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Considering the Crosscutting Concepts

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Considering the Crosscutting Concepts

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A metaphor:
Understanding the NGSS is a 
“piece of cake”!
Why do we think the Crosscutting Concepts (CCCs) important? *(Group Brainstorm)*
Understanding the NGSS is a piece of cake

- **Performance Expectation**

**Baking Tools & Techniques**

- Science & Engineering Practices

**Cake**

**Disciplinary Core Ideas**

**Frosting**

- Crosscutting Concepts

Adapted from NSTA

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Understanding the NGSS is a piece of cake

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Experts and novices organize their ideas differently

» Experts use a conceptual framework

» Novices rely on surface features

Chess experts and novices players were shown pieces randomly arranged on a chess board…

And an analogy.
Experts grouped pieces together based on the **strategic moves** that the pieces could make in a game. Novices only remembered **individual pieces**.
One goal of science education is to teach students think more like experts

What if we gave students an expert-like conceptual framework to organize their ideas around?
How will the CCCs help students learn science?

1. A conceptual framework helps students make sense of new content and tackle novel problems

2. Allows students to be more flexible and creative with their science and engineering ideas

3. Helps students to develop their ideas over time
There are 7 Crosscutting Concepts (CCCs)

1. Patterns
2. Cause and effect
3. Scale, proportion, and quantity
4. Systems and system models
5. Energy and matter
6. Structure and function
7. Stability and change

Now…Speed Dating!
Patterns

The CCC of ____ highlights that structures or events are often consistent and repeated.

Cause and effect

The CCC of ____ investigates how things are connected by identifying the reasons behind an occurrence, and what that occurrence results in.

Scale, proportion, and quantity

Different measures of size and time affect a system's structure, performance, and our ability to observe phenomena.

Systems and system models

The CCC of _____ helps us understand the world by describing how things connect and interact. We can use simple representations to explore these interactions.

Energy and matter

These things are neither created nor destroyed, but may flow into and out of a system and influence its functioning.

Structure and function

The way something is built and the parts that it has determine how it works.

Stability and change

Over time, a system might stay the same or become different, depending on a variety of factors.
Rotation Stations: Name that CCC!

- Work together!
- Decide which single CCC works best to make sense of the 3-4 phenomena presented at each station.
Rotation Stations: Name that CCC!

• Why were these examples representative of that particular CCC?

• Other content ideas/phenomena you can think of?

• Will finding classroom connections for these ideas be easy or challenging?

• Do you see any connections or overlap among the CCCs?

• How might the CCCs help integrate science with other subjects?
Find examples of your CCC in the NGSS:

» Handout Matrix of Crosscutting Concepts in NGSS

» Go to www.nextgenscience.org

» Search for Performance Expectations that include your CCC in the foundation boxes.

» Discuss possible ways that CCC might be used within that Performance Expectation

» Share out up to 3 examples
Vertical Alignment Activity

- Table 1 = Patterns
- Table 2 = Cause & Effect
- Table 3 = Scale, Proportion, & Quantity
- Table 4 = Systems & System Models
- Table 5 = Energy & Matter
- Table 6 = Structure & Function
- Table 7 = Stability and Change
Questions for Consideration:

1. Do these progressions make sense? Was it clear what order the ideas belonged in?

2. What clues helped you figure out the progression?
Lenses Activity

- Use the CCC that you worked with during the Vertical Alignment Activity
- Use your CCC to explore what you see in the CAS’ Shark Lagoon Webcam
- Observe for 2 minutes and then into Groups to discuss
Lenses Activity

Discuss these questions with your group and RECORD the discussion:

– **COULD** we connect this to the CCC?

– **SHOULD** we connect this to the CCC?

– What might students **LEARN** from viewing this through this CCC lens?
Shark Lagoon Webcam
Questions to Consider:

- What was it like forcing yourself to examine this phenomenon through a specific lens?
- Did you notice or think about anything you might have missed otherwise?
- How did ideas about what students might learn differ based on the CCC being applied?
- How might you go about deciding which CCC to use when teaching a given piece of content?
- How might students benefit from using different CCCs to explore the same content?
The NGSS highlights “big ideas” and encourages students to make connections among ideas and across disciplines to mirror the way scientists approach the world.

These crosscutting concepts providing a set of lenses with which scientists approach events in the natural world.

These are **lenses that the teacher must make explicit** for students who are learning to acquire the unique way that scientists approach phenomena.