The Horticultural Society of New York

GROWING WITH THE GARDEN: PRACTICING HORTICULTURE WITH INNER CITY CHILDREN

This Curriculum Guide was produced in April 2010 by The Horticultural Society of New York.

Author:	**Pamela Ito**
Contributors:	**John Cannizzo** **Mark Hill** **George Pisegna** **George Tonkin**
Photography:	**Mark Hill** **National Park Service**
Art:	**Ms. Torres' 4th grade class at PS 153: Christopher Cruz, Alex De La Cruz, Hennessy Figueros, Michma Francois, Yamilex Marte, Genesis Solano, Will Sterling, Kimberly Torres, Anasia Wilson**
Editors:	**John Cannizzo** **Omar Davis** **Alyssa Meyers**

FOREWORD

USING THIS CURRICULUM

This curriculum outlines the development of an urban, native plant garden in West Harlem. The creation of the garden and the activities and suggestions that follow are based on our work in the field. We emphasize experiential learning: as students plant seeds and dig in the garden, they become more aware of the living world around them. We also seek to spark students' creativity through artistic extensions and activities that call on their imaginations to design their garden.

In October of 2008, The Horticultural Society of New York (HSNY) began work with the National Parks Service by becoming a local partner in its nationwide First Bloom program. This involved developing the former site of Hamilton Grange as a native plant community garden with the Boys and Girls Club of Harlem (BGCH) and with elementary students from PS 153. Both BGCH and PS 153 are in located in New York City's Community Board 9, where more than 90% of the families live below the poverty level. HSNY was very excited about this unique collaboration, as it would enable us to share our technical expertise in gardening, botany and maintaining gardens with inner-city students. It was also an excellent complement to our mission—namely, using horticulture as a social services and educational tool for the underserved communities of our city. This collaboration between HSNY, NPS and the Boys and Girls Club of Harlem was cited by the National Parks Service in March 2010 as the "*Best First Bloom Program*" in the country.

Using our experience with the First Bloom project as our template, we developed this curriculum for inner-city children, with the following goals in mind:

- Introduce city children to the natural world around them through hands-on activities in the garden.
- Educate students in the history of their neighborhood through interaction with community members.
- Build students' observation skills through visits to and a thorough analysis of the garden site.
- Develop students' ability to work cooperatively to achieve a common goal.
- Provide opportunities for students' creativity, including drawing and painting.

This curriculum will take you through some of the many stages of garden creation, beginning with discussion of seeds and the needs of plants and moving through discussions of photosynthesis, an introduction to native plants, garden design, and planting the garden. The curriculum is organized into the following units, and each unit includes activities and background information for the instructor:

I. Starting with Students
II. Site Considerations
III. Plant Considerations
IV. Native Plants
V. Participatory Garden Design
VI. Garden Installation

By working collaboratively to imagine and create a garden, students experience the beneficial effects of horticulture, including a strengthened connection to their environment. We hope this curriculum will help you develop an urban garden, and more importantly, allow your students to cultivate their skills, their knowledge, and their imaginations.

UNIT I. STARTING WITH STUDENTS

Just as it is important to explore the site to develop an understanding of the past, present and future of the garden location, cultivating the urban child is crucial to any garden development project. In our 20-year history with New York City children, many of our most sustainable projects have "taken root" by merely planting a seed. For HSNY's typical audience, a simple show of hands might reveal that 50% of an average third grade class in West Harlem has never planted a seed. Child advocacy expert Richard Louv (2006) directly linked the lack of nature in the lives of today's young generation—he calls it nature-deficit—to some of the most disturbing childhood trends, such as the rises in obesity, attention disorders, and depression. HSNY seeks to reverse this growing urban trend.

In beginning a garden project, our hope is for students to think beyond their own immediate needs and see themselves as part of a community effort. This important first step is crucial to the sustainability of any project. We attempt to empower them with knowledge acquisition and skill development so that they will take ownership of and continue to "green" their neighborhoods. Similarly, HSNY strongly believes in the use of plants as therapy and a means to more positive learning experiences. Plants stimulate the senses—reaching the students in a profound and tangible way.

STARTING WITH STUDENTS ACTIVITY

Summary: Compare the basic needs of people and compare these with the needs of plants. Discuss the relationship and inter-dependence of plants and people. Plant a seed indoors. Plant an idea in an observation journal.

Materials:

- Observation journals
- Name tags, seeds
- Copies of 3 or 4 different types of seed packets
- Index cards

Instructional Procedure:

Step 1: Introduce the topic and make personal connections.

A simple beginning might be to start with a brief project overview. Then, move onto the fun stuff—getting to know the students! Each one can introduce themselves and say their favorite plant. It might be helpful to have name tags, so you can refer to each student individually.

Discuss plants' needs: air, water, sunlight, soil, and space. Compare with people's needs: air, water, food, and shelter.

Step 2. Distribute seed packets photocopies for group discussion.

Read the information on the packet and search for specific plant needs like light and watering requirements, planting depth, distance, and height. These details will be referenced when we plan and plant our garden. Identify new terms and ideas, and then have them reflect through sketches and non-fiction writing in their observation journals.

Step 3. Form small cooperative groups.
Split into groups by looking at on growing factor on the seed packet. Our example here will be light requirements. Have all the children those whose seeds packets need full sun can form a group. Another group can be those seeds that prefer growing in shade. And another group can be plants that grow in partial sun. In groups, write all the names of the plants and sketch from the seed packets in their observation journals.

