars, fill with one-third soil and two-thirds water to separate the particles. (Note: Make a key that tells which soil is in which container.)
• Enough extra soil (of each type) to fill cups for planting
• Writing utensils
• Scrap paper
• Copies of Soil Experiment report (one per student)
• Small cups (poke holes in bottom) or pots
• Small plates (to place under cups to collect water)
• Vessel for watering plants (spray bottle or large plastic cup will work)
• Masking tape
• Radish seeds

Summary

Students explore the concept of healthy soil through a hands-on planting activity and scientific observation.

Background

Scientists describe soil based on the type and amount of particles in it. The three types of particles present in soil are clay, sand, and silt. Clay soils are tightly packed with little space between the particles. Sand soils have larger particles, which allow for more space between each grain. Silt soils have particles that are bigger than clay and smaller than sand. Different types of plants require different types of soil to grow robustly. For example, cactus and other desert plants grow in sandier soils that allow for more drainage of water. Tropical plants require soil that contains more clay, since the particles are closer together and retain more moisture. This activity asks students to consider soil type as an important factor in growing healthy plants.

Method

1. Gather all materials necessary for the activity.
2. On the board, draw the chart on the following page. Alter names and locations to match the soils you use.
### Activity 5.4: Soil Experiment

<table>
<thead>
<tr>
<th>Number</th>
<th>Name or Locations</th>
<th>Description</th>
<th>Good for Growing?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Potting Soil</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Cactus Soil</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Compost</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Construction Site</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>School Yard</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. Divide the class into five groups.

4. Pass out one soil sample to each group and allow two minutes for the students to make observations about it. Rotate the soil samples, allowing two minutes for each (ten minutes total), until all the students have had a chance to write down observations about all of the soil samples.

5. Ask the students to identify what they see. They should identify the samples as soil or dirt; if they struggle, prompt them by giving hints.

6. Holding up one soil sample at a time, ask students to volunteer their observations or descriptions about what they see. Complete the chart on the board as you record student observations. **Ask:** *Would this soil be good for growing? Why or why not?* Encourage students to think about the plant’s roots and water’s ability to pass through the different types of soil—this is easier to observe with a dry sample.

7. Have students remain in their groups and tell them they will now test their theories about the soils. Give each group one Soil Experiment worksheet, one cup, one of the soil samples, a piece of masking tape, and two to four radish seeds.

8. Have the students fill their cups with the given soil and label them with the date and type of soil used. Tell students to make a hole in the soil up to the first knuckle of their index finger and drop in the seeds. When the students have finished planting their seeds, have them bring their cups to a designated location, place them on plates, and water their seeds.

9. Once the students have finished planting, have them complete their Soil Experiment report. Encourage them to discuss the observations they made about their soil and about what plants need to grow.

### Extensions

- Investigate the permeability of each type of soil by creating a science experiment of pouring colored water through each. Track time and amount of water that flowed through.
- Acquire a soil testing kit to examine the nutrient composition, contaminant level, and acidity level of all five soil samples.
SOIL EXPERIMENT

Title: ____________________________________________________________

Group Members: __________________________________________________

Materials used: ____________________________________________________

Questions: ________________________________________________________

Hypothesis: What I think will happen...

Method: What I did... (To help explain your method, use the back of this sheet to make a sketch of your method.)
SOIL EXPERIMENT

Data: What I observed...

____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________

Results:

____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________

Was my hypothesis correct? (circle your answer and explain in your conclusion)

YES

NO

Conclusion: What I learned...

____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________
Lesson 6:
The Waste Cycle
Lesson 6: The Waste Cycle

**Background**

American culture is focused on consumption and disposal. We purchase, use, and discard electronics, clothes, material goods, and food at will. Analyzing what we use daily, where it comes from, and how quickly we use or replace it can reveal what we truly need, as opposed to what we think we need. This analysis leads to an understanding of the waste cycle. In the natural world there is no waste. Anything used in one step of a cycle, such as the life cycle of a plant (or animal), is used in the next, creating a continuous circle. Specifically regarding plants and food, what we think of as food waste is actually part of an important natural process: the life cycle of a plant. By throwing away excess food, we also throw away important plant nutrients. Unnecessary food waste and the consequent interrupted plant life cycle reflects the wastefulness of society as a whole. Recycling and reusing material goods and composting food waste are ways waste can be utilized as a positive asset.

**Method**

This lesson teaches students that food waste can actually break down to form compost, a nutrient-filled material that helps new plants grow. Students will explore the connection between our food waste and plants. When we throw food in the landfill, we take it out of its normal life cycle. Students will learn that reducing waste and composting can help reestablish healthy plant cycles.

**Discussion/Verbal Exploration**

1. *What is waste?*
2. *What everyday items do we replace at least every year? Is this always necessary?*
3. *What are some ways we waste food every day?*
4. *What are some ways we can decrease the amount of food and material goods we waste?*
**ACTIVITY**

90 Minutes

Grades 5-8

- Students will understand the definition of waste.
- Students will understand how the waste cycle can be a positive asset.

**Summary**

Students reflect on what they know about waste, inventory a week’s worth of trash, and learn where trash goes after it hits the garbage can.

**Background**

The United States produces massive amounts of garbage each year. In 2009 alone, Americans disposed of 243 million tons of trash. Half of that 243 million tons was removed and sent to recycling centers, but the remaining half was sent to one of the country’s 3,000 active landfills. While generally safe, landfills can leak chemicals and gases into nearby bodies of water. Decomposition occurs very slowly in landfills; consequently, the normal waste cycle is disrupted. Many of the items sent to landfills could be reused or recycled in various ways. In this lesson, students will investigate how much garbage their classroom produces in one week. They will categorize classroom trash into garbage, recyclables, and food waste.

**Method**

1. **Ask: What is waste?**
   - Begin the lesson by creating a Waste KWL (Know, Want to know, Learn) chart. In the Know column, ask students to brainstorm what they know about waste. **Ask:** What are synonyms for the word waste? Where does garbage go? Why might landfills be harmful to the environment? Prompt students to discuss what they know about alternatives to simply discarding what they no longer need, such as recycling, reusing, and repurposing.
   - Continue filling in the KWL chart by asking students what they would like to know about waste. **Ask:** How is trash processed? Who takes out the school’s garbage? What will we do if we run out of room for trash?

2. **Ask: How much waste do we produce?**
   - Have students predict which products are thrown away most frequently in their school community. To answer this question, tell students that they will be sorting the trash their classroom has collected that week. If possible, include another classroom’s trash as well. Make a chart with three categories: Garbage, Recyclables, and Food Waste.
   - Give students gloves and place a tarp or garbage bags on the floor. Carefully pour the trash into the middle of the tarp, and ask students to sort the waste into the three categories labeled on the chart. Ask one volunteer to record the items on the chart, using tallies for repeat items.
   - Discuss the data collected. **Ask:** Which product was thrown away the most? Were there more recyclable items than garbage items? What percentage of the trash was food waste?
• Ask students to imagine how much food waste might be in the cafeteria’s trash. If possible, take a trip to the lunchroom and carefully examine the trash there. If there is a garbage bag, lift it out and carefully rummage through the trash. (Note: Only the teacher should do this step, while wearing gloves, for safety reasons.) Have students estimate what percentage of the cafeteria garbage is food waste.

3. **Ask:** Where does the waste go?

• Invite an expert to your classroom to speak with students about where trash goes. Contact your local waste pickup company to see if a representative can speak to your class. Explain that he or she will be describing the process of bringing trash to a landfill. Ask him or her to bring photos and other hands-on materials for students.

• Have students prepare one to three questions to ask the expert. Sample questions could include:
  – Where does trash go after it leaves our classroom?
  – How much trash is produced on an average day of school?
  – What is a landfill?
  – Is trash sorted into categories, or is everything put into one pile?
  – Is trash compacted into smaller amounts?

• Show students the online video *A Day in the Life of Your Garbage and Recyclables*, [http://www.youtube.com/watch?v=Prigs6dLLCQ](http://www.youtube.com/watch?v=Prigs6dLLCQ). Explain that, while this is not set in your community, trash is dealt with similarly across the country.

**Sources**


**Extensions**


• Take a field trip to a local landfill or trash processing facility.

• Have students sort or weigh the garbage produced in their homes for one week. Tell them to compare the amount of garbage to the amount of waste recycled or composted.

• Give each student one trash item to research from production to elimination. Students should report where and how the item was originally made, who used it, and how it will be disposed of.
ACTIVITY

60 Minutes

Grades 5-8

- Students will learn the meanings of decomposition and compost.
- Students will learn about composting and be able to link it to the plant cycle.
- Students will understand how the waste cycle can be a positive asset.

Materials

- Empty water or soda bottles, including bottle caps, two per student (Note: To save time, cut the upper half of the bottle until it is almost removed. Students can then access the inside of the bottle for filling, but still close it later.)
- Scissors
- Spray bottle filled with water
- Soil from a garden or lawn (not store-bought potting soil), enough to fill one bottle per student

(Continued on next page)

Summary

Students learn that food waste can be reduced through composting, and observe the act of decomposition through their own decomposition chambers.

Background

Food waste is a major issue in the United States—32 million tons of food is thrown out each year. This amounts to 14% of all trash, and represents the largest component of garbage reaching landfills. In addition to increasing our overall garbage production, food waste can have large economic and environmental impacts.

Food waste impacts people economically. Individuals, families, and businesses spend large amounts of money on food, and much of this food ends up in the trash. Making wise food purchases and avoiding needless waste helps save money. Food waste also impacts the environment. When food decomposes in landfills, it emits methane, a powerful greenhouse gas that contributes to global warming. Landfills account for 20% of all human-produced methane. Reducing food waste reduces the environmental impact of landfills.

An easy and effective way to reduce food waste is through composting. Compost is produced when food waste and other organic materials such as yard waste and manure decompose. In the act of decomposition, tiny bacteria and fungi break down the waste and form humus, a dark brown, soil-like material. This material, also known as compost, helps improve soil structure by adding valuable nutrients that help plants grow. Composting reduces the need for fertilizers and pesticides, which can harm farm workers and contaminate local rivers, lakes, and groundwater.

