Integrating Academic Standards

NGSS in the Kitchen & Garden

As you arrive...

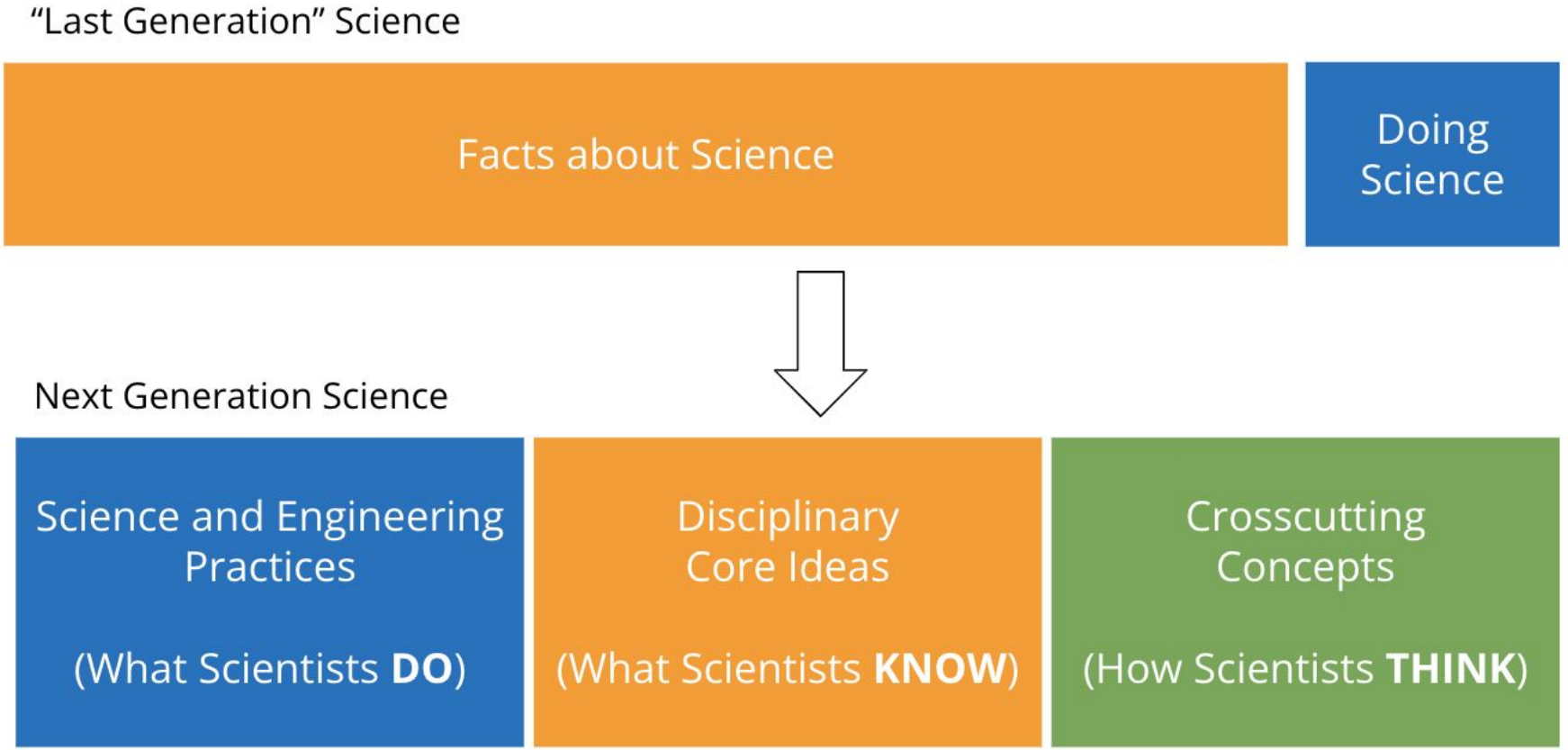
- Grab paper and something to write with.
- Feel free to introduce yourself in the chat (Name, Role, Location)
- Write down some of your main questions about NGSS in the kitchen &/or garden.

