PHENOLOGICAL LITERACY

UNDERSTANDING THROUGH SCIENCE & STEWARDSHIP

Informal Education Outreach Activities at the Boys and Girls Club, Westside Clubhouse, Santa Barbara, CA

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Overview

In October 2010, we started an informal phenology and science education program at the Boys and Girls Club on Santa Barbara's Westside. The Westside is located very close to the city's prosperous downtown area. Yet most of the residents in this neighborhood have very low-incomes and speak English as a second language. The neighborhood is generally safe, yet gang activities and occasional gang violence occur in close proximity to the Boys and Girls Club. We were approached by the Boys and Girls Club director, Magda Arroyo, and asked to develop a safe, outdoor-based after school program aimed at teaching ~15 kids between the ages of 8 and 11 about nature and fostering their enjoyment of the outdoors.

We started our after school program and called it the Nature Sleuths. I met with the Nature Sleuths group and facilitated a science-based activity once a week from November 2010-June 2011. We began by planting a native plant phenology garden at the Boys and Girls Club. As the plants in the garden grew, we moved onto more sophisticated activities, such as exploring plant phenophases in natural areas around Santa Barbara, collecting data for the USA-NPN's Nature's Notebook program, and meeting local scientists to discuss careers in the sciences.

The phenology garden generated many positive comments from neighborhood residents, as well as Boys and Girls Club members. During the school year, volunteers from the neighborhood would often help me in the garden and come by to talk. Now that the program has concluded, the garden is still thriving. Boys and Girls Club staff have continued to maintain and care for the garden.

Summary of Activities

Many of our activities were based in the Nature Sleuths phenology garden. In addition to planting, decorating, and maintaining the garden, we engaged in several phenological activities, including:

- An outdoor phenology relay race
- Natural history observation activities
- Phenological scavenger hunts
- Scientific data collection, using protocols established by the USA NPN

We also embarked on many exciting off-site scientific adventures, visiting and often touring behind the scenes at:

- The Santa Barbara Botanic Garden, which hosted us **four** times throughout the year so that we could observe seasonal changes in various native plant habitats
- UC Santa Barbara's Cheadle Center for Biodiversity and Ecological Restoration
- Santa Barbara Museum of Natural History
- Fairview Gardens, an organic farm that also educates local residents about sustainable urban agriculture
- UC Santa Barbara's Research Education and Experience Facility, a small public aquarium that harbors touch tanks where people experience local marine life first hand

During school holidays, the Nature Sleuths and I took all-day hiking trips in Santa Barbara's front range, where kids collected phenological data on several native plant species and honed their plant identification skills. In April - May 2011, everyone was ready to celebrate phenology and the upcoming end of the school year. I divided the kids into two teams, who gave themselves the names "Sky Blue" and the "Cheetahs". Each team made a poster, depicting their experiences as Nature Sleuths and gave a short oral presentation at our end of the year Celebration Day in the park, which took place on June 1, 2011. Student posters are pictured below.

UCSB Undergraduate Help.

Undergraduate interns, **Sara Healey** and **Mike Shahandeh**, were an integral part of the Nature Sleuths program. Sara helped lead Nature Sleuths activities almost every week between January-June. She also helped design the assessments described below, and conducted (as well as transcribed) all of the post-program interviews with the kids who attended Nature Sleuths on a regular basis.

Assessment

To evaluate the efficacy of our phenology outreach efforts, we gave 12 students a pre-program assessment at the start of the program (Appendix A). At the beginning of the program, most students were aware that an environment is similar to a habitat, but had a limited understanding of how plants change from season to season. Almost all of the students were aware that that plants need water, sunlight, and soil to grow and thought that plants were important because they provide oxygen for us to breathe.

Nature Sleuths was an optional, after-school program, so attendance often fluctuated from week to week. Moreover, some of the original Nature Sleuths moved away or stopped coming to the Boys and Girls Club after school. At the end of the school year, we conducted oral interviews with the five girls who attended and participated in program activities almost every week. Each of the girls could name at least six native plant species, distinguish between different plant life forms, name the parts of a flower, and provide a rough definition of phenology. Below are some student responses to our interview questions (listed in Appendix B):

- "My favorite part about Nature Sleuths were going on the field trips and learning more about life and the environment. Just learning about the environment, and plants, and what they do, and how they help the Earth"

- "Well usually I would be at my house right now, usually if I didn't know about it, I wouldn't be doing anything now." - in response to the question "*How has the Nature Sleuths affected your life?*"

- "It's affected my life that it teached me like if I walk on the street and I see a plant, I can probably point out to someone that's hummingbird sage or that's blue eyed grass. Well It's affected my life cause I have been helping out my kindergartners that I tutor at my school and yeah." - in response to the question "*How has the Nature Sleuths affected your life?*"

After working with the Boys and Girls Club, I've come to believe that the creative freedom and independence provided by informal educational settings make them excellent venues for phenology outreach. I was able to develop a unique curriculum tailored to the needs to the Nature Sleuths kids. The students were also able to help develop activities, make creative decisions regarding their garden space, and spend extensive amounts of time outdoors. Prior to our field trips, many of the Nature Sleuths had never visited the local university or been hiking. Now many of the students have expressed a new appreciation for the timing of biological events and the natural world that will hopefully continue to grow in future years.