Method

1. **Ask: What is food waste?**
   - Have students recall the food waste they discovered in the school trash. Discuss with students their reactions to this food waste. Add their reactions to the Waste KWL chart.
   - Explain to students that approximately 14% of the country’s garbage is food scraps, which amounts to 32 million tons per year. Use the image at the top of the *New York Times* article, “One Country’s Table Scraps, Another Country’s Meal,” to prompt discussion about wasting food. Have students brainstorm what negative effects wasted food might have.
ACTIVITY

2. **Ask:** *How do we reduce food waste?*
   - Remind students that food waste can be reduced by composting. Composting is the act of breaking down food into healthy soil that can later be used to help plants grow.
   - Ask for a volunteer to draw a plant’s life cycle on the board. Guide the student so that the final diagram includes some variation of the following diagram:
     
     seed ➔ sprout ➔ full-grown plant ➔ dead decomposing plant ➔ soil ➔ seed
   - Explain decomposition if students are not familiar with the concept. Tiny bacteria and fungi act quickly to break down dead plants, transforming them into nutrient-rich soil that will help other plants grow.
   - Remind students that most of the foods we eat come from plants. Consequently, the foods we eat decompose in the same way that plants do.

3. Help students create their own decomposition chambers.
   - Give each student two empty bottles with the tops cut almost off. Tell them that one bottle will be for decomposing food waste, and the other for decomposing a trash item of their choice (small enough to fit in the bottle).
   - Have students fill each bottle halfway with soil from the earth. Tell them that this soil, as opposed to store-bought potting soil, already contains decomposers such as bacteria, fungi, and possibly worms. Students can add leaves, sticks, or other natural items of their choice.
   - Spray water in each bottle until the soil is moist. Replace the lid.
   - Display bottles where students can access them. Tell students to observe the bottles over the next month for signs of decomposition. Examples of decomposition include mold, color change, and strong odors. Tell them to notice which items are decomposing more quickly. Most likely, food items will be breaking down rapidly.

**Sources**


Extensions

- Have students keep a tally of how much food is thrown away in their households for one week.
- Make brochures or posters advertising the harmful effects of wasting food. Post them in the lunchroom and around the school.
- Discuss worldwide hunger with students, and ask them to connect this with food waste in the United States and other developed countries. See the Environmental Protection Agency’s report, “Waste Not Want Not: Feeding the Hungry and Reducing Solid Waste Through Food Recovery,” http://www.epa.gov/osw/conserve/materials/organics/pubs/wast_not.pdf.
Summary

Students create a worm compost bin for their classroom.

Note: Activity 6.2 From Waste to a Resource should be completed prior to this activity.

Background

This lesson helps teachers and students create a worm compost bin for their classroom*. By composting food scraps, the organic material that would otherwise be dumped into a landfill can be used in gardens instead. In a landfill, organic material has a hard time breaking down in a natural way due to a lack of oxygen. Deterioration in a landfill is an anaerobic (without oxygen) process, whereas composting in a worm bin is an aerobic (with oxygen) process. When we turn the compost, we incorporate oxygen into the process.

*Check with your principal to make sure worm composting is allowed in the classroom. Some school districts have regulations about where food can be stored and whether or not food can leave the lunchroom. In this lesson, food will be restricted to your classroom. If you are able to implement a larger, school-wide composting system, see the Extensions section for more information.

Method

1. Review with students what they observed in their decomposition chambers in Activity 6.2. Ask: Which items decomposed quickly? Which items did not decompose?

2. Remind students that food put in a landfill does not break down as quickly as the food in their decomposition chambers. When food in landfills does break down, it emits a harmful gas called methane that contributes to global warming. Tell students to name other reasons why food waste can be harmful.

3. Have students explain what organisms are breaking down the food in their decomposition chambers. When they mention worms, explain that there is a special species of worm that people often use for indoor composting. Red wigglers process food waste efficiently, speeding up the process of decomposition. The worms digest the food waste and bedding, leaving behind a nutrient-rich material called castings (worm poop) that can be used when planting in a garden. Red wiggler worms also reproduce quickly, which allows for more worms to eat more food.

4. Create a classroom compost bin by layering half of the shredded newspaper into the plastic bin and laying the worms on top of the newspaper. Layer the food scraps on top, followed by the other half of the newspaper. The worms will
begin to eat away at the newspaper and food scraps within a day or so. Explain to students that worms’ bodies are light-sensitive meaning the worms should be buried under the layers of food scraps and newspaper to avoid the light. Remember to keep the bin closed to avoid letting in light or attracting flies.

- Have students research which food items are appropriate for the red wigglers to eat. Make and display a list.
- Talk with your principal and food service director to determine whether or not students can bring food from the cafeteria into the classroom compost bin. Snacks eaten in the classroom can be composted, as well as breakfast or other items that students bring into the classroom.
- If appropriate, have students make posters advertising the compost bin and encouraging fellow students to use it for food disposal.

**Extensions**

- Develop a composting system for your school. Explain to students that they can work towards reducing the school’s food waste by making a worm compost bin for multiple classrooms. For assistance, visit compost.css.cornell.edu, or contact Seven Generations Ahead at act@sevengenerationsahead.org.
- Conduct student research projects to learn more about worms. Earthworms are beneficial organisms for growing food on farms and gardens. In many parts of the country, however, earthworms are an invasive species that damage forest floors. Have students write essays on the benefits and drawbacks of having worms in our ecosystems.
Lesson 7:
School and Community Gardens
Background

School gardens, whether window, container, or outdoor gardens, enhance the emotional, social, and physical health of schools. Living plants in schools have been shown to increase information retention by students and staff. Living gardens also help teachers of all subjects provide hands-on learning experiences that expose their students to the joys of growing food. Working with and learning about living gardens can incorporate math, science, social studies, and literature in an alternative setting. Students who work in a garden are able to learn the parallels of basic human and plant needs and draw connections from plant life to their own bodies.

Method

Big or small, a garden can be any place a person decides to grow food or ornamental plants. Students will begin to understand that in an urban environment where space is limited, a garden simply means a space where we take care of plants. In this lesson, students will be able to relate the needs of their bodies to the needs of plants and understand that plants are living beings that respond to their environment, in positive and negative ways. Students will learn what to consider when designing a garden space, including space, maintenance, and community needs, and will plan their own garden. The students will begin a discussion about where support can come from in their neighborhood and how to ask for help from their community.

Discussion/Verbal Exploration

1. What gardens do you notice around the school or in your neighborhood? What do these gardens look like?
2. What are the key elements and conditions that make a successful school garden?
3. How can you contact these people for help to create your own garden?
4. What is required for ongoing garden maintenance?
5. Start a conversation about the basic requirements of creating a garden space. Have students brainstorm five basic requirements (in addition to space and plants) to get a garden started.
ACTIVITY

45-60 Minutes

Grades 5-8

- Students will learn that gardens take many forms, indoors and outdoors.
- Students will learn what to consider when designing, planting, and maintaining a garden.

- Plan a Community Garden worksheet (one per group)
- Activity 7.1.1 Garden Bed Design worksheet (one per group)
- Art supplies (crayons, markers, pencils, pens, glue, scrap paper, construction paper, scissors)
- Magazines—specifically gardening, housekeeping, food, and outdoor magazines

Summary

Students plan a community garden.

Background

The official motto of Chicago is *Urbs in Horto*, Latin for “City in a Garden.” The many forms a garden can take are as diverse as the city’s population. A garden may be several containers of vegetables on a back porch or a rooftop. A garden might be a corner lot on community-owned land. A garden might be located at a school, church, community center, food pantry, housing development, or in a truck!

When considering planting a community garden, taking the community and the needs of that community into account must be part of the conceptual process. By thinking about their own community’s needs, students will be able to use the concept of the garden to improve access to fresh produce, enrich a sense of community, and beautify community space.

Method

1. Assemble materials for the activity.
2. Introduce the activity by asking the students what community means to them. Create a word cloud on the board with community as the center and students’ ideas about meaning as the branches. Then ask the students what some of the needs of a community are and add those to the board.
3. Tell the students they will be creating a community garden. Have them split into groups of two to five, depending on the class size. Give each group a copy of the Plan a Community Garden worksheet.
4. Read the instructions of the Plan a Community Garden worksheet to the class. Remind students that considering all suggestions and ideas can help a cooperatively built garden succeed.
5. Allow students 35–40 minutes to come up with a garden concept to present to the class.
6. Students can use the Garden Bed Design worksheet to help plan their garden.
7. Use the remaining time after project completion for presentation and discussion of ideas and garden concepts.
8. Optional: Present the project as a contest and have the class vote on a favorite garden.
Sources

Truck Farm Chicago http://www.truckfarmchicago.org
Kitchen Garden Planner, Gardener’s Supply. www.gardeners.com

Extensions

Have students research, discuss, and compare at least three different farming models and methods. Students might choose from the following: organic, sustainable, conventional, large-scale, small-scale, no-till, biodynamic, hydroponic, and aquaponic farming.
PLAN A COMMUNITY GARDEN

The city gives you permission to create a garden in a location of your choice. Using the materials and information from class, imagine a concept for this garden. You may draw, write, or build a model to demonstrate your concept. Complete the following prompts as a guide through the process:

Garden Name: __________________________________________

WHERE: Where will you locate your garden? You might choose a specific neighborhood, or a different public site in your city.

________________________________________________________________________

________________________________________________________________________

WHO: Who will you involve in your garden planning process? Think of different groups of people, including friends, neighbors, community leaders, and people at your school.

________________________________________________________________________

________________________________________________________________________

WHAT: As you conceptualize your garden, consider these three Ps:
What will you plant? (vegetables, fruits, ornamental plants)

________________________________________________________________________

________________________________________________________________________

What will you produce? (food, health benefits, community benefits)

________________________________________________________________________

________________________________________________________________________
What will your garden provide? (community gathering space, a safe place, making neighborhood more visually appealing, a place to learn and teach)

**WHY:** Why did you choose the type of garden you did? Why did you choose to plant the things you did? Why do location and community needs affect your decisions?

