# Kindergarten Institute - Elementary Science

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# Objectives:

- I will be able to identify examples of how the **NGSS practices** overlap with **Common Core Math and ELA standards** in my current science curriculum.
- I will be able to explain how **integrated lessons** can best support **deeper learning.**
- I will be able to generate ideas for setting up a **science center** in my classroom.

# Science/Math Integration Experience: Kindergarten – "Snail Shells"

**Essential Question:**

***How are snail shells different from other shells?***

# Science/Math Integration Experience: Kindergarten – "Snail Shells"

**View video:**

The Secret Life of Snails

***Model note-taking of class ideas.***

# Accountable Talk Conversation

| Share Thinking | Agree/Disagree |
| --- | --- |
| ❖ I noticed _____. | ❖ I agree with _____ because _____. |
| ❖ I think _____ because_____. | ❖ I disagree with ____ because_____. |
| ❖ I wonder _____ because _____. | |

# Science/Math Integration Experience: Kindergarten – "Snail Shells"

**Participate in science/math experience regarding shell classification.**

# Lesson Reflection