Step 4: Student survey.
Working in their collaborative groups, take a poll of how many students are similar to the plant they have. When outside, would they choose a sunny, partial sun or shady location to sit in? How many have ever seen the plant on the seed packet in front of them? Take a tally and report back to the class.

Step 5. Create a flash card game to learn plant names. Give each student a small index card (pieces of paper work too). Then follow this outline, first doing an example together as a class.

LINE 1. Describe how the plant looks.
Use descriptive adjectives.
I am smaller than a pea, taller than your mother, two shades of green, soft, leathery, etc…

LINE 2. What is the plant useful for?
I shade streams and rivers, I provide nectar for hungry insects…I can comfort an upset tummy

LINE 3. An identifying characteristic that is unique to that plant.
I am green all winter long (evergreen).
My shiny leaves are bigger than your hands.

LINE 4: WHAT AM I?

Here's an example:

My sunny yellow flowers
have a brown center.

I provide nectar for hungry bees.

I am found on roadsides
and in fields.

WHAT AM I?

Step 6. Create a flash card game to learn student names. Give each student a small index card then list three lines of information about themselves and end with WHO AM I?

Step 7. Celebrating our differences. We've found that students readily share endearing compliments about each other. This is a fabulous opportunity to complement and celebrate each other and create a positive platform for future learning.

Background information:
Plants need light to carry on food production. But while the requirement of light is almost universal, different plants need different degrees of light. Some must have bright sunlight to do well; others tolerate or prefer full shade. It is a good idea to find out what a plant's light requirements are in order to choose an appropriate site for it. But even so, watch the plant as it grows to make sure you've made the right choice. If the plant has too little light, it will put out few leaves and remain short, sending out long, leggy shoots or leaning in an attempt to reach the light. If the light is too strong for a plant it will wilt, and the leaves may looked scorched and brown.

Usually a plant that is said to need "full sun" needs at least 6 hrs. of sun a day, ideally between 10 am and 6pm. This includes most vegetables and flowers. Plants that prefer full sun may have to be watered more often, for soil moisture will be lost through evaporation in a sunny site, the air will be drier, and plants will lose moisture through their leaves. Shade-loving plants prefer sites in dappled or full shade, like under the overhanging branches of a tree. Shade-loving plants include violets, hostas, and ferns.

STUDENT PLANTING ACTIVITY

A brief survey of our students revealed that over half of the third grade class (mostly 9-year-olds) had never planted a seed. We took this as an indication that we were definitely meeting an important need--both experientially and educationally. Starting, observing and recording the growth of a seed is a fabulous starting place for any gardening project.

Summary: This activity will bring the outdoors into the classroom so the students can closely monitor seed germination and growth. Students will dissect seeds to explore their anatomy, then plant their own seeds in a plastic pot.

Materials

- Pre-soaked lima, fava or black beans, nasturtium and marigold seeds
- 3-inch square plastic pots
- Water
- Observation journals
- Colored pencils
- Magnifying glasses
- Blank index cards
- Paper towels
- Newspapers (to cover tables)
- Potting soil
- Masking tape (to label pots)

Instructional Procedures:
(Note: for this activity you will have to soak beans overnight. It may be helpful to have a few types of seeds that have already germinated: pea, bean, and corn)

Step 1: Introduce the topic and make personal connections. Re-cap the last activity with 2 who am I cards and 2 what am I cards. Then quickly review plant needs. Inspire the students with questions like: What does a seed need to grow? Why can't a dry seed germinate? How long can a seed survive while in its dormant state?

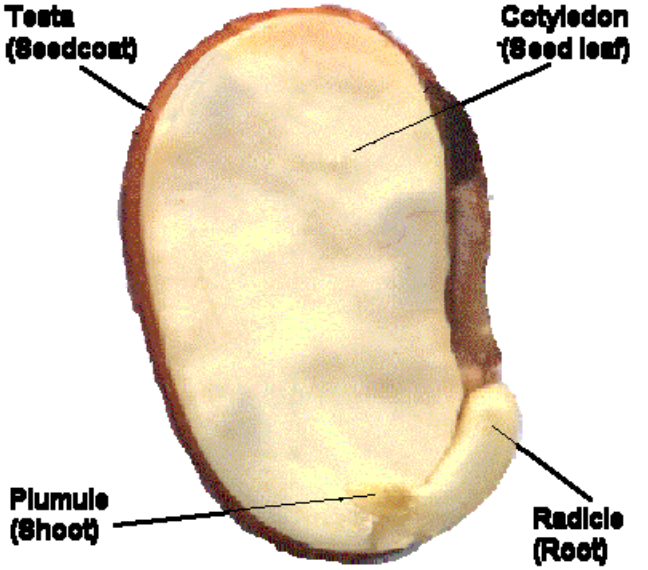
Step 2: Review plant needs.

Step 3: A Seedy Character. Students will examine different types of seeds. Make sure the dried beans/peas have been soaked. The corn can be cut off the cob with a sharp knife. Hand out a paper towel, a magnifying glass, three blank index cards, and three different types of seeds to each student. Spend some time having them draw the seeds as they see them. One seed per card. Next, work with the students to dissect the beans piece by piece. Review and label the parts of a seed as you go (seed coat, cotyledons, embryo, shoot and root). Have the students draw the inside of the bean/pea/corn on the back of the index cards.