**HOW:** How will your garden benefit the community? How will you maintain your garden?
### Vegetables and Herbs

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<td><strong>Hot Peppers</strong></td>
<td><strong>Kohlrabi</strong></td>
<td><strong>Collard Greens</strong></td>
<td><strong>Kohlrabi</strong></td>
<td><strong>Basil</strong></td>
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<td><strong>Arugula</strong></td>
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<td><strong>Garlic</strong></td>
<td><strong>Cauliflower</strong></td>
<td><strong>Carrots</strong></td>
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<td><strong>Turnips</strong></td>
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*Linking Plants and Food: A Curriculum Toward Sustainability*

*Activity 7.1.1 Garden Bed Design Worksheet*
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Activity 7.1.1: Garden Bed Design Worksheet
**ACTIVITY**

**Summary**

Students prepare a presentation for a mock school board that describes the benefits of school gardens.

**Background**

School gardens provide a variety of benefits for the school community. As Barbara Yost describes in her article “Benefits of Gardening for Children,” school gardens can encourage social skills, better attitudes towards learning, higher academic achievement, healthy eating habits, and improved self-efficacy. In this lesson, students read Yost’s article, which aggregates results from research at multiple institutions regarding the benefits of school gardens. Students will prepare a presentation on how a garden would benefit their school. Students can present the ideas to a mock school board, made up of several teachers and the school principal. (Teachers should consult prior with principal to set up presentation time to school PTA, principal, or other interested parties.) Alternatively, students can give presentations to their class.

**Method**

1. Lead a Think, Pair, Share activity with your students. Write the following question on the board: How do school gardens benefit the school community? Give students three to five minutes to think of answers independently, writing their ideas on a piece of paper. Then have students pair with classmates to discuss their ideas. Finally, have each student in the class share one of their partner’s ideas. Keep a list on the board.

2. Tell students to keep these ideas in mind as they read the article “Benefits of Gardening for Children.” Hand out copies of the article. Explain to students that many studies have addressed the question, How does gardening help children? The authors of this particular article surveyed many of these studies, and provided a summary of what they found in this article. As students read, they should underline each idea that supports how gardens benefit children.

3. After students have finished reading the article, have several volunteers share some of the ideas that surprised or excited them.

4. Briefly explain to students that the school board oversees the financial affairs of your school district. In order for a new project—such as a school garden—to be approved by the school board, an individual or group must present the project to the board, and explain how it benefits the school.

5. Tell students that they will learn about this process by presenting a project to a mock school board made up of the principal and several teachers or classmates. (Modify this description according to which adults are participating.)
at your school.) Students may choose to work alone, or in groups of two or three, to prepare a presentation for the mock school board that outlines the benefits of school gardening for children. They can use the article as support for their presentation. Encourage students to research some of the ideas from the article further, in order to provide more details during their presentation.

6. Students may present in a number of ways. Brainstorm ideas about how presentations are made. Ideas may include PowerPoint presentations, lectures, commercials, role-play, posters, brochures (explained verbally), and videos. Presentations should be limited to seven minutes.

7. Tell students that they will practice their presentation with one other group, who will ask follow-up questions and provide critiques. They will then present to the mock school board the next day. Make sure students know the specific days they will be presenting.

8. While explaining the assignment to students, give tips on giving a successful presentation, including engaging the audience, making eye contact, and speaking with confidence.

9. Hand out the Mock School Board Presentation worksheet to each group and read through the directions together. This will guide the students as they prepare their presentations.

10. Instruct groups to complete the worksheet and receive teacher approval before beginning their projects.

Sources

Fresh from the Farm Resource Center. https://sites.google.com/site/sgafff/
Funding/Grant Information


Extensions

Funding may be available at your school for a school garden. Speak with your principal to find out. If budget funds exist, speak with your students about taking on this project. If possible, present a class plan to the school board. See the School Garden Wizard (www.schoolgardenwizard.org) for advice on planning a school garden, or contact Seven Generations Ahead (act@sevengenerationsahead.org).
Mock School Board Presentation

List the ideas you will focus on in your presentation. Each idea should in some way answer the question, How do school gardens benefit children? If you are only focusing on one or two ideas, make sure to provide more details than just a sentence.

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What method will you use for your presentation?

________________________________________________________________________

________________________________________________________________________

What materials do you need for your presentation?

________________________________________________________________________

________________________________________________________________________

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________________________________________________________________________

Make sure each person in your group has a task. List the tasks here, and who will be in charge of them.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Large projects often have multiple steps. Keep in mind that you have three days to finish this project. Decide in advance which steps you need to complete to prepare your presentation. Write down a rough timeline of when you will accomplish each step.

**Finished by:**

(Example) Step 1 *Write script for role-play.*  
*Tuesday*

Step 1 ____________________________

Step 2 ____________________________

Step 3 ____________________________

Step 4 ____________________________

Step 5 ____________________________

Step 6 ____________________________

Step 7 ____________________________
Benefits of Gardening for Children

Gardening provides different forms of engagement for children, including designing, planting, and maintaining gardens; harvesting, preparing, and sharing food; working cooperatively in groups; learning about science and nutrition; and creating art and stories inspired by gardens. The studies summarized below have been selected because they include control groups, pre- and post-measures, well controlled correlations, or in-depth qualitative analyses. For more studies, see Blair (2009), “The child in the garden: An evaluative review of the benefits of school gardening.”

**Studies**

**Healthier Eating and Nutrition**
Children who grow their own food are more likely to eat fruits and vegetables (Bell & Dymet, 2008; Libman, 2007; Lineberger & Zajicke, 2000; Morris, Neustadter, & Zidenberg-Cherr, 2001; Pothukuchi, 2004) and to show higher levels of knowledge about nutrition (Canaris, 1995; Koch, Waliczek, & Zajicke, 2006; Pothukuchi, 2004). They are also more likely to continue healthy eating habits throughout their lives (Morris & Zidenberg-Cherr, 2002). Eating fruits and vegetables in childhood has been shown to be an important predictor of higher fruit and vegetable consumption in adulthood, which can help prevent or delay chronic disease conditions over a lifetime (Heimendinger & Van Duyn, 1995).

**Positive Social and Interpersonal Skills**
When third to fifth grade students who participated in a one-year gardening program filled out a survey of life skills, they showed a significant increase in self-understanding, interpersonal relationship skills, and ability to work in groups compared to nonparticipating students (Robinson & Zajicke, 2005). Qualitative surveys of 52 second and third grade students working in a community garden classroom program in San Antonio revealed that participants were likely to have positive bonding experiences with their parents and other adults (Alexander, North, & Hendren, 1995). Children who garden are more accepting of others who are different from themselves (Dymet & Bell, 2006; Eames-Sheavly, 1994), a finding consistent with research that indicates that community gardening projects “grow” community (Glover, 2004).

**Science Achievement and Attitudes Towards Learning**
Students who are actively engaged in garden projects tend to enjoy learning and show improved attitudes towards education (Canaris, 1995; Dirks & Orvis, 2005). Third, fourth and fifth grade students who participated in school gardening activities scored significantly higher on science achievement tests than students who did not experience any garden-based learning activities (Klemmer, Waliczek, & Zajicke, 2005). Parent involvement, shown to enhance student achievement (Henderson & Mapp, 2002), increases at schools with garden programs (Alexander, North, & Hendren, 1995; Dymet & Bell, 2008).

**Self-Efficacy and Enhanced Stewardship**
The process of gardening gives empowering experiences. Students engaged in designing and maintaining gardens...
Lesson 8:
Farm to Fork
Linking Plants and Food: A Curriculum Toward Sustainability
Lesson 8: Farm to Fork

Background

Eating locally grown food impacts the environment, the economy, and personal health. The food itself has traveled fewer miles by truck or plane, and will, ideally, be fresher, tastier, and less damaged than food grown far away. Many fruits and vegetables that are grown hundreds of miles away are harvested before they are ripe, and are ripened during transportation with the help of chemical sprays. Foods purchased from small, local farms are less likely to be grown using pesticides and chemical fertilizers.

Method

This lesson helps students understand the complexity of the food system and weigh the pros and cons of purchasing food from various distances. Students will begin to understand the steps required to get food they eat every day from where it is grown to their plates. They will investigate what transportation miles are and how this distance affects the nutritional integrity of their food. Students will also begin to understand the importance of a local economy and how it can affect a neighborhood’s overall physical and financial health.

Discussion/Verbal Exploration

1. Where do you buy your food?
2. Where do you think that food comes from?
3. Where is the closest farm to our school? Does any food in our cafeteria come from that farm?

Sources

Community Alliance with Family Farmers (CAFF), Farm to School Program. www.caff.org
ACTIVITY

45 Minutes

Grades 5-8

• Students will understand the process involved in the farm-to-consumer cycle.
• Students will discuss the economic impact of food purchased from local versus distant farms.
• Students will understand the impact of distance and transportation on the food supply in terms of quality loss, nutrient loss, and increased energy consumption.

• Role-playing cards with the following labels: apple, farmer, consumer, grocer, packager, trucker, factory worker, and second trucker
• Ten fake dollar bills

Summary

Students consider the complexity of the food system, as well as the pros and cons of purchasing food during different times of year and from different types of vendors.

Background

The food we eat, whether whole foods such as fruits and vegetables, or processed foods such as boxed soup mix, goes through a process of planting, growing, harvesting, processing, distributing, and consumer purchasing. This process is called the food system and varies in length depending on the food in discussion. Whole foods go through a shorter process than processed foods.

Method

1. Ask for nine volunteers to participate in a role-playing game. Assign each volunteer one of the role-play cards. Give fake money to the consumer.

2. In the first role-play, line up the apple, consumer, and farmer. Tell the apple that it will be sold at a farmers market. Tell the consumer to give the farmer all of his money. The farmer then gives him the apple. Ask students to stop and consider the transaction.
   
   Ask: What just happened in this scenario? What can the farmer now do with his money? How many people did the apple have to travel through to get to the consumer?

3. In the second role-play, line up the apple, farmer, consumer, trucker, and grocer. Tell the apple that it will be sold at a grocery store because it is the middle of winter. Before the apple can get from the farmer to the consumer, however, it must be shipped via the trucker to the grocer. Have the consumer give all his money to the grocer, who then in turn gives half the money to the trucker. The trucker then gives half his money to the farmer. Ask students to stop and consider what just occurred.
   
   Ask: How much money does the farmer have now? What can he do with his money? How much does the trucker have? What would happen if the consumer bought the apple during the fall, when apples are in season?

