Introduction to Next Generation Science Standards.

- The Next Generation Science Standards are now available.
- Twenty-six states and their broad-based teams worked together with a 40-member writing team and partners throughout the country to develop the standards.
- Led by Achieve
- Written based on three dimensions

Stand Back! I'm Going to Do Science!

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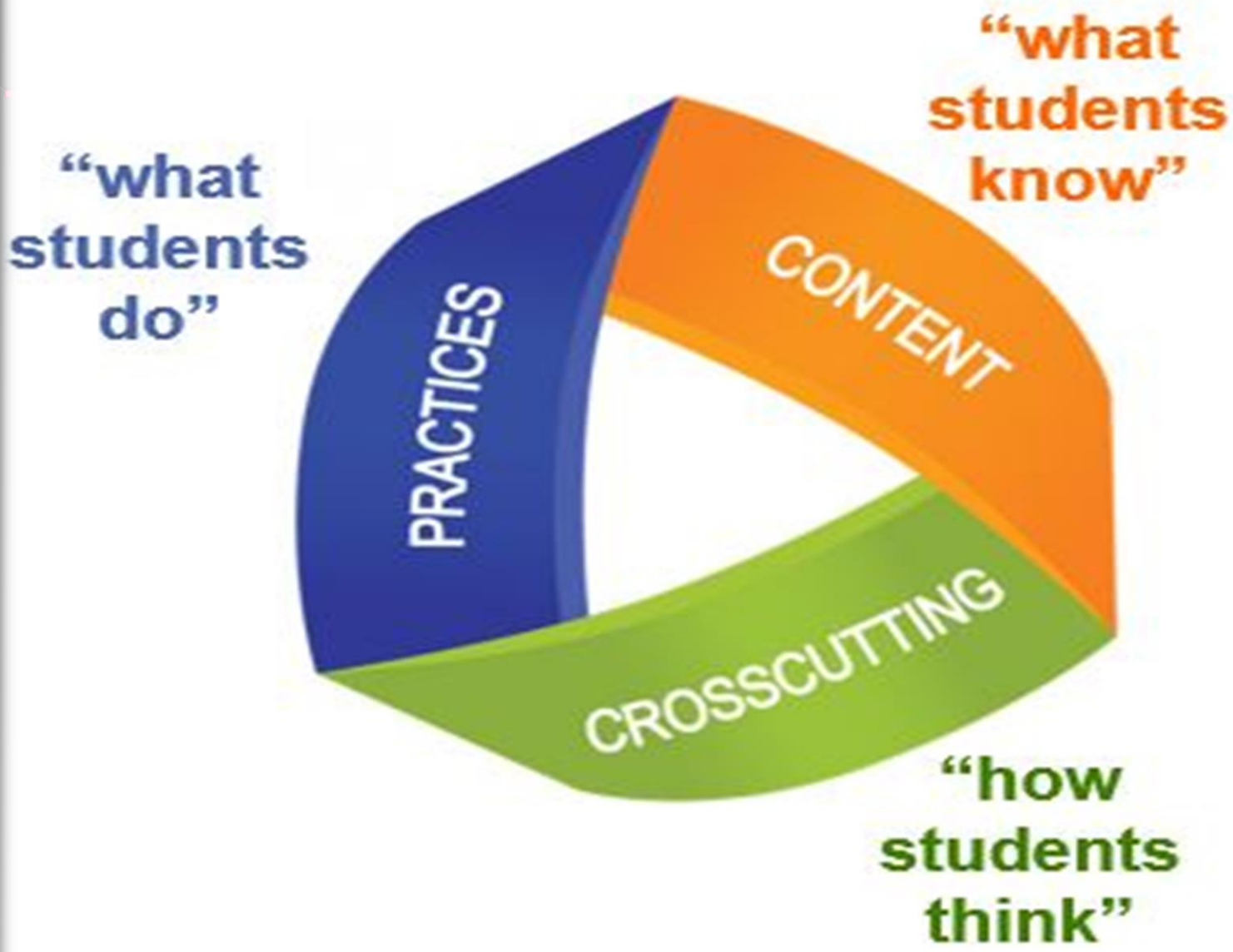
Three Dimensional Learning

- Science and Engineering Practices
- Disciplinary Core Idea
- Cross-Cutting Concepts



Quoted text from Peter A'Hearn

Science and Engineering Practices

- Asking questions (for science) and defining problems (for engineering)
- Developing and using models
- Planning and carrying out investigations
- Analyzing and interpreting data
- Using mathematics and computational thinking
- Constructing explanations (for science) and designing solutions (for engineering)
- Engaging in argument from evidence
- Obtaining, evaluating, and communicating information

Disciplinary Core Ideas

Life Science

LS1: From Molecules to Organisms: Structures and Processes

LS2: Ecosystems: Interactions, Energy, and Dynamics

LS3: Heredity: Inheritance and Variation of Traits

LS4: Biological Evolution: Unity and Diversity

Physical Science

PS1: Matter and Its Interactions

PS2: Motion and Stability: Forces and Interactions

PS3: Energy

PS4: Waves and Their Applications in Technologies for Information Transfer

Earth & Space Science

ESS1: Earth's Place in the Universe

ESS2: Earth's Systems

ESS3: Earth and Human Activity

Engineering & Technology

ETS1: Engineering Design

ETS2: Links Among Engineering, Technology, Science, and Society

Crosscutting Concepts

- Patterns
- Cause and Effect: Mechanism and Explanation
- Scale, Proportion and Quantity
- Systems and System Models
- Energy and Matter: Flows, Cycles and Conservation
- Structure and Function
- Stability and Change

2.Interdependent Relationships in Ecosystems

2.Interdependent Relationships in Ecosystems

Students who demonstrate understanding can:

2-LS2-1. Plan and conduct an investigation to determine if plants need sunlight and water to grow. [Assessment Boundary: Asses is limited to testing one variable at a time.]