Step 4: Sowing seeds
Review the methods of planting a seed. Cover the tables with newspaper. Pass out pots, soil, and a piece of masking tape for students to label their pots. Give each student a dried pea, bean, and corn kernel to plant. Put the pots under a grow light and assign a water monitor to water the seeds every other day.

Background Information:

Seeds, just like humans, have needs that need to be met in order to thrive and grow. Armed with the genetic information needed to make a new plant, seeds wait to break dormancy until they have an ample supply of water, optimum temperatures, and a well-aerated soil or other spot in which to dig in. First the seeds absorb water, which helps to make the stored food available to the embryo. This doubles the size of the seed, splits the seed coat, and makes oxygen available to the plant. In the presence of oxygen, the stored food is "burned" by the plant. If there is too little oxygen available, the seed may rot.



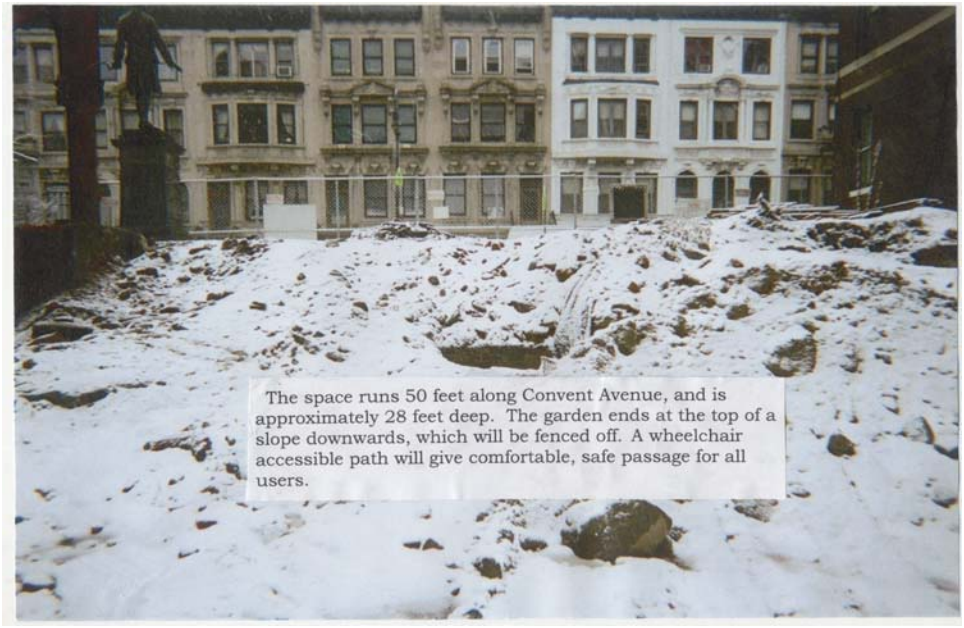
The root is the first part of the plant to emerge from the seed embryo. This anchors the plant and allows it to absorb water and nutrients. Next, the shoot begins to grow. When

the seedling's first real leaves emerge from the soil, the plant can shift from getting its energy from the cotyledons, and begin making its own food through photosynthesis.

Seeds have an outer coat or wall, which is usually very tough, hard, or woody, within which are cotyledons and the embryo. Seeds normally have just one embryo, but sometimes have more than one. Seeds develop as a result of the fertilization of the egg in the ovule of the ovary of a flower. Typically seeds are oval or globular and range in size from dust-like orchid seeds to the large seed of the *Persea americana* (avocado), with some plants bearing seeds of even greater size such as *Cocos nucifera* (coconut). Seeds vary greatly in color, texture, longevity, and methods of dispersal. Some of the modifications of seeds which aid in dispersal are coverings of spines, hooks, bristles, cotton, or plumes, or having wings and arils.

UNIT II. SITE CONSIDERATIONS

We visit the site with the children often. In some ways it is typical of urban sites. The place that is designated for the native plant garden is unusual in other ways. It is the former site of Alexander Hamilton's house. In September of 2008, the house was relocated across the street to St. Nicholas Park in an involved engineering project. It is a wonderful advantage for the children to be exposed to the site of the garden at this early stage, which allows them to internalize the process through which a construction site can be transformed step-by-step into a garden. It is a very powerful experience for the children to take part in all aspects of a project like this. Before being able to consider what the new site will be like, they must first understand the current site. How big is it? What is its relation to the sun? What sort of buildings surround it? Students measure the site, photograph it, draw it and write about it. This is an important aspect of planning the garden. The site that you work at may be a community garden, public space or part of a school compound. The aim is the same: to help children to form a relationship with the site by observing its characteristics. The goal of their study is to create a comprehensive site analysis—including its past, present and future for the students. Starting with the site's past: students can unearth the land used and history of the area. If possible, collect images of what the site might have looked like 100 years ago. In our case, since the garden site was on National Park property, we invited a park employee to provide some historical context for the site. If your site is in a school, you could approach the teacher who has been at the school longest. If the site is in a community space, invite a local "village elder" or long-term community resident to speak with your students about the site. The students might also consider some community needs (food production, a site for recreation or maybe a safe place for community gatherings) and determine if these needs could be met by the garden.