4. In the third role-play, line up all the volunteers. Tell the apple that it will be purchased in the form of an apple-flavored cereal. Before the apple can get from the farmer to the consumer, however, it must be shipped via the trucker to a factory, where it will be transformed into cereal, packaged by the packager, put in a box by the factory worker, and shipped by a second trucker to the grocery store. Have the consumer give all his money to the grocer, who in turn gives half the money to the first trucker, who gives half the money to the
factory worker, and so on, until the remaining money reaches the farmer. Ask students to stop and consider this scenario.

**Ask:** How much money does the farmer have now? How is this different from when the consumer bought a fresh apple in the fall?

5. Have students brainstorm a list of other packaged foods that would have similar production to consumption cycles.

6. Finally, have a discussion about the nutritional qualities of the fresh apple versus the trace remains of an apple in the packaged cereal. Encourage students to consider the importance of eating fresh, whole foods whenever possible.

**Sources**

Community Alliance with Family Farmers (CAFF), Farm to School Program. www.caff.org

**Extensions**

- Students research farmer salaries online and create a monthly budget for a farm family of two parents and three children in grade school. The family farm is 100 acres of a crop of your choice. *How comfortable is their lifestyle? Are they able to save?*

- Compare the nutrition labels of processed apple sauce to a whole apple (search for “apple nutrition facts” in any online search engine). *What are the differences? What are the similarities? Is one better than the other? Why?*
Summary

Students consider the complexity of the food system, as well as the pros and cons of purchasing food during different times of year and from different types of vendors.

Background

Eating locally grown foods impacts the environment, the economy, and personal health. The food itself has traveled fewer miles by truck or plane, and will, ideally, be fresher, tastier, and less damaged. Many fruits and vegetables that are grown hundreds of miles away are harvested before they are ripe, and are ripened during transportation with the help of chemical sprays. There is less of a need to use pesticides and chemical fertilizers on foods harvested from small, local farms. Pesticide use depends on the individual farm and can be found by researching the information via phone call or website of the farm.

Purchasing produce from local farms keeps money in the local economy. When a consumer in Chicago purchases a green pepper grown in California, the green pepper first must be harvested by a farmer, then delivered by a trucker, and finally sold by a grocer. When locally grown green peppers are purchased from the farmer who grew them, the consumer’s dollar goes directly to the farmer, ultimately supporting the local economy.

Purchasing food locally also decreases the chance that the food will have been sprayed with pesticides and chemical fertilizers. Pesticides and chemicals are typically used to aid the growing process; however, they are harmful to our health*.

This lesson helps students understand our complex food system, and weigh the pros and cons of purchasing food from various distances.

*Pesticide use depends on the individual farm. Contact a specific farm for more information.

Method

1. Hold up a piece of fruit and ask students to guess where the fruit was grown. Ask a student to look at the sticker to confirm the location.

2. Find the location on a map. Calculate the distance the food traveled from its original location to your city and record this number on the board.

3. Give each student or small group another piece of fruit. Ask students to read the produce stickers and determine how far this food traveled to get to your city. Each group should put a thumbtack on the map at the front of the classroom. Groups should also measure how many miles their food has traveled using map scales on the small maps in front of them.
4. Name the closest fruit or vegetable farm near your city. Calculate the distance from your city to the farm and write this on the board. Ask students how many miles the fruit or vegetable would have traveled if it were grown at this farm. Compare the distances.

5. **Ask:** What do you think happens to the fruit or vegetable when it travels from a far away state to your city? Allow time for students to offer ideas.

**Extensions**

- Challenge students to plan a menu with the fewest food miles.
- Have students track their food miles for one day. Take note of foods that give inadequate information such as a bag of potato chips or a soda—where do all ingredients come from?
Summary

Students learn which fruits and vegetables are grown within 300 miles of their community. Consider teaching the second half (Games 1 and 2) of this activity outside considering the use of buckets of water and the need for space to move.

Background

In this lesson, students learn the definition of locally, or regionally, grown foods, which is generally considered to be food grown within 300 miles of a community. For a list of which foods are grown locally in your area, visit your state’s university extension website and search for a harvest calendar. This calendar should show all the crops that grow in your area. Use this as a guide when helping students explore which fruits and vegetables are grown locally.

This lesson asks students to focus on the nutritional benefits of eating locally. Local foods are often more nutritious than others for the following reasons:

1. The longer distance a food travels, the more nutrients it loses before reaching the market.
2. Small local farmers are able to choose crops that focus on nutrition, taste, and seasonality rather than durability, since their foods do not travel far to markets. Small farmers are also able to plant more diverse crops that they rotate each year, resulting in more nutritious produce.
3. Local produce is handled by fewer people and fewer machines, decreasing the likelihood of contamination, damage, and nutrient loss.

Method

1. Ask students for a definition of the word local. Write down possible definitions on the board. Then ask students to apply the word to food. Ask: What is the definition of local food? Engage the students in a discussion that answers the following question: How close to your town should food be grown to be considered local? Tell students that food experts often disagree on what constitutes local food, but a general rule is that food grown within 300 miles of a community is considered local. Explain that the opposite of locally grown is often referred to as conventionally grown.
2. Tell students to consider what factors affect where a particular crop can be grown. Ask: Why can oranges grow in Florida but not Minnesota? Explain that different plants need different temperatures, amount of rainfall, amount of sun, and types of soil.
3. Write the words Locally Grown on one half of the board, and Conventionally Grown on the other half.
4. Give each student one food picture. Have students consider the temperature, amount of rainfall and sun, and type of soil within 300 miles of your community. Then tell them to guess whether or not their food grows locally. Have students tape their food image to the appropriate side of the board.

5. As a class, discuss which pictures were placed correctly and incorrectly. Make note of how many fruits and vegetables are available locally.

6. Tell students to brainstorm answers to the following question: Why might eating locally grown fruits and vegetables be better for your body? Explain that the farther away a food is grown, the longer it has to travel before reaching the market. Food has to be transported across the country (or world) to grocery stores before individual consumers can take it home. On the way, fresh produce loses beneficial nutrients.

7. Divide students into two groups and play two games that emphasize these concepts.

**Game 1: Nutritional Differences in Local vs. Conventional Foods**

Students stand behind buckets filled with water. One path is longer than the other, with the shorter path representing local food miles traveled and the longer path representing conventional food miles traveled. Students soak up water in a sponge, run to the opposite side bucket and squeeze water into the bucket. Do not tell students to try to get the most water in their bucket; simply instruct them to squeeze the sponge and run it to the other bucket. Students then run back, and the next student repeats the process. After the game is finished, the students look to see whose bucket has more water. The bucket with more water represents nutrients in the food: the local food bucket will have more water, representing nutrients and flavor retained, and the conventional food bucket will have less water, representing nutrients and flavor lost in transportation.

**Game 2: Local vs. Conventional Food Relay Race**

Students are split into two teams, with each team receiving the same number of fruit and vegetable pictures in a bag. (Use the same pictures from the introduction game.) One at a time, students select one picture out of the bag, and then race to the other side, placing the picture into either the conventional food basket or the local food basket. After the game is finished, the whole group will gather around and see which group sorted the pictures the most accurately.

**Sources**


**Extensions**

Visit a neighborhood grocery store and interview a store manager. Research how many items in the store are locally sourced. Interview the store manager about why this percentage of items is low or high.
Summary

Students engage in a potato toss game to demonstrate the impact of food miles in the food system.

Background

When asked where food comes from, students often answer “the store,” and when further prompted, they might answer “a farm” or “a factory.” With guidance, students can move beyond responding with one word answers and toward thinking about some of the effects of transportation inherent in the food system. This activity will help students make a connection between the challenges involved in a potato toss with the factors involved with food traveling in a food system and the amount of energy, time, and thought that must go into ensuring that the system works. Ultimately, students will realize the impact of transportation and food miles on food in the food system.

The potato toss is best carried out in an area with lots of space such as a gym, hallway, courtyard, or playground. If limited to a classroom, have students kneel or only allow them to use one hand to make it more challenging.

Method

1. Post both maps in the front of the room or somewhere they can be used as a reference.
2. Pair students off and have them form two lines facing each other, roughly one foot apart. Distribute one potato per student pair.
3. Explain to students that they will toss the potato, then take a step back, repeating this action each time they toss the potato. If any pair drops its potato, students are to sit down until only one pair remains.
4. After the winning pair is determined, have the students sit and begin the discussion by asking what they thought the activity was intended to demonstrate. Ask: As you and your partner stepped further away from each other, did it get easier or harder to get the potato to him/her? Why? Extend the discussion by asking students how much thought and energy they had to put into each toss. Ask them to compare the chances of dropping the potato when pairs were close together versus far apart.
5. Use their responses to lead into a discussion about the food system and food miles. Encourage students to refer to the maps in their responses. Ask: Do you think producers face challenges similar to those you faced in the potato toss? What challenges might a producer in the state of Washington face transporting food to Georgia? What challenges would a farmer in China face transporting food to Iowa?
Extensions


- To explore energy in food production versus energy in food transportation, read “Food Miles and the Relative Climate Impacts of Food Choices in the United States”: http://pubs.acs.org/doi/pdfplus/10.1021/es702969f.
Linking Plants and Food: A Curriculum Toward Sustainability
Activity 8.5: Banana Farmer

Summary
Students consider the benefits and costs of purchasing conventionally grown, organic, and fair trade certified produce.

Background
Consumers in the United States face an overwhelming number of choices when purchasing a seemingly simple product, such as bananas. Consumers ask themselves: Should I buy organic bananas, fair trade certified bananas, or conventionally grown bananas? What is the difference? Which bananas are more affordable and available year-round? Grocers take consumer preferences into account when making purchasing decisions for their stores. Grocers ask themselves: Which type of bananas do customers prefer? Which type of bananas are most profitable? Similarly, farmers determine their prices and farming practices based on demands of grocers, who purchase the bulk of their crops. Farmers ask themselves: What price can I expect on the market? What type of farming can I afford?

Consumers expect low prices for conventionally grown bananas. In order to make a profit, grocers pay as low a price as possible when buying these bananas from farmers. Farmers trying to make a profit producing these bananas may not be able to afford organic practices or fair wages for their workers. When grocery stores sell organic or fair trade certified bananas—which tend to be more expensive—consumers may consider the price too high and not purchase them or shop elsewhere. This lesson engages students in a role-play in which they consider the multiple factors that affect which foods end up in our grocery stores.

