RESOURCES

TITLE | TEACHING NEXT GENERATION SCIENCE STANDARDS OUTSIDE

CATEGORY | Garden Educator Training

SUB-CATEGORY | Learning & Teaching Outdoors

OVERVIEW | This document outlines a training for garden educators on what the Next Generation Science Standards (NGSS) are and how lesson plans can incorporate NGSS concepts. Education Outside partnered with the San Francisco Unified School District (SFUSD) to lead this training. We suggest contacting someone in your school district or city to see if they can lead a training on NGSS or other standards. If this is not possible, we suggest using the training resources listed as a starting point for discussions.

Training Rationale:

In 2013, California adopted the Next Generation Science Standards (NGSS) for K-12 schools. The NGSS emphasize 3-D learning; integrating core ideas, practices, and crosscutting concepts for real world applications. The NGSS present a great opportunity for garden educators to leverage the hands-on value of the garden to support formal education standards. This training provides educators with an introduction on how to integrate NGSS into garden experiences and a way to understand and communicate the value of garden-based education to formal educators.

Suggested Time of Year:

September/October. We suggest offering this training early in the school year.

Suggested Workshop Length:

3 hrs

Training Objective:

Garden educators will learn the basics of NGSS and how to apply these standards to lessons in the outdoor classroom. They will be able to explain what Disciplinary Core Ideas, Cross-Cutting Concepts and Science and Engineering Practices are and will explore how to incorporate them into individual lesson objectives and outcomes. Educators will understand how the NGSS principle of learning-science-by-doing-science functions in the outdoor classroom and will practice articulating to school community members how classes in the garden are aligned with NGSS.

Training Overview:

This training explains what the NGSS are and defines crosscutting concepts, disciplinary core ideas and science and engineering practices across the elementary grade levels. It also reviews curriculum and lessons to demonstrate and explore the ways in which the NGSS are incorporated into lessons. We suggest reviewing the details of the NGSS on-line prior to leading this training. Some key terms are defined here for reference:

- *Crosscutting Concepts* are “concepts that hold true across the natural and engineered world.”

- *Science and Engineering Practices* are "what students do to make sense of phenomena. They are both a set of skills and a set of knowledge to be internalized."
- *Disciplinary Core Ideas* (DCIs) are "necessary for understanding a given science discipline."[1]

Students need to understand all three concepts to be proficient in science. Educators should understand this model and practice applying it to existing and new curriculum.

Activity Ideas:

- Disciplinary Core Idea Scavenger Hunt: Have garden educators review existing lessons on their own with the goal of finding select standards (For example: Have eduators review the kindergarten and first grade units from the *Education Outside Curriculum*, available in the Table of Contents. Once educators have discussed what the DCIs mean and how they show up, have educators break into groups to answer questions such as, "*Where in the kindergarten unit can you find activities that address the NGSS DCI: 'Organization for Matter and Energy Flow in Organisms?'"*). In small groups, have educators discuss why they chose some activities and not others. As a large group, brainstorm ways to incorporate additional activities into existing lesson plans.
- Run BEETLES Professional Learning Sessions, especially *Making Observations and Evidence and Explanations*[2].
- Have the group design two-minute challenges, as explained in *Education Outside's Best Practices for Teaching* linked in the Table of Contents, that involve common outdoor classroom materials such as soil, rocks, leaves, tape, rubber bands, and magnifying lenses. Ask them to design challenges that would require students to use the NGSS science and engineering practices (i.e. ask questions, develop and use a model, etc.).
- NGSS Scientific Practices Circus (this activity is adapted from California Academy of Sciences[3]): Create a rotation of eight stations with different lesson activities, each involving a different NGSS scientific practice. For example, one station might ask educators to look at holes in the leaves of a plant and ask participants to brainstorm as many explanations as they can for how the holes got there. Another station might have a worm bin available and ask participants what they notice and what they wonder. Have educators visit each station to perform the activities. For each station, ask educators to determine the primary NGSS scientific practice being used, discuss what grade level(s) the activity would be best suited for, and brainstorm how one might adapt the activity to make it more successful.

Assessing Understanding:

- Exit Ticket(s):
  - Have educators name as many scientific practices as they can.
  - Have educators explain the differences between disciplinary core ideas, cross cutting concepts, and scientific and engineering practices.
  - Have educators write how they would explain to an adult audience (i.e. Principal or interested parent) in three sentences or less what the NGSS are and how they relate to their lesson(s).
  - Have educators write how they would explain to a student in three sentences or less what the NGSS are and how they relate to their lesson(s).

References:

1. NGSS Lead States. 2013. *Next Generation Science Standards*: For States, By States. Retrieved from https://www.nextgenscience.org/
2. Regents of the University of California. 2019. BEETLES. *Making Observations*. Retrieved from http://beetlesproject.org/resources/for-program-leaders/making-observations/.
3. California Academy of Sciences. Educator Trainings. Retrieved from: https://www.calacademy.org/sites/default/files/assets/docs/pdf/sepcircus_lessonplan.pdf

Additional Information:

- NGSS Lead States. 2013. Next Generation Science Standards: For States, By States. *Quality Examples of Science Lessons*. Retrieved from https://www.nextgenscience.org/resources/examples-quality-ngss-design.