SITE ANALYSIS ACTIVITY

Summary: This activity will enable the students to record the present conditions of the site. They will create a base map for future design work and make an environmental assessment of the site. Students will measure, photograph and make detailed notes of the site.

Materials:

- Cameras
- Chart paper
- Pens
- Observation journals
- Tape measure
- Graph paper

Instructional Procedures:

Step 1: Introduce the topic and make personal connections. Provide a brief synopsis of the site's past and give each student 10 minutes to record their observations of the location in their observations journals. They can include details about the number of trees, the existing structures and buildings near the site, a general guess at it size, how it makes them feel, and other details they notice.

Step 2. Group Sharing. Have each student add one of their observations to the chart paper for discussion.

Step 3. Collect On-Site Details. Measure and assess the site as a group. Count and identify the trees. Measure exiting paths and locate borders. Consider a few of the following details: hours of direct sunlight, light obstructions, wind direction, wildlife potential, soil type and soil pH.

Step 4. Photograph the Site. Divide into groups and have each group concentrate on photographing one area of the garden.

Step 5. Prepare a Base Map with graph paper. Older students can make their diagram to scale. This map will be used to design the garden.

UNIT III. PLANT CONSIDERATIONS

This unit is comprised of the following three activities: a) exploring plant anatomy and function b) uncovering photosynthesis and c) plant classification. The goal of this unit is to create the foundation of knowledge for the students and set the stage for sensory exploration and hands-on learning. This phase of the project will also focus on bringing the study of nature indoors to the students

PLANT PART EXPLORATION ACTIVITY

Summary: This activity is an experiential explosion of learning as students eat their way through plant parts. They will identify the six major plant parts, review their functions, and discuss which parts are edible, and sample edible plant parts. (NOTE: Be aware of food allergies.) Explore plants through sensory perception and record observations.

Materials:

- Observation journals
- Color pencils
- Whole and precut examples of each edible plant parts(artichokes, small "trees" of broccoli, red cabbage leaves, mint, berries, at least a half pound of sunflower seeds & raisins, carrots cut in circles, celery cut in short sticks, beets, other interesting plant parts)
- Paper towels
- Spoons and plastic knifes
- A cutting board
- Worksheets
- Magnifying glasses

Instructional Procedures:
Step 1: Introducing the topic and making personal connections
Draw and discuss the six major parts of every plant (roots, stem, leaves, flower, fruit, seed). How do these plant parts compare to our body parts? What part of us is like a stem, holding our bodies up? (skeleton) What part of us collects water? (our mouth)

Step 2: Investigate the plant parts
Pass out magnifying glasses and paper towels to each student. Pass out plant parts:
Roots - *carrot circles*
Hold up to a light source and note the water stored in the carrot's center.

Stems - *celery sticks*
Snap the stick in half to view the stem's plumbing. Note the moist center.

Leaves - *red cabbage*
Examine the surface of the leaves. Note the outer leaf shape and texture.

Flowers - *broccoli*
Each bunch of broccoli is a bouquet of many tiny flowers. Count them!

Fruits - *raisins*
This dried grape protects the seeds within. Peel open and look for the tiny seeds.

Seeds - *sunflower seeds*
If you planted this seed, would it grow? If it is raw, it might grow. But if it has been roasted, the embryo inside has been cooked and salted and it will rot in a pot of soil.

Step 3. Eat the plant parts! Yum! Draw or record the plants in their observation journals.

Step 4. Read: *Tops & Bottoms* by Janet Stevens

BACKGROUND INFORMATION

Roots - provide structural support for the plant. Help to keep the plant anchored in the ground. Collect water and minerals from the soil. Edible roots: beets, radishes, turnips and carrots. Prepare roots by cutting into circles so water storage and xylem are visible.

Stem - the skeleton of the plant. Attached to the roots and connected to the leaves. Moves the water and minerals throughout the plant. Holds the leaves up to the light. Edible stems: celery, broccoli stems, asparagus, fennel, bamboo shoots. Prepare stems so that students can see the 'pipes' that transport water and food (xylem and phloem) are visible.

Leaves - food factories for the plant. In a process called photosynthesis, they use light, water, and CO2 to make food/energy for the plant. The leaves can also regulate the amount of water in the plant. Transpiration occurs when a plant sweats through little holes in the leaves (stomata) so that it can expel excess water. Edible leaves: parsley, oregano, mint, lettuce, cabbage, collard greens, spinach.

Flower - the reproductive part of the plant. Pollen, from the male portion of the flower, eventually fertilizes the ovary to produce fruit. Edible flowers: tulips, broccoli, artichoke, nasturtiums, pansy, rose petals, violets. Each little bunch of broccoli is like eating a bouquet of about 50 flowers! Put a bunch of broccoli in the refrigerator two weeks before this lesson. Some of the tiny yellow flowers may bloom, and you can still eat the flowers!

Fruit – the method of dispersal for the seeds, the ripened ovary. There are a numerous examples of fruits: avocado, zucchini, eggplant, mango, kiwi, oranges, watermelon, cherries, grapes, cucumbers, tomatoes, pumpkin, apple, bananas, berries, peppers, lemons, limes, etc. Small fruit like berries or raisins have seeds that students can find.

Seed - holds the baby plant (embryo), the food for the plant (the seed leaves or cotyledon) and the outer covering (seed coat). Edible seeds: sunflower seeds, pumpkin seeds, popcorn, beans (peanuts included), rice, peas, nuts. Seeds still in their shell are the best to use.