Method
1. Ask students to define the following concepts: conventionally grown, organic, and fair trade certified. These definitions can be found in the glossary in the student workbook. Write the definitions on the board. Have students brainstorm reasons why a farmer would choose to grow foods using those practices. Similarly, ask why grocers would choose to stock foods that were conventionally grown, organic, or fair trade certified.

2. Choose one to three students to play the role of grocery store owners. Divide the remaining students into three groups. Hand out one Banana Farmer Profile card to each group.

3. Tell students that the grocers are hoping to find a new farm from which to purchase their bananas every year. The grocers’ decision could result in a lot of money for the farmer who is chosen. Each group will try to convince the grocers that its bananas are the best choice for the store.
4. Students should read their Banana Farmer Profile and prepare a commercial that they will present to the grocers and the other farmers. The grocers will then discuss the pros and cons of each farmer and choose a winner.

5. Allow time for discussion at the end of the role-play. **Ask:** Which type of farmer does Farmer One, Farmer Two, and Farmer Three represent? How can you tell?

**Extensions**

Research other food items that can be purchased fair trade or organically. Have students create a poster about the benefits of purchasing this item organically or from a fair trade organization.
Banana Farmer Profiles

Farmer One:
You are a farmer in Costa Rica. Your farm grows all different kinds of fruits and vegetables, including bananas, oranges, pineapples, and coffee. You know that growing diversified crops is healthier for the soil than growing just one crop in your soil. Because your farm is so big and grows many different kinds of food, you need lots of workers. You pay your workers a fair hourly wage, because you know that they work long hours and need to support their families. Because so much money goes towards paying your workers a fair wage, you need to charge a little bit more for your bananas when you sell them. Therefore, your bananas cost 99 cents per pound.

Farmer Two:
You are a banana farmer in Costa Rica. Your farm is 100% organic. You do not spray any pesticides or chemical fertilizer on the plants you grow, which means dangerous chemicals will not get into the plants that people eat. Organic practices also keep chemicals out of the water supply and help the soil stay healthy because the good insects and worms are not killed by chemicals. Because you do not use chemicals, you need to hire more people to remove the pests on the plants by hand. In order to earn the money you need to pay your workers, you need to charge more for your bananas. Your bananas cost $1.10 per pound.

Farmer Three:
You are a banana farmer in Costa Rica. You grow only bananas on your plantation, which is not very good for the soil but is less expensive and easier because you only have to buy one type of machine to harvest them. It is much cheaper for you to use pesticides than it is to pay workers to remove pests from plants. You use chemical fertilizers to help the plants grow but try to use the products with the fewest harmful chemicals in them, because you are worried about your customers getting sick. So far, you have not had any problems growing lots of bananas, and you are not spending too much of your money on workers’ wages or farm equipment. You are able to sell your bananas for a very low price. Your bananas cost 70 cents per pound.
Lesson 9:
Local Access
**Background**

Living a healthy lifestyle includes many things—a balanced and nutritious diet, exercise, health education, and support. But it is not always as easy as just knowing these things are better for a person; sometimes living a healthy lifestyle versus not is a matter of having access to these things. Roadblocks to a healthy lifestyle can include a lack of neighborhood security, which can impede exercise or food access; inconsistent or unavailable transportation to grocery stores; high cost of healthy food; and lack of knowledge of how to cook healthy meals.

Examining the accessibility of healthy food options in a neighborhood can help people understand how to take advantage of or improve those options. Grocery stores are not the only way to acquire healthy foods. Corner stores, mobile food delivery companies, food banks, local farms, and farmers markets are all examples of different food procurement options. The availability of these places varies from neighborhood to neighborhood, but learning about the options can help people make healthy choices.

**Method**

This lesson asks students to research and discuss food deserts and their impact on communities. Because the concept of a food desert may be new to many students, allow time to define and discuss the concept. Expand the discussion to consider why food deserts are problematic.

**Discussion/Verbal Exploration**

1. *Where do you buy your food?*
2. *What is a desert?*
3. *How might you explain the concept of a food desert to a person who has never heard of the term?*
4. *Why are food deserts a problem?*

**Sources**

ACTIVITY

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**Summary**

Students discuss food options in their neighborhood.

**Background**

Healthy food access can improve the health of a neighborhood, and lack of it can cause more problems than poor physical health. Often times neighborhoods with poor access to food options have higher crime rates, are lower-income, and have a higher possibility of slipping into poverty. Sometimes poor food access is the cause and sometimes it is the effect. Neighborhoods that have distant grocery stores, or no grocery stores at all, are known as food deserts. Food deserts are located in predominantly low-income areas, whose residents often lack access to reliable and affordable transportation. Consequently, many people who live in food deserts rely on fast food restaurants and corner stores as their main food options. Discussion and analysis of local options, whether fast food or a local farm, can give students an understanding of the strengths and weaknesses of a neighborhood’s healthy food availability.

**Method**

1. Divide students into two groups. Have one group form a circle, facing outward, with students standing about a foot apart from each other. Have the second group form another circle, outside the first circle. Students in the second group should face the students in the first group, creating two concentric circles. Each student should be paired with another student.

2. Read one of the discussion questions (listed below) aloud. Have students discuss the question with their circle partner for two to three minutes.

3. When time is up, instruct the outer group of students to rotate two people to the right.

4. Pose another question for this pair. Next instruct the outer group to rotate five people to the left.

5. Repeat rotations for additional questions.

6. After all discussion questions have been addressed, have students consider how food options affect residents’ overall health. Tell students to list as many ways health is affected by food options as they can. Write the list on the board.

**Pinwheel Discussion Questions**

- Where do you go in your neighborhood to eat or buy food?
- Do the places you go to eat or buy food in your neighborhood offer healthy food options?
- What establishments are you happy that you have in your neighborhood? What places support a healthy lifestyle?
Activity 9.1: Pinwheel Discussion

- Are there places in your neighborhood that do not encourage a healthy lifestyle?
- In your neighborhood, what would you like to see change in terms of food options that would promote healthy lifestyles?

Sources


Extensions

Research the obesity and diabetes rates in your neighborhood. Do they seem high or low? If high, what are some possible solutions?
ACTIVITY

Time Allotted
60 Minutes

Target Audience
Grades 5-8

Objectives
• Students will identify places in their neighborhood that offer healthy foods.
• Students will compare their neighborhood food establishments to those available in surrounding areas.
• Students will plan a meal of healthy foods sold at neighborhood food establishments.

Materials
• Map of the neighborhood surrounding the school
• Access to addresses of restaurants, grocery stores, and markets in the neighborhood
• Large chart paper
• Markers

Summary
Students map various food options in their community.

Note: A review of Activity 9.1 is helpful for this activity.
Teachers may want to teach Activity 9.1 first.

Background
Discussion of healthy neighborhood food options can lead to a critical analysis of the number and location of food options available to local families. Locating grocery stores, restaurants, markets, and corner stores on a map and exploring the healthy food that may or may not be offered at each location will provide information on where to find healthy options. Use these discussion questions to promote deeper analysis of the data students acquire: Are there bus or train stops near grocery and corner stores? Why is this important? Which areas of your community are farthest from grocery stores—how would people get there? What is the population of your community? Do you think there are enough food locations to serve everyone? What kind of healthy options are available in food stores? Do you think residents know how to prepare their groceries into a healthy meal?
This activity asks students to discuss the food options in their neighborhoods and consider how those options do or do not support healthy lifestyles.

Method
1. Refer to the Pinwheel Discussion in Lesson 9.1 to start a class discussion. Have students recall the list of the places they identified as healthy food options and unhealthy food options. Write the list on the board. Tell students they will use this list to map food options in their neighborhood.
2. Draw a map of your students’ neighborhood on large chart paper. In pairs, students should look up the address of one of the establishments on the list. Students can use a phonebook, a Google map, or another resource. Pairs should also discuss what types of healthy foods are offered.
3. Have students work together to draw places on the map where they can purchase food, including healthy and unhealthy food. Include restaurants, farmers markets, grocery stores, small markets, fast food chains, and independent bakeries and delis.
4. Display the map in front of the class. Have students reflect on the number of healthy food options in their neighborhood.
5. Have students compare their findings to other places that have a different residential population. Ask: What are the differences between food options in this neighborhood compared to neighboring areas?
6. Tell students to apply what they have learned in plotting neighborhood food establishments to plan a menu of healthy food options. Encourage students to share their menus with each other.

**Sources**


**Extensions**

- Plan a short visit to each food establishment and have students document prices of a variety of food items. Compare and contrast similar food items from different establishments. *What does this data mean?*
- Invite a local food hub leader to speak about their hardships and successes. A food hub is a central coordinator of supply chain logistics that offers a variety of services that benefit small and midsize producers. Students should create a list of questions for the speaker before the presentation and during the presentation.
Lesson 10:
My Food Culture
Background

Culture and food are interrelated social components of every society. Culture and food are also related to a region and the kind of food that can grow there. Today, globalization influences culture and food in many ways. Foods that were not available to our ancestors because of distance are available to us. Globalization also makes it possible to ship food halfway across the world to feed hungry people. Analyzing why we eat what we do, what our neighbors eat, and what our ancestors ate helps us understand our own culture better. Analyzing what other cultures eat can encourage understanding of cultural diversity among students.

Method

This lesson examines food culture within a community and also explores why we eat what we do. Students will research different food cultures within their community while examining the concepts that connect and differentiate food cultures. Students will also research the economic impacts of local versus chain restaurants in their neighborhood.

Discussion/Verbal Exploration

1. What types of food do all cultures eat? What types of foods are limited to one or a few cultures?
2. Why are there similarities and differences between food cultures?
3. What foods grow in our climate?
4. Are there many fast food restaurants in my neighborhood?
5. What does “global food market” mean?
**ACTIVITY**

60 Minutes

Grades 5-8

- Students will explore and explain their own food culture.
- Students will tie their own food culture back to the broader community.
- Students will understand the link between food culture and what is grown in different regions of the country and the world.

**Summary**

Students research the history and cultural significance of a traditional family food.