Session Overview

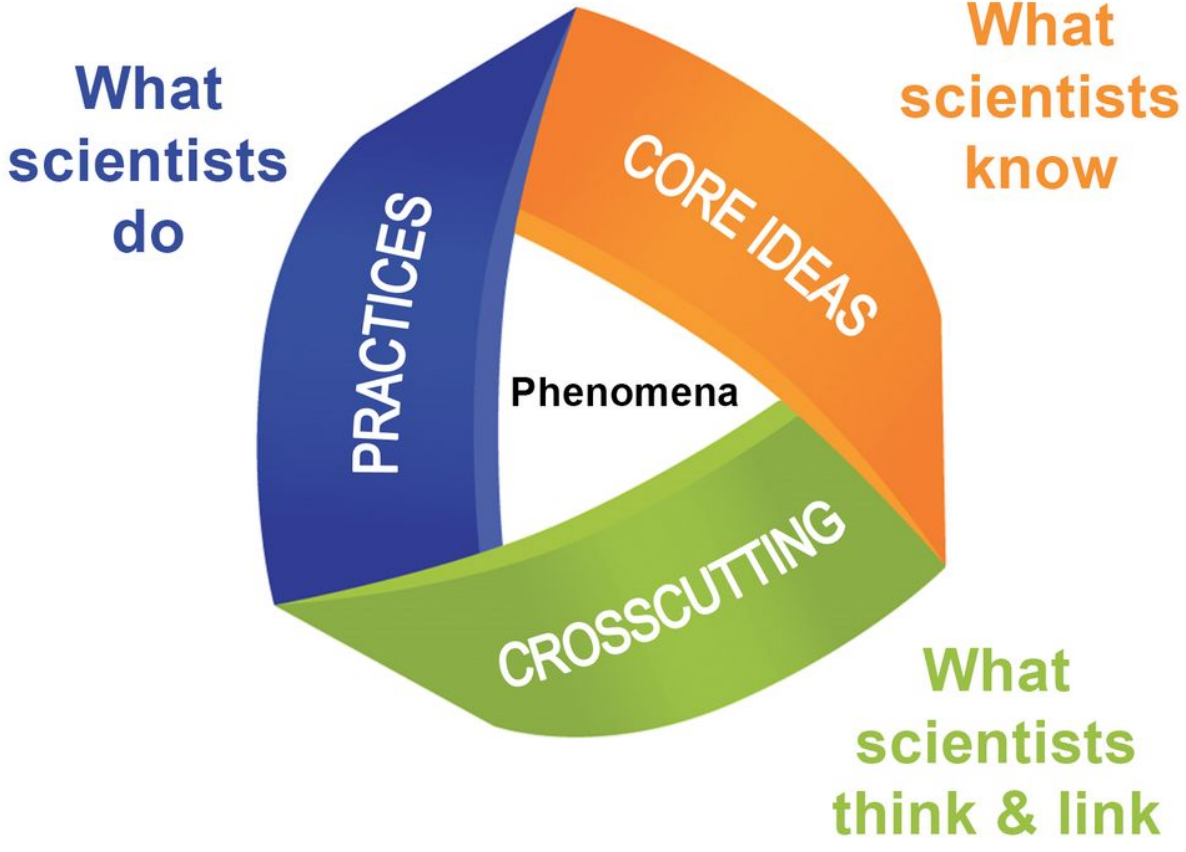
- What is 3 dimensional design?
- Exploring the 3D design process
- Practice!
- Discussion + Q&A

“Next Generation” vs. “Last Generation” Science Standards

"Last Generation" vs Next Generation



THREE DIMENSIONS OF THE FRAMEWORK



“Last Generation” vs Next Generation (Example)

S2L1b.Students should know the plant needs: soil, sun, water, and air”

NEXT GENERATION SCIENCE STANDARDS

Student Performance Expectation (PE)

- Science & Engineering Practices (doing science) — Planning and Carrying Out Investigations
- Disciplinary Core Ideas (knowing science) — Interdependent Relationships in Ecosystems
- Crosscutting Concepts (connecting science) — Cause and Effect

2-LS2-1. Students should be able to plan and conduct an investigation to determine if plants need sunlight and water to grow.