2-LS2-2. Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.*

2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats. [Clarification Statement: Emphasis is on the diversity of living things in each of a variety of different habitats.] [Assessment Boundary: Assessment does not include specific animal and plan names in specific habitats.]

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Developing and Using Models

Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions.

- Develop a simple model based on evidence to represent a proposed object or tool. (2-LS2-2)

Planning and Carrying Out Investigations

Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.

- Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question. (2-LS2-1)
- Make observations (firsthand or from media) to collect data which can be used to make comparisons. (2-LS4-1)

Connections to Nature of Science

Scientific Knowledge is Based on Empirical Evidence

- Scientists look for patterns and order when making observations about the world. (2-LS4-1)

Disciplinary Core Ideas

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)

LS4.D: Biodiversity and Humans

- There are many different kinds of living things in any area, and they exist in different places on land and in water. (2-LS4-1)

ETS1.B: Developing Possible Solutions

- Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. *(secondary to 2-LS2-2)*

Crosscutting Concepts

Cause and Effect

- Events have causes that generat observable patterns. (2-LS2-1)

Structure and Function

- The shape and stability of structu of natural and designed objects a related to their function(s). (2-LS

4-ESS3 Earth and Human Activity

4-ESS3 Earth and Human Activity

Students who demonstrate understanding can:

4-ESS3-1. **Obtain and combine inf…es and their uses affect the environmen…** renewable energy resources are … surface mining, and air pollution … …ams, and sunlight; non- …s of habitat due to

4-ESS3-2. **Generate and compare… …ns.*** [Clarification Statement: Examples of solution… …sment Boundary: Assessment is limited to earthquakes, floods, tsunamis, and volcanic eruptions.]

Performance Expecation

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Constructing Explanations and Designing Solutions
Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems.

- Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution. (4-ESS3-2)

Obtaining, Evaluating, and Communicating Information
Obtaining, evaluating, and communicating information in 3–5 builds on K–2 experiences and progresses to evaluate the merit and accuracy of ideas and methods.

- Obtain and combine information from books and other reliable media to explain phenomena. (4-ESS3-1)

Scientific Practices

Disciplinary Core Ideas

ESS3.A: Natural Resources

- Energy and fuels that humans use are derived from natural sources, and their use affects the environment in multiple ways. Some resources are renewable over time, and others are not. (4-ESS3-1)

ESS3.B: Natural Hazards

- A variety of hazards result from natural processes (e.g., earthquakes, tsunamis, volcanic eruptions). Humans cannot eliminate the hazards but can take steps to reduce their impacts. (4-ESS3-2) *(Note: This Disciplinary Core Idea can also be found in 3.WC.)*

ETS1.B: Designing Solutions to Engineering Problems

- Testing a solution involves investigating how well it performs under a range of likely conditions. *(secondary to 4-ESS3-2)*

Content Core Ideas

Crosscutting Concepts

Cause and Effect

- Cause and effect relationships are routinely identified and used to explain change. (4-ESS3-1)
- Cause and effect relationships are routinely identified, tested, and used to explain change. (4-ESS3-2)

Connections to Engineering, Technology, and Applications of Science

Interdependence of Science, Engineering, and Technology

- Knowledge of relevant scientific concepts …benefits, to decrease known risks, and to meet societal demands. (4-ESS3-2)

Scientific Concepts

Connections to other DCIs in fourth grade: **4.ETS1.C** (4-ESS3-2)

Articulation of DCIs across grade-levels: **K.ETS1.A** (4-ESS3-2); **2.ETS1.B** (4-ESS3-2); **2.ETS1.C** (4-ESS3-2); **5.ESS3.C** (4-ESS3-1); **MS.PS3.D** (4-ESS3-1); **MS.ESS2.A** (4-ESS3-1),(4-ESS3-2); **MS.ESS3.A** (4-ESS3-1); **MS.ESS3.B** (4-ESS3-2); **MS.ESS3.C** (4-ESS3-1); **MS.ESS3.D** (4-ESS3-1); **MS.ETS1.B** (4-ESS3-2)

Common Core State Standards Connections:

ELA/Literacy –

RI.4.1 Refer to details and examples in a text wher…
RI.4.9 Integrate information from two texts on the …
W.4.7 Conduct short research projects that build k…
W.4.8 Recall relevant information from experiences … sources. (4-ESS3-1) …vide a list of
W.4.9 Draw evidence from literary or informational …

Mathematics –

MP.2 Reason abstractly and quantitatively. *(4-ESS…*
MP.4 Model with mathematics. *(4-ESS3-1),(4-ESS…*

Connections to Common Core Literacy & Math Standards

How do I get started?

- https://www.teachingchannel.org/videos/transition-to-ngss-achieve

Great Sources of Science Lessons for Grades K-5

Use the PDF link to access the units at this site:

- http://www.alvordschools.org/Page/6371 (Units)
- http://www.mccracken.kyschools.us/NGSS.aspx
- betterlessons.com/
- http://ngss.nsta.org/Classroom-Resources.aspx