**Background**

Food not only provides us with nourishment and sustenance, but also ties us together culturally and socially. In this activity, students investigate foods that their families traditionally eat. Everyone has a food culture, whether it is a meal eaten on religious holidays or just a favorite recipe.

**Method**

1. **Ask:** What is the purpose of food? Have each student write down three answers to this question on an index card. Then, have students share their answers in groups of four. Each group of four should then write their answers on the board. See how long the list is, and which ideas are repeated. Students may brainstorm that food in our society contributes to one or more of the following:
   - Nourishment
   - Cultural Exchange
   - Religious Tradition
   - Flavor Enjoyment
   - Social Gatherings

2. Have students share one way that food is involved with a tradition in their family. It can be through a religious ceremony or holiday, or a routine their family members have (e.g. “Every Sunday we eat breakfast as a family”).

3. Tell students that they will be in charge of researching the cultural history of one type of food that their family frequently eats. The food can be a specific dish (such as Pad Thai) or a single food item (such as eggplant). Tell students that specific foods will be easier to research than broad categories (such as rice or pasta). Using the Internet, books, and interviews with family members, students should choose one type of food and answer the following questions.
• In which countries or regions of the world is this food typically eaten?
• Where is this food (or its ingredients) grown, and in what season?
• Is the food associated with any cultural events, religious holidays, or other ceremonies?
• How is this food made? Is it typically made in a factory or by hand? Find a recipe.
• How does your family incorporate this food into its traditions? How long has your family been eating this? Why did you begin to eat this food? Who typically makes this dish in your family?

4. Students should present their findings in a creative format, such as a poster, commercial, a PowerPoint presentation, or an oral report. As students present, have them put a thumbtack on the map where their food originates, and mark on the chart paper in which season their food is typically grown.

5. Point out what foods students have in common.

6. If possible, have students bring in samples of their cultural dishes to share.

7. After the presentations, ask students to reflect on the question: What factors affect our food culture? Answers may include seasonality, religious tradition, ancestor origin, and the price and availability of certain foods.

Extensions

• Have a “Food Night” with your students’ families. Each family can bring in a dish their family enjoys eating. Encourage families to bring in the recipe, and collect the recipes to copy and send home with students. Alternately, have a “Food Day” with students during school following the same guidelines. Depending on your school’s food regulations these activities may or may not be possible.

• Watch the PBS documentary The Meaning of Food and hand out student worksheets, found on the website (http://www.pbs.org/opb/meaningoffood/classroom/pop-student_worksheet.shtml), for them to complete.
Summary

Students learn that while cultures across the world have many differences, they also have some similarities, such as eating bread as a staple food.

Background

Bread is one food that almost all cultures eat. Different variations of bread around the world include baguettes in France, focaccia in Italy, soda bread in Ireland, naan and roti in India, dark rye bread in Russia, tortillas in Mexico, pandesal in the Philippines, and mantou in China. In this activity, students learn which regions of the world produce various types of grains and will connect these grains to the types of bread made in different regions.

Note: Be careful to avoid stereotypes when discussing these concepts with students. The world contains many different cultures, and there is much variation within each country and each culture. Redirect statements such as “All Mexicans eat tortillas,” and remind students that people’s tastes and traditions vary within every culture.

Method

1. Ask students to volunteer names of foods that are eaten in various countries. Examples include rice and beans in Mexico, sushi in Japan, and noodles in Thailand. Remind students that people in these countries eat more than these foods, because all countries are made up of diverse groups of people with diverse tastes and traditions.

2. Tell students that bread is one food that is eaten in virtually every culture across the world. On the board, make a list of types of breads that students associate with particular regions of the world. As students come up with ideas, label them on the map.

3. Explain that various regions of the world produce certain types of grain, depending on the area’s climate and population. Divide the class into four groups. Assign each group a region of the world on a map (e.g. northwestern, northeastern, southwestern, and southeastern regions). Each group is responsible for researching the grains that are grown in its region and then locating them on a map. Students should write their findings on small note cards and use thumbtacks or magnets to attach them to the map.

4. Student groups should present their findings. Tell students to make comparisons between the grains grown in various regions and the types of bread most popular there.

5. Tell students to reflect on why it is important to understand commonalities among cultures. Have students write responses in journals or have a class discussion.
Sources


Extensions


• If possible, bring in samples of bread from a market that offers different kinds. Have students compare and contrast.

• Bake bread with your students.

• Investigate the cultural history of bread in different countries. Ask: How did this staple food carry societies or populations through difficult times?
Summary

Students stage a debate over whether or not to build a McDonald’s restaurant in a fictitious village.

Background

While fast food chains of all types can be found in many countries, McDonald’s is often the poster child for the globalization of the American diet. McDonald’s operates 30,000 restaurants in 120 countries, which means a McDonald’s operates on every continent except Antarctica. McDonald’s opens a new restaurant every fourteen hours, and two-thirds of those are located outside the United States. Both pros and cons of the spread of American fast food exist. The restaurants provide quick, calorie-dense, and affordable food for millions of families. However, a diet high in fats and processed foods, which characterizes fast food, has been linked to the spread of obesity and type 2 diabetes in the United States and, increasingly, around the world.

Students will debate whether to open a McDonald’s restaurant in a fictitious village in a developing country. Each student will play the role of a village resident whose life experience affects his or her opinion on building fast food restaurants locally. To ensure all students take part in the debate, you may duplicate roles (see Activity 10.3.1 for role descriptions) or allow students to create their own characters.

Method

1. Tell students that you are going to show them a type of food that is becoming more prevalent in countries around the world: American fast food. Hand out the infographic “The Fries that Bind Us.” Allow students time to examine it, and then ask for reactions. Walk students through the map key, and ask what impressions students may have. Ask: Are you surprised to see McDonald’s and Starbucks restaurants around the globe?

2. Hand out the article “Mediterraneans Abandon their Famous Diet.” Allow time for students to read the article independently or in small groups. Tell students to write answers to the following questions:
   - What does the article consider to be “the U.S. diet”?
   - What are some pros and cons of the U.S. diet?

3. Tell students that they will stage a debate. Explain the situation:

Westin, a fictional village in a developing country, is deciding whether or not to allow the McDonald’s corporation to build two new restaurants in the village. Each of you will play a role in this community. Some of you will be village council members, who have called a meeting to hear from
townspeople on this issue. Some of you will be residents of Westin. Your character roles, assigned randomly, will inform you of your role in the community, your job (if you have one), and your feelings towards the construction of two new McDonald’s restaurants.

4. Hand out a character assignment to each student. Direct students to read and absorb their character description. If time allows, have students write a small biography of their character, in order to more deeply understand the role.

5. Set up the scene. Tell the village council members to sit at the front of the room, and direct other students to sit as audience members. Tell the moderator to read his or her introduction, and then open up the floor to council members to introduce themselves and explain their position on the issue. Audience members may interrupt with questions and comments, as long as they introduce themselves before speaking.

6. Allow ample time for the debate. When the dialogue seems to be waning, have the moderator ask village council members to give one final statement. Then all participants will cast a vote on whether or not to allow McDonald’s to build in their village.

7. After the debate and vote, ask for student reactions to the situation. Ask: Did you agree with your character’s point of view? If not, how did it feel to be playing this character? How did you feel about the voting results? Did any statements or characters in the debate surprise you? Did you change your mind throughout the debate?

Sources


Extensions

Have students read the article “McDonald’s’ Foreign Food,” available at http://www.chicagotribune.com/business/ct-biz-mcdonalds-food-around-the-world,0,5168632.photogallery, which highlights McDonald’s products that cater to local food preferences around the world. Have students write a reflection on this idea, or design their own McDonald’s menu for their culture or community.
Moderator

- As the moderator, your job is to make sure the debate progresses smoothly. Begin the debate by reading this introduction:

  Good morning community members, and a special welcome to our village council members. We are here this morning to debate a proposal from McDonald’s corporation to build two new restaurants in our community of Westin. McDonald’s wants to build one restaurant on the north side of the village, and one on the south side. Each village council member will get a chance to speak for two minutes, in an attempt to convince the community to vote for or against this resolution. Then we will open up the floor to comments from community members. Make sure to raise your hand before you speak, and I will call on you. Before speaking, please introduce yourself.

- Give each village council member the opportunity to introduce himself or herself, and allow each member two minutes to speak. After each council member speaks, open up the floor for questions and comments from the audience members. Allow room for back-and-forth discussion, but make sure everyone gets a chance to speak.

- When instructed by your teacher, end the debate by giving each council member one minute to speak. Then allow all participants to vote on the resolution. Participants should vote by closing their eyes or writing on a piece of paper, so they are not influenced by the votes of others.

- Remember, your job is to stay neutral. If necessary, you can summarize the points of each side, but do not offer your own opinion.

Village Council Member #1

- You have been a member of the village council for the past seven years and also own Woods Construction Company. You employ sixteen construction workers and are very excited about the prospect of building two new McDonald’s restaurants in Westin.

- Your company will be contracted by McDonald’s corporation to construct the buildings (both interior and exterior), as well as the parking lots. You will use the money you earn to pay your employees, who have faced a slow construction season this year, and to pay for lunches and school fees for your three children.

- Without this contract, you will have to consider letting go at least three employees this fall.

Village Council Member #2

- You are a registered nurse. This is your first year on the village council. Recently, you have become concerned about the health of the village residents. Obesity and diabetes have never been issues in the past, but lately more and more adults are seeking medical care for treatment of fatigue, heart disease, and complications from diabetes. You believe this is due, at least in part, to increased fast food consumption.

- While there has never been a fast food restaurant in your village before, many families travel to the nearby big city of Johnstown to work. While there, they purchase fast food meals for their families and bring them home at the end of the day. In informal interviews with patients, many have told you they are cooking less from scratch and eating out in the big city more.

- You are worried that McDonald’s restaurants in your village will only make health problems worse.
Village Council Member #3

- You are the oldest member of the village council and Westin’s only village historian. You are especially interested in the history of food in your village because your village has been famous for its tomatoes for hundreds of years. Most village adults are skilled at making many different tomato dishes, and these recipes have been passed down from generation to generation.

- As you conduct interviews with village residents, you have noticed that fewer children are interested in this food history. As they become busier with school and outside interests, fewer children are learning how to cook traditional foods.