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Appendix A. Pre-program assessment given to the Nature Sleuths kids in Fall 2010.

Nature Sleuths Pre-program Survey

Please tell us about yourself:

Name: _____

Age:_____

What school do you attend? _____

Do you have a science teacher at school? ☐ Yes ☐ No

Are you a ☐ girl or a ☐ boy?

Have you used a digital camera before? ☐ Yes ☐ No

Have you planted a garden before? ☐ Yes ☐ No

Please answer the following:

5 = very true **4** = mostly true **3** = not sure **2** = not true **1** = not true at all

1. I like science……	5	4	3	2	1
2. I want to learn about plants and the environment……	5	4	3	2	1
3. I want to learn about the things that scientists study….	5	4	3	2	1
4. I plan to go to college some day…….	5	4	3	2	1

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Nature Sleuths Pre-program Survey

5. Define the word environment. Give an example of an environment.

6. Draw a plant in the space below. Label three parts of the plant.

7. Why are plants important?

8. What things does a plant need to grow?

9. How does a plant change in the time between **winter** and **spring**?

10. How does a plant change in the time between **spring** and **fall**?

11. What is **phenology**?

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Appendix B. Post-program interviews conducted in May 2011 with the five Nature Sleuths students who attended >90% of the Nature Sleuths activities. Interviews were conducted and transcribed by UCSB undergraduate intern, Sara Healey.

Nature Sleuths Post-program Oral Interviews Questions

1. What is phenology?
2. In the garden we planted, how many plants can you name?
3. What are the different parts of a plant?
4. What's the difference between a grass, an herb, and an evergreen?
5. Over the past 5 months, name one thing you learned.
6. What was your favorite part about Nature Sleuths?
7. Do you feel that you have learned a lot? What?
8. How has Nature Sleuths affected your life?
9. Has Nature Sleuths helped you in school? How?
10. What could Alisa and I have done to help you more?

Nature Sleuths
Young scientists exploring and observing outdoors

Take Home Assignment

As a Nature Sleuth, you are learning how to become a **junior phenologist** at the Boys and Girls Club. On Wednesdays, we've been gardening and observing nature on field trips. For extra practice and to learn more about plants and the seasons, please do the assignment on these pages.

Students who turn in their completed assignments next week
will earn a special (and delicious) prize!

The Phenophases of a Flowering Plant

A phenophase is a particular stage of an individual's life cycle. Some phenophases that we've observed in plants include: seed germination, flowering, and making fruits. Draw a line that matches each flowering plant phenophase on the left side of the page with its picture. Color each picture.

1. bud

2. fruit

3. emerging leaf

4. flowering

Questions

1. What does the word **deciduous** mean?

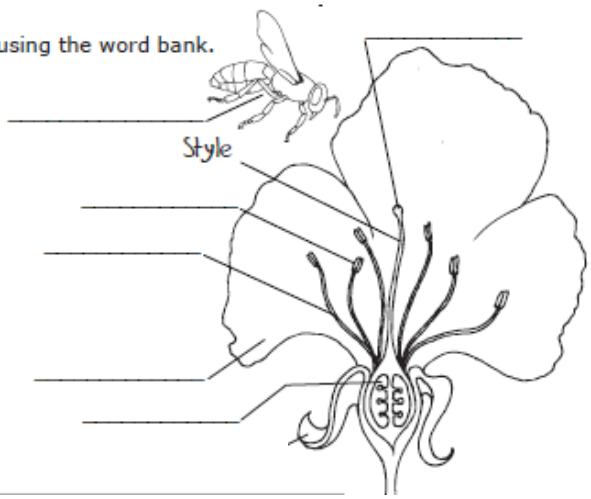
2. What does the word **evergreen** mean? Do evergreen plants ever drop their leaves?

Nature 🔍 Sleuths
Young scientists exploring and observing outdoors

FLOWER POWER

LEARNING ABOUT FLOWER PARTS

1. Label the picture below using the word bank.



Word Bank: use this to label the part of the flower

Ovary: a round, oval shaped flower part where the eggs are found. After **pollination**, ovaries grow into fruits (that contain seeds)
Anther: a structure where **pollen** is made
Filament: holds up the anther
Stigma: a sticky spot on the flower that grabs pollen
Style: a long thin structure. Pollen travels through the style to reach the ovary
Pollinator: an organism that brings pollen to a flower
Petal: the colorful part of a flower that often attracts pollinators

More Flower Power!

Choose a flower somewhere around your home or in your neighborhood. **Draw** it in the space below and **label** the flower's parts: ovary, style, stigma, petal, anther and filament.