PHOTOSYNTHESIS: A TRANSFORMATION OF SUNLIGHT INTO FOOD ACTIVITY

Summary: This activity is designed to make the abstract concept of photosynthesis tangible**.** Students will explore the function of leaves and the process of photosynthesis. They will also realize (or understand) the interconnectedness and interdependence of humans to plants. And finally, they will b able to witness oxygen production in aquatic plants first-hand.

Materials:

- Photosynthesis mystery bags (one blue balloon labeled O_2, one red balloon labeled CO_2, a laminated green leaf labeled Chlorophyll, a laminated sugar packet, a small light-bulb or drawing of the sun, a laminated drawing of a water droplet labeled H_2O)
- "What is Photosynthesis" worksheet
- Color pencils
- Elodea (an aquatic plant available in pet stores)
- Glass jars with secure tops.

Instructional Procedures:

Step 1: Introducing the topic and making personal connections

Let's start out with a little movement. Stand up and ask the students to imagine that they are plants, and that their hands are leaves. Have them to and put their arms up in the air. Now turn off the lights so that the only light in the room is the sun coming through the windows. Without them leaving their seats, encourage them to show you what a real plant would do in this situation. *(The students lean and reach toward the light)* Try slowly turning on and off the light for fun.

Now sit down and closer your eyes for this story. What would happen to a mouse if it was in a closed, airtight, glass jar? Would it live or die? Why would it die? What would happen if that same mouse were put in the same jar, but this time, with a plant? Would the mouse live or die? Why would it live? How did the plants presence help the mouse to live? (*The plant used sunlight, water, and the carbon dioxide that the mouse breathed out to produce new oxygen for the mouse to breathe.*)

Step 2: Group Experiment

Take a piece of Elodea (common water plant) and place it tip first into a slim glass jar half-filled with water. Turn the jar upside down and place it under a bright light. Ask the students to write down what we did to prepare for the experiment and come up with a few predictions (hypotheses) of what will happen.

Step 3. Read *In Living Sunlight: How Plants Bring the Earth to Life* by Molly Bang and Penny Chisholm, 2010.

Step 4. Review photosynthesis vocabulary
Discuss the process and purpose of photosynthesis (In sunlight, the green plant absorbs carbon dioxide from the air and mixes it with water to make sugar and release oxygen as a by-product).
(Chlorophyll, H_2O=water, CO_2= carbon dioxide, O_2= oxygen)

Step 5: Photosynthesis Mystery Bags
Divide the students into groups of 4 or 5. Pass a "Photosynthesis Mystery Bag" to each group. Before opening the bags, explain that the students will be cooperating as a group to arrange the objects in the bags to piece together the basic chemical equation for photosynthesis (Chlorophyll + carbon dioxide + water + sunlight = oxygen + sugar). Each group will come up with their own equation. Write the final equation for each group on the board. As a class, decide which equations are the most complete.

Step 6: Check the Elodea
If photosynthesis occurs, sunlight will be absorbed by the green chlorophyll of the leaves and combine with the water and carbon dioxide. The little bubbles of gas that form on the plant are the oxygen by-product.

Step 7: Congratulate and praise
The students have begun to understand a complex biological process that boggles the minds of most adults. Share a learning smile together or a round of applause or a class cheer!

BACKGROUND INFORMATION:
Of all the organisms in the natural world, green plants are the only ones that manufacture their own food. This process is called **photosynthesis** and begins when light strikes the plant's leaves (both sunlight and artificial light can power this process). Cells in the plant's leaves, called **chloroplasts**, contain a green pigment called **chlorophyll** which reacts with sunlight to split the water in the plant into its basic components.

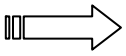
Carbon dioxide enters the leaf through holes called **stomata** and combines with the stored energy in the chloroplasts through a chemical reaction to produce a simple sugar. The sugar is then transported through tubes in the leaf to the roots, stems and fruits of the plants. Some of the sugar is used immediately by the plant for energy; some is stored as starch; and some is built into a more complex substances, like plant tissue or cellulose.

Fortunately for us, plants often produce more food than they need, which they store in stems, roots, seeds or fruit. We can obtain this energy directly by eating the plant itself or its products, like carrots, rice or potatoes. Photosynthesis is the first step in the food chain which connects all living things. Every creature on earth depends to some degree on green plants.

The oxygen that is released by the process of photosynthesis is an essential exchange for all living things. Forests have been called the "lungs of the earth" because animals inhale oxygen and exhale carbon dioxide in the process of breathing, and plants take in carbon dioxide and give off oxygen in the process of photosynthesis. The process where oxygen and excess water are given off through the stomata is called **transpiration**. Losing water through transpiration also helps to pull water up through the plant by creating a vacuum-like effect.

The photosynthetic process can be expressed by the simplified equation:

Green plants In the presence of sunlight

Carbon Dioxide + Water = Glucose  **(sugar) + Oxygen**

AN INTRODUCTION TO THE PLANT KINGDOM ACTIVITY

Summary: Collage art will be the result of a quick lesson in the difference between annuals, perennials, shrubs, and trees**.** Photographs of the site will be used to identify existing plants and to consider their growing conditions.

Materials:

- Photographs of the site
- Reference identification books
- Visuals of the each plant type example
- Index cards
- Plant catalogues
- Glue
- Scissors
- Observation journals.

Instructional Procedures:

Step 1: Introducing the topic and making personal connections
Reach back to the first activity and review some of the elements on the seed packets. Examine the photographs of the site together. Vocabulary and short talk on the differences in trees, shrubs, perennial and annuals as well as a review of the different tolerances of plants to sun (shade-loving and sun-loving species).

Step 2. Each table will receive four plants. Have them carefully examine the leaves and flowers. Each pair of students will receive an annuals identification book, which includes growing conditions and pictures of the plants. Students will identify the name of their four plants and copy the light and soil condition information into their observation journals.

Step 3. Make Plant ID Cards. Working in pairs, the students can cut photographs from the plant catalogues and add information to the card to make a plant identification card of their own. They can "quiz" each other on the different plant names and types.

Step 4: Group sharing. Each pair can select one ID card to share with the whole group. All cards can be kept in a basket or container for future reference before dismissal or during "choice" time. The information on the cards is an important building block for the final garden design.

Step 5. Quiet Reflection. Students can individually record their favorite plants in their observation journals.

BACKGROUND INFORMATION:

Trees are plants with woody trunks or stems, and you can see them all the year around. Those that lose their leaves in the winter, are called deciduous. Trees like oak, and maple, and sweet gum, and locust. The trees that hold their leaves throughout the winter, are called evergreens. Most trees with needles, like pine and spruce trees are evergreens; trees like the holly are also evergreens. Most trees will have one main trunk, but there are trees that have multiple trunks. Trees can range in height from 3 foot tall to almost 300 feet tall.

Shrubs also have woody trunks or stems, and can also be deciduous or evergreen. Shrubs will usually have multiple stems that grow in a branching form. Whereas trees that are pruned to grow in a shrub form will generally have one or two main stems, the major difference is their size.

Perennial refers to plants that live for more than two years and repeat a vegetative-reproductive cycle annually. Perennials include flowering plants, trees, shrubs, bulbs, some vegetables and herbs, many vines, and grasses (including lawn turf). The green-stemmed soft growth of these plants dies down to the ground in autumn, while their roots rest below ground, gathering the strength and energy to send up new stems and new branches that will flower the following year. With favorable growing conditions, the plants repeat this process year after year. Common perennials include daylilies, chrysanthemums, ferns, hostas, grasses and sedum.

Annual flowers complete their entire life cycle in one growing season. They flower within a few months after their seeds are sown, produce a continuous show of color throughout one full growing season, and die the same year. As their blossoms fade, the seeds ripen and are scattered to make new plants. Annuals often produce a great abundance of flowers because seeds are their primary method of reproduction. However, some plants grown as perennials in warmer habitats like the South grow only as annuals in cooler climates like the North. Although annuals die before the arrival of seasonal temperature extremes, their species survive the worst climatic conditions in the form of dormant seeds, which can be viable up to hundreds of years. Examples of annuals are marigolds, coleus, and pansies.

The Name Game

Every plant has two names. One is the botanical or Latin name, the other is the common name. Since one plant may have several common names, the botanical name is used universally to avoid confusion. A botanical name as two components, the first is called the Genus, which is always capitalized, the second is the species which is never capitalized. The whole botanical name will always appear in italics. *Sansevieria trifasciata,* for example, is often called "sword plant," "snake plant" or "mother-in-law's-tongue." In Japan, they call it "tigers tail," and in Brazil it's called "Sword of St. George." But its botanical name is universally *Sansevieria trifasciata*.

UNIT IV. NATIVE PLANTS

Native plants have become popular with many gardeners and landscapers around the country. The National Park Service in fact has a rule that *only* native plants can be used in their projects and this became an excellent teaching point in our project working with the Boys and Girls Club and PS 153. A simple way to look at a native plant is any plant that inhabited an area before civilization. Native plants have adapted to the amount of sun, rain, winter, and type of soil in their habitat. Natives usually have a higher survival rate and are more drought-tolerant than most garden plants. They have also adapted to the regional specifics of pollinators, pests and diseases. Additionally, the National Parks Service will only use native plants, because they are preserving "America; our land, history, animals, and plants."

NATIVE PLANT SELECTION ACTIVITY

Summary: This activity will ask the students to consider the plants first as scientists then as a designers. They will investigate native plants through the use of a slide or power-point presentation. These plants will be assessed for their incorporation in the design. Unusual qualities such as a) attracting pollinators, b) height and width requirements and c) varying flowering times will be highlighted.

Materials:

- Slide or PowerPoint presentation
- Handouts with the scientific names of each plant
- Small stereo and soothing music.

Instructional Procedure:

Step 1. Introducing the topic and making personal connections. Open with a short discussion about how one might feel moving from one home to a new one. Those students who have recently been transplanted might share their feelings and experiences. Compare this experience with a person or family who has stayed in one home for many years. What are the benefits of this situation? Discuss the difference between native and introduced plants.

Step 2. Assessing natives. Review images of the plants and highlights while students follow along with their plant sheet.
NOTE: In our presentation, students viewed 130 plants. This may be too many for the age of the group targeted and the activity time. With that said, we prefer to give too many rather than too few options. This participatory process is meant to draw on the opinions of the group and create a shared design.

Step 3. Native plant selection. Each student can submit their top ten choices for the final design. They can list a justification for their choice—for example, Joe Pye Weed has tall, interesting flowers.