- You are worried that bringing McDonald’s and other fast food restaurants into the community will only make the lack of interest in traditional dishes worse.

Village Council Member #4

- You are the village treasurer, and have long been concerned about the employment rate in the village of Westin. Only 60% of adult males are employed, and only 25% of adult females work for wages. Many village members come to you looking for work or other financial help, and you continually direct them to the nearby big city of Johnsontown.

- You fear that more community members will move out of the village to work in Johnsontown, so you strongly support the McDonald’s proposal.

- You believe that two new fast food restaurants will bring jobs for many village members, and will encourage more people to move to Westin.

Village Council Member #5

- You are the principal of the local school system. You are undecided on whether or not McDonald’s should build in the village of Westin.

- On the one hand, you know that fast food is not healthy and might put local restaurants out of business. On the other hand, you know that many of your students have two working parents who do not have time to make meals at home.

- You have decided to hear from the other villagers on the matter before making up your mind.

McDonald’s Representative

- You are a McDonald’s manager from the nearby big city of Johnsontown, hoping to open and manage two new restaurants in this small village of Westin. You have managed McDonald’s restaurants for ten years, and each year your profits increase.

- You went from working behind the counter at a Johnsontown McDonald’s, earning $4/hour, to managing two restaurants of your own. Your family was able to move to a bigger house near the city school.

- The Johnsontown McDonald’s restaurants each employ at least 30 city residents.

- You hope to bring the same number of jobs to Westin.
Parent of Four Children

- You are a single parent of four children. Your spouse died in a traffic accident on the way to the nearby big city of Johnsontown. You did not finish high school, and therefore have worked multiple part-time labor jobs for the past four years.
- Because you work most hours during the day, you have very little time to cook meals for your children.
- You are very excited about the prospect of fast food restaurants in the village. You know that these meals are cheap and quick, and will help you to feed your children and still keep your jobs.

Doctor

- You are the village doctor. You work with the nurse who is on the village council. You both have noticed a rise in adults seeking medical care for treatment of fatigue, heart disease, and complications from diabetes. You believe this is due, at least in part, to increased fast food consumption.
- While there has never been a fast food restaurant in your village before, many families travel to the nearby big city of Johnsontown to work. While there, they purchase fast food meals for their families and bring them home at the end of the day. In informal interviews with patients, many have told you they are cooking less from scratch and eating out in the big city more.
- You are worried that McDonald’s restaurants in your village will only make health problems in your village worse.

Teacher

- You are one of two teachers who teach at the Westin Village School. Because there are many village children who attend the school, you work long hours every day.
- You barely have time to cook for yourself.
- You are in support of bringing fast food restaurants to the village, because you know the meals are quick to order and relatively cheap. The time and money you save will help you focus on your job.

Restaurant Owner #1—Husband

- You and your wife own a local restaurant that serves traditional foods. Your family has run the restaurant for the past three generations, and you hope to pass it on to your son. You fear that fast food restaurants in the village will take customers away from your restaurant.
- You know that fast food meals are cheap and quick, so customers will expect similar prices from your restaurant. Due to the price of vegetables and meat in the area, you are unable to lower your prices without losing money.
- You and your wife are opposed to the building of McDonald’s.
Restaurant Owner #2—Wife

- You and your husband own a local restaurant that serves traditional foods. Your family has run the restaurant for the past three generations, and you hope to pass it on to your son. You fear that fast food restaurants in the village will take customers away from your restaurant.
- You know that fast food meals are cheap and quick, so customers will expect similar prices from your restaurant. Due to the price of vegetables and meat in the area, you are unable to lower your prices without losing money.
- You and your husband are opposed to the building of McDonald’s.

Animal Rights Advocate

- You grew up in the village, but currently attend the university in the nearby big city of Johnsontown. You study the culinary arts (cooking and food production), and hope to become a chef when you graduate.
- While taking classes, you learned about large fast food corporations and how they get their meat for hamburgers and chicken sandwiches. Most of their meat is from animals raised on factory farms where hundreds of animals are kept in close quarters, fed unhealthy diets, and slaughtered inhumanely. You have always loved animals and believe that restaurants should get their meat from humane sources.
- You oppose the building of McDonald’s in the village.

Former Mayor

- You were mayor of the village for fifteen years, but then retired to spend more time with your family. Like the treasurer on the village council, you have long been concerned about the employment rate in the village of Westin. Only 60% of adult males are employed, and only 25% of adult females work for wages.
- Many village members came to you looking for work or other financial help, and you always directed them to the nearby big city of Johnsontown. You are afraid that more community members will move out of the village to work in Johnsontown, so you strongly support the McDonald’s proposal.
- You believe that two new fast food restaurants will bring jobs for many village members, and will encourage more people to move to Westin.

Student

- You are a high school student whose father works in the nearby big city of Johnsontown. Your father occasionally brings home meals from the fast food restaurants in Johnsontown. Your mother thinks the food is unhealthy, but likes the fact that she does not have to prepare meals on those nights.
- You love McDonald’s food, and think having a nearby fast food restaurant will help your mother. You also realize that fast food meals are not healthy.
- You are undecided on the issue of allowing McDonald’s to build restaurants in your village.
**Linking Plants and Food Glossary**

**antioxidant:** a molecule that fights the harmful effects of free radicals, which attack healthy body cells

**compost:** biological process of breaking down waste into a rich, soil-like substance

**conventionally grown:** crops or products grown with the help of chemicals such as pesticides; also, crops or products grown more than 300 miles away

**cycle:** a sequence of events that is repeated periodically

**decomposition:** when an organism’s tissues are broken down by bacteria and its body’s own chemicals

**fair trade:** a relationship between a person who produces something and the person or company that purchases their product, in which the producer receives a fair price for their product

**fertile:** soil that is capable of producing crops

**food desert:** neighborhoods that have distant grocery stores or markets, or no grocery stores at all

**fruit:** the ripened, seed-bearing parts of plants (thus, any food that contains seeds is considered a fruit)

**globalization:** the removal of barriers between countries so they can more easily trade goods

**growing season:** the optimum season in which a fruit or vegetable should be sown or planted

**harvest:** the picking of a plant when it is ripe or ready for use

**harvest season:** the season in which a fruit or vegetable is at optimum ripeness and is ready to be picked

**local food:** food that is grown or produced within 300 miles

**MyPlate:** a symbol used by the United States Department of Agriculture to indicate the components of a healthy diet; the plate shows one half filled with fruits and vegetables, the other half filled with grains and protein, and a bowl or glass of dairy on the side

**nutrient:** compounds found in the environment that plants and animals need to grow and survive

**obesity:** a weight that is greater than what is considered healthy for a person’s height

**organic:** food grown without pesticides or chemicals

**organic matter:** material that has come from a once-living organism; is capable of decay, or the product of decay; or is composed of organic compounds (containing carbon)

**pesticides:** a chemical substance put on plants to kill potentially harmful insects

**photosynthesis:** the process by which green plants use the sun, water, and carbon dioxide to produce sugar (energy) for the plant; oxygen is also produced and used by animals, including humans

**sustainable:** an action or process that can be continued forever without running out of resources or significantly damaging the environment
### How does *Linking Plants and Food* meet Illinois Learning Standards?

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<td>Activity 5.4 Students will be able to conduct an experiment to answer a research question.</td>
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<td>investigations.</td>
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<td><strong>SCIENCE State Goal 12.A.2a</strong> Describe simple life cycles of plants and animals and the</td>
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<td>them live in different environments (e.g., specialized teeth for eating certain foods,</td>
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<td>thorns for protection, insulation for cold temperature).</td>
<td>Activity 2.2 and 3.1.1 Students will be able to identify how each plant part contributes to the</td>
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<td>and recycling in actual situations.</td>
<td>Activity 6.2 Students will be able to explain that composting is an effective way to reduce food</td>
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<td><strong>SCIENCE State Goal 13.B.2f</strong> Analyze how specific personal and societal choices that</td>
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<td>humans make affect local, regional and global ecosystems (e.g., lawn and garden care,</td>
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<td>mass transit).</td>
<td>Activity 5.3 Students will be able to discuss human actions that affect soil health.</td>
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<td><strong>PHYSICAL DEVELOPMENT &amp; HEALTH State Goal 22.A.2b</strong> Demonstrate strategies for the</td>
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<td>prevention and reduction of communicable and non-communicable disease (e.g., practicing</td>
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<td>cleanliness, making healthy food choices, understanding the importance of immunizations and</td>
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<td>regular health screenings).</td>
<td>Activity 4.2 Students will be able to identify the nutritional benefits of eating a varied diet,</td>
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<td>diet).</td>
<td>Activity 4.2 Students will be able to identify the nutritional benefits of eating a diet with</td>
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<td>Activity 4.1 Students will be able to identify the five food groups and understand why daily</td>
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<td><strong>PHYSICAL DEVELOPMENT &amp; HEALTH State Goal 23.C.2a</strong> Identify physical, mental, social</td>
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<td>and cultural factors affecting growth and development of children (e.g., nutrition, self-</td>
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<td>esteem, family and illness).</td>
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<td>Activity 10.1 Students will be able to research the history of their family’s food culture.</td>
</tr>
<tr>
<td><strong>LANGUAGE ARTS Grade 5 Common Core Standard</strong></td>
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<tr>
<td>CC.5.SL.1.d Comprehension and Collaboration: Review the key ideas expressed and draw</td>
<td>Activity 5.1 Students will be able to discuss the importance of preserving healthy soil.</td>
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<td>conclusions in light of information and knowledge gained from the discussions.</td>
<td>Activity 5.3 Students will be able to discuss human actions that affect soil health.</td>
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<td>Activity 6.2 Students will be able to identify how food waste can be harmful to the</td>
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<td>environment and the economy; explain why composting is an effective way to reduce food waste.</td>
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<td>is purchased locally and from distant farms.</td>
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</table>
### MATHEMATICS Grade 5 Common Core Standard
CC.5.OA.2 Write and interpret numerical expressions. Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. For example, express the calculation “add 8 and 7, then multiply by 2” as $2 \times (8 + 7)$.

**Activity 8.1** Students will be able to calculate the mileage between where food was grown and where it was purchased.

### SOCIAL SCIENCE State Goal 15.B.2a
Identify factors that affect how consumers make their choices.

**Activity 8.1** Students will understand the impact of transportation on their food supply in terms of quality loss, nutrient loss, and increased energy consumption.