A CLOSER LOOK AT THE STANDARDS

- Add your ideas on the cross cutting concepts and science and engineering practices to this online whiteboard (LINK IN CHAT).
- Start by choosing one cross cutting concept and one science and engineering concept to brainstorm on.

DISCUSS

- Translate this DCI into simpler language.
- How does your DCI show up in the kitchen or garden?

Topic	Primary School (Grades K-2)	Elementary School (Grades 3-5)	Middle School (Grades 6-8)	High School (Grades 9-12)
LS2: Ecosystems: Interactions, Energy, and Dynamics				
LS2.A: Interdependent Relationships in Ecosystems	• Plants depend on water and light to grow. (2-LS2-1) • Plants depend on animals for pollination or to move their seeds around. (2-LS2-2)	• The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plants parts and animals) and therefore operate as "decomposers." Decomposition eventually restores (recycles) some materials back to the soil. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem. (5-LS2-1)	• Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors. (MS-LS2-1) • In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction. (MS-LS2-1) • Growth of organisms and population increases are limited by access to resources. (MS-LS2-1) • Similarly, predatory interactions may reduce the number of organisms or eliminate whole populations of organisms. Mutually beneficial interactions, in contrast, may become so interdependent that each organism requires the other for survival. Although the species involved in these competitive, predatory, and mutually beneficial interactions vary across ecosystems, the patterns of interactions of organisms with their environments, both living and nonliving, are shared. (MS-LS2-2)	• Ecosystems have carrying capacities, which are limits to the numbers of organisms and populations they can support. These limits result from such factors as the availability of living and nonliving resources and from such challenges such as predation, competition, and disease. Organisms would have the capacity to produce populations of great size were it not for the fact that environments and resources are finite. This fundamental tension affects the abundance (number of individuals) of species in any given ecosystem. (HS-LS2-1),(HSLS2-2)

How Do We Apply This?

7 steps for designing NGSS-aligned lessons in the kitchen & garden

1. IDENTIFY THE GARDEN PHENOMENON OR TASK

- What is happening in the garden?
- What natural phenomenon do you want to explore?
- What tasks do you need/want to do in the garden?

Examples:

- The compost pile needs to be turned
- The cilantro is going to seed

2. IDENTIFY YOUR DCI

- How is this related to science?
  - What explains this phenomenon?
  - What explains why we do this practice this way?
- Find the DCI that most closely aligns with this phenomenon or task.

  Examples:
  - The compost pile needs to be turned because all living things need oxygen.
  - The cilantro is going to seed because reproduction is a natural part of every living things' life cycle.

3. IDENTIFY YOUR GUIDING QUESTIONS

- What are the questions about WHY this phenomenon is occurring, or WHY we do this task this way?
- What is the mystery?

Examples:

- What is happening in the compost pile? Why do we need to turn it?
- What is happening with this cilantro plant? Why is this occurring?

4. IDENTIFY YOUR SCIENTIFIC PRACTICE

- What do students need to DO in order to gather more evidence for this mystery?
  - What tools do they need?
  - What “data” will they collect and how?

Examples:

- Comparing organic matter in compost piles that have vs. haven’t been turned
- Making observations of cilantro plants weekly over three months

5. IDENTIFY YOUR PRIOR KNOWLEDGE

- What prior knowledge or contextual information do students need in order to be able to make sense of the data they collect?

  Examples:
  - Compost piles are filled with microorganisms that facilitate the decomposition process
  - Overview of the life cycle for plants that reproduce sexually

6. IDENTIFY YOUR STRUCTURES FOR SUPPORTING STUDENT SENSE-MAKING

- What structures/support might you offer to help students make sense of their observations and synthesize/reflect on their learning?

  Examples:
  - Structured student talk routines
  - Guided discussion questions
  - Writing/reflection prompts

7. ORGANIZE YOUR ANSWERS INTO A LESSON PLAN!

Garden phenomenon or task + Related DCI + Guiding question(s) + Scientific practice(s) + Prior knowledge + Structures for supporting student sense-making

Engage → Explore → Explain → Elaborate → Reflect


Let’s Practice!

Q & A