Step 4. Consolidate all the plant lists and assess. This can be charged and emotional, so we suggest playing some classical music to soften the tone. Students can be creating poems with the names of their plant selections while the tallies are taken.

BACKGROUND INFORMATION

Besides the basics of light and height requirements, other considerations include: the plant's mature size and form, its growth rate, texture, color, and flowering time. Flowering times: Most flowering plants have a 2-week window in which they bless us with their blooms. If we desire a colorful garden, we need to select different plants that flower in all times of the year. The plant selection would therefore need to include plants that flower in spring, summer, fall, and even winter. (Different varieties of witch hazel will flower from late fall to late winter.)

Plant List for the Hamilton Grange Garden designed by the children from the Boys and Girls Club of Harlem and Public School 153

Perennials – we put in anywhere from two to ten of each variety.

Latin name	Common name	Notes	Height	Light requirement	Moisture requirement
Symphyotrichum cordifloia	Blue wood aster	butterflies	5 ft.	sun to part shade	moist to dry soil
Polygonatum pubescens	Hairy Solomon's seal		3 ft.	shade to part sun	rich moist to dry soil
Clematis virginana	Virgin's bower	leaves may irritate, tolerates concrete debris	20 ft. vines	sun to part sun	moist soil
Dryopteris cinnamomea	Cinnamon fern		30 – 60 in.	sun to partial shade	moist to wet soil
Juncus gerardii	Black grass		16 in.	sun	very moist soil
Dennstaedtia punctilobula	Hay-scented fern		15 – 30 in.	sun to partial shade	moist to dry acidic soil
Sorgastrum nustem	Indian grass	very drought resistant	4 – 6 ft.	full sun	dry, poor sandy soil
Thelypteris noveboracensis	New York fern		12 – 24 in.	sun to part shade	moist soil
Andropogon virginicus	Broom sedge		3 – 4 ft.	sunny	dry to wet soils
Asclepias syriaca	Common milkweed	butterflies	4 – 6 ft	full sun	poor soil, moist to dry
Asclepias syriaca	Common milkweed	butterflies	4 – 6 ft.	full sun	poor soil, moist to dry
Solidago flexicaulis	Zig-zag goldenrod		1 – 4 ft.	sun to shade	moist to dry
Andropogon glomeratus	Bushy beardgrass	very drought resistant	2 – 4 ft.	sunny	dry to wet, poorly drained soils
Schizachyrium scoparium	Little bluestem	butterflies	3 – 4 ft.	sun	dry sandy soils

Panicum virgatum	Switchgrass		4 – 6 ft.	sun to part shade	dry to wet soil
Symphyotrichum novea-belgii	New York aster	butterflies	4 ft.	sun to part shade	wet to moist soil

Shrubs – five blueberries and one each of the others.

Latin name	Common name	Notes	Height	Light requirement	Moisture requirements
Vaccinium agustifolium	Low bush blueberry	edible fruit, birds, butterflies	2 ft.	sun to partial shade	sandy acidic soil
Salix discolor	Pussy willow	birds, butterflies	15 ft.	sun	moist to wet soil
Viburnum lentago	Nannyberry	birds, butterflies, tolerates concrete debris	30 ft.	sun to part shade	rich moist soil
Cornus racemosa	Gray dogwood	birds	20 ft.	sun to part shade	moist well-drained soil

UNIT V. PARTICIPATORY GARDEN DESIGN

Each activity has built upon the others to increase student knowledge, skill and comfort with plants. This unique designing method is embraced by The Horticultural Society of New York to ensure that the students understand plants in a deep, meaningful and personal way. When they identify with plants, they being to see themselves as an integral part of influencing plants and gardens—thereby taking ownership of them. Upon to this point, the activities have viewed plants from the perspective of a scientist, a landscaper, a city planner, a historian, a neighbor, a photographer, an architect, an artist and a curious child. Working in small groups promotes understanding of one another. To accomplish their goals, they listen to and negotiate with each other to find harmony. These life skills are valuable facets of learning.

In our model project at the Hamilton Grange, all design elements of the garden, even the hard-scaping features, were directly contributed by local children. Their designs were eventually presented before the Community Board 9 in West Harlem and the final garden plan was a synthesis of their efforts.

ELEMENTS OF DESIGN ACTIVITY

Summary: This activity will involve students in the visualization of the future garden. They will synthesize all the elements of the project to date to create a garden sketch.

Materials:

- Copies of Base Maps for each child
- Reference photographs of the site
- Plant list with pictures of each plant
- Large sheets of paper for making sample sketches.

Instructional Procedures:

Step 1: Introduce the topic and make personal connections. Drawing from the measurements and research collected in Unit II, provide a brief synopsis of the site's past and re-visit the photographs and selected plant list for the site. These elements are the scaffolding of the design.

Step 2. Calculating the number of plants in the garden. As a class, determine how many trees, how many shrubs, and perennials to incorporate in the garden. Refer to the plant information sheets to determine the full-grown height of each plant.

Step 3. Modeling. After distributing the copies of the garden sketch, the garden educator should quickly sketch 2 or 3 sample designs so that they become familiar with the process, reminding the students of the plant height, flowering times, hardiness, etc.