### SOCIAL SCIENCE State Goal 17.B.2a
Describe how physical and human processes shape spatial patterns including erosion, agriculture and settlement.

**Activity 5.3** Students will be able to discuss human actions that affect soil health.

**Activity 8.1** Students will understand the impact of transportation on their food supply in terms of quality loss, nutrient loss, and increased energy consumption.

### SOCIAL SCIENCE State Goal 17.C.2c
Explain how human activity affects the environment.

**Activity 5.3** Students will be able to discuss human actions that affect soil health.

**Activity 8.1** Students will understand the impact of transportation on their food supply in terms of quality loss, nutrient loss, and increased energy consumption.

**Activity 8.3** Students will be able to explain the economic impact of foods purchased from local versus distant farms.

**Activity 8.1 and 8.4** Students will understand that food purchased from distant farms increases energy consumption.
**Illinois Learning Standards**

<table>
<thead>
<tr>
<th>Component</th>
<th>Standard</th>
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<tbody>
<tr>
<td><strong>SCIENCE State Goal 11.A.3a</strong></td>
<td>Formulate hypotheses that can be tested by collecting data.</td>
<td>Activity 5.4 Students will be able to form a hypothesis based on observations and previous knowledge.</td>
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<tr>
<td><strong>SCIENCE State Goal 11.A.3b</strong></td>
<td>Conduct scientific experiments that control all but one variable.</td>
<td>Activity 5.4 Students will be able to conduct an experiment to answer a research question.</td>
</tr>
<tr>
<td><strong>SCIENCE State Goal 11.A.3c</strong></td>
<td>Collect and record data accurately using consistent measuring and recording techniques and media.</td>
<td>Activity 5.4 Students will be able to describe the results of an experiment and form conclusions based on data.</td>
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<tr>
<td><strong>SCIENCE State Goal 11.A.3d</strong></td>
<td>Report and display the process and results of a scientific investigation.</td>
<td>Activity 5.4 Students will be able to describe the results of an experiment and form conclusions based on data.</td>
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<tr>
<td><strong>SCIENCE State Goal 11.B.3b</strong></td>
<td>Sketch, propose and compare design solutions to the problem considering available materials, tools, cost effectiveness and safety.</td>
<td>Activity 7.1 Students will create a visual representation of a community garden, including details on where the garden will be located, who it will be serving, what they will plant/produce/provide, why the garden is beneficial and how their garden will affect the surrounding community.</td>
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<td><strong>SCIENCE State Goal 11.B.3c</strong></td>
<td>Select the most appropriate design and build a prototype or simulation.</td>
<td>Activity 7.1 Students will plan and create mock layout of community or school garden based on research of successful garden designs.</td>
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<tr>
<td><strong>SCIENCE State Goal 12.E.3c</strong></td>
<td>Evaluate the biodegradability of renewable and nonrenewable natural resources.</td>
<td>Activity 6.2 Students will be able to explain that composting is an effective way to reduce food waste; observe decomposition of food items and compare this to decomposition of other trash items.</td>
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<td><strong>PHYSICAL DEVELOPMENT &amp; HEALTH State Goal 22.A.3a</strong></td>
<td>Identify and describe ways to reduce health risks common to adolescents (e.g., exercise, diet, refusal of harmful substances).</td>
<td>Activity 4.2 Students will be able to identify the nutritional benefits of eating a varied diet; identify the nutritional benefits of seven different colored foods.</td>
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<td><strong>PHYSICAL DEVELOPMENT &amp; HEALTH State Goal 22.A.3b</strong></td>
<td>Identify how positive health practices and relevant health care can help reduce health risks (e.g., proper diet and exercise reduce risks of cancer and heart disease).</td>
<td>Activity 4.2 Students will be able to identify the nutritional benefits of eating a varied diet; identify the nutritional benefits of seven different colored foods.</td>
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<td><strong>PHYSICAL DEVELOPMENT &amp; HEALTH State Goal 22.C.3b</strong></td>
<td>Develop potential solutions to address environmental problems that affect the local community’s health.</td>
<td>Activity 6.3 Students will be able to make a worm composting bin for their classroom.</td>
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<td><strong>PHYSICAL DEVELOPMENT &amp; HEALTH State Goal 23.B.3</strong></td>
<td>Explain the effects of health-related actions upon body systems (e.g., fad diets, orthodontics, avoiding smoking, alcohol use and other drug use).</td>
<td>Activity 4.1 Students will be able to identify all five food groups and explain the health importance of eating foods in each group.</td>
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<td><strong>PHYSICAL DEVELOPMENT &amp; HEALTH State Goal 23.C.3</strong></td>
<td>Describe the relationships among physical, mental and social health factors during adolescence (e.g., the effects of stress on physical and mental performance, effects of nutrition on growth).</td>
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**Linking Plants and Food Component**

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<td>Activity 6.3</td>
<td>Students will be able to compare food decomposition rates in a landfill and worm compost bin.</td>
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<td>Activity 4.2</td>
<td>Students will be able to identify the nutritional benefits of eating a varied diet; identify the nutritional benefits of seven different colored foods.</td>
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<td>Activity 9.1</td>
<td>Students will be able to identify places in their neighborhood that offer healthy foods.</td>
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<td>Activity 9.1</td>
<td>Students will be able to identify places in their neighborhood that offer healthy foods; list three effects that healthy food options have on the overall health of the area's residents.</td>
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<td>Activity 6.3</td>
<td>Students will be able to make a worm composting bin for their classroom.</td>
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<td>Students will be able to identify places in their neighborhood that offer healthy foods; plan a meal of healthy foods sold at neighborhood food establishments.</td>
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<td>Activity 8.1 and 8.2</td>
<td>Students will be able to relate economic and community health with purchasing food from locally owned venues.</td>
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<td>Activity 4.1</td>
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**LANGUAGE ARTS Grade 6 Common Core Standard**  
CC.6.SL.1.c Comprehension and Collaboration: Pose and respond to specific questions with elaboration and detail by making comments that contribute to the topic, text, or issue under discussion.  
**Activity 5.1** Students will be able to discuss the importance of preserving healthy soil.  
**Activity 5.3** Students will be able to discuss human actions that affect soil health.  
**Activity 6.2** Students will be able to identify how food waste can be harmful to the environment and the economy; explain why composting is an effective way to reduce food waste.  
**Activity 8.1** Students will be able to discuss the economic impact on farmers of food that is purchased locally and from distant farms.

**LANGUAGE ARTS Grade 6 Common Core Standard**  
**Activity 6.2** Students will be able to identify how food waste can be harmful to the environment and the economy; explain why composting is an effective way to reduce food waste.  
**Activity 8.1** Students will be able to discuss the economic impact on farmers of food that is purchased locally and from distant farms.

**MATHEMATICS Grade 7 Common Core Standard**  
CC.7.RP.2 Analyze proportional relationships and use them to solve real-world and mathematical problems. Recognize and represent proportional relationships between quantities.  
**Activity 8.1** Students will be able to calculate the mileage between where food was grown and where it was purchased.

**SOCIAL SCIENCE State Goal 15.A.3c** Describe the relationship between consumer purchases and businesses paying for productive resources.  
**Activity 8.1** Students will be able to discuss the economic impact on farmers of food that is purchased locally and from distant farms.  
**Activity 9.1** Students will be able to identify places in their neighborhood where they can buy healthy and locally grown foods that can support local economy.

**SOCIAL SCIENCE State Goal 15.C.3** Identify and explain the effects of various incentives to produce a good or service.  
**Activity 8.1** Students will be able to discuss the economic impact on farmers of food that is purchased locally and from distant farms.

**SOCIAL SCIENCE State Goal 18.A.3** Explain how language, literature, the arts, architecture and traditions contribute to the development and transmission of culture.  
**Activity 10.2** Students will be able to discuss the impact that food habits have on transmitting culture.  
**Activity 10.1** Students will be able to research the history of their family’s food culture.

**SOCIAL SCIENCE State Goal 17.B.3a** Explain how physical processes including climate, plate tectonics, erosion, soil formation, water cycle, and circulation patterns in the ocean shape patterns in the environment and influence availability and quality of natural resources.  
**Activity 5.1** Students will be able to describe the amount of fertile soil available on Earth; discuss the importance of preserving healthy soil.  
**Activity 5.3** Students will be able to describe how long it takes for organic matter to break down to form healthy soil; discuss human actions that affect soil health.
Resources

Community Alliance with Family Farmers (CAFF), Farm to School Program  
www.caff.org


Fresh from the Farm Resource Center https://sites.google.com/site/sgafff/  
Funding/ Grant Information


Let’s Move! www.letsmove.gov Michelle Obama’s initiative to support a healthier generation of kids.

MyPlate, USDA Nutrition Education Program www.choosemyplate.gov


Seven Generations Ahead www.sevengenerationsahead.org  
Programs | Farm to School

University of Illinois Extension Program- Illinois Master Gardeners.  
http://web.extension.illinois.edu/mg/

Contributors

Authors:
Lindsey Arenberg, *Fresh from the Farm Program Manager, Seven Generations Ahead*
Erin McMillan, *Educator, Seven Generations Ahead*
Cassandra Orr, *Educator, Seven Generations Ahead*
Melissa Tobias, *Former Education Coordinator, Seven Generations Ahead*
Courtney Woods, *Former Educator, Seven Generations Ahead*

Editor:
Andrea Alter

Editing Assistance:
Lindsey Arenberg, *Fresh from the Farm Program Manager, Seven Generations Ahead*
Shari Brown, *Program Associate, Seven Generations Ahead*
Gary Cuneen, *Executive Director, Seven Generations Ahead*
Erin McMillan, *Educator, Seven Generations Ahead*

Graphic Design:
Cassandra Orr, *Educator, Seven Generations Ahead*

Supported By:
The Chicago Community Trust
The Lumpkin Family Foundation
The Philancon Fund
The Walter S. Mander Foundation

Text Layout and Design:
Kim Serra, *Graphic Designer, KSerra Design*

Other Contributors:
The Land Connection Calendar. *The Land Connection. www.thelandconnection.org*
Kelly Joslin, *Green Earth Institute*