Step 4. Creativity unleashed! This process is often inspiring, empowering and fun. Using a scale model of the space (one foot per graph square), each child will create his or her own unique design. We noticed that some children make all the paths and physical

features in their design first, and then figure out what plants go where; others put the plants down first and squeeze paths through them. While the students are creating their designs, facilitators and teachers can circle around with the photos and pictures of the plants for inspiration. Allow as much time as possible for this process; students who are finished can assist others or make another design.

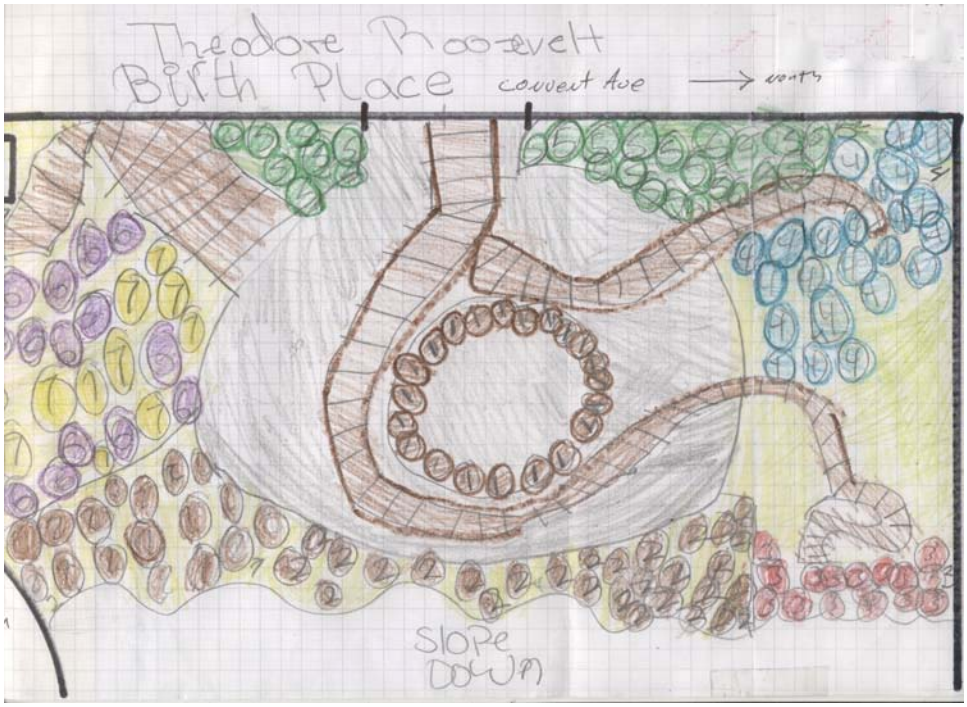
Step 5. Share and Praise. In small groups, have each group praise each individual designs.

DESIGN ILLUSTRATION ACTIVITY

Summary: Add decorative elements to the finished designs. Paint the designs with watercolors and visualize the finished garden.

Materials:

- Paper
- Newspaper
- Watercolor paints
- Cups of water
- Paper towels
- Small stereo for playing music



Instructional Procedure:
Step 1: Introduce the topic and make personal connections. After all the designs are submitted, the process of combining and consolidating the designs begins. We suggest from the individual designs, smaller group designs can form. It is important to stress that the design process is not a competition but rather a synthesis of styles.

Step 2. Introduce some additional natural elements in a garden, such large rocks, a water feature, a wind generator, and benches. In small groups, have the students review their individual drawings and discuss their preferences.

Step 3. Distribute newspaper, paper, water color paints and cups of water.

Step 4. Turn on the music and give the students the opportunity to paint their garden designs.

Step 5. Lead the group in a positive review of a few designs—seek out similarities in designs, note exciting garden elements and give positive feedback on each design. The goal here is to make every feel positive about their contributions.

Step 6. Reflection time using their observation journals—this often provides much needed self-help for students as they go through the design process. They can write about their preferences and their experiences.

UNIT VI. GARDEN INSTALLATION

NICE WARM FUZZY OPENING TO HOW WONDERFUL THIS IS AND HOW REWARDING IT IS!

The student should be familiar with the garden site by now. For the installation, it should be safe for the whole group to be busy working at the same time; if it is too small, the groups might be more secure taking turns in the space. Before the students arrive, the garden crew can place the plants or stake where they will be planted. Areas that are not yet paved can be designated with sand or mulch so the students feel comfortable stepping on them.

GARDEN INSTALLATION ACTIVITY

Summary: The students reflect on the site's current surroundings, review the final design and will plant and water the garden.

Materials:

- Gloves
- Hand tools
- Short-handled shovels
- Watering cans
- Index cards and pencils

Instructional Procedure:

Step 1: Introduce the topic and make personal connections. Refer to the final garden design.
Re-cap the plants needs, the available light in the space and the native plants appropriate for the site.

Step 2. Demonstrate the use of the hand tools. Utter a few words about garden safety.

Step 3. When you are ready to transplant, demonstrate and review the planting instructions. Dig a hole, remove the plant from the plastic pot, loosen the roots, place the plant into the hole and firmly press the soil around the plant.

Step 3. Take photos of the students in action! Their excitement and enthusiasm is contagious and should be shared with all the partners.

Step 4. Water around each plant.

Step 5. Mulch the plant.

Step 6. If time permits, share index cards with the students so they can write a message, a hope, a reflection, a thought, a wish, a dream or a secret to the plant they just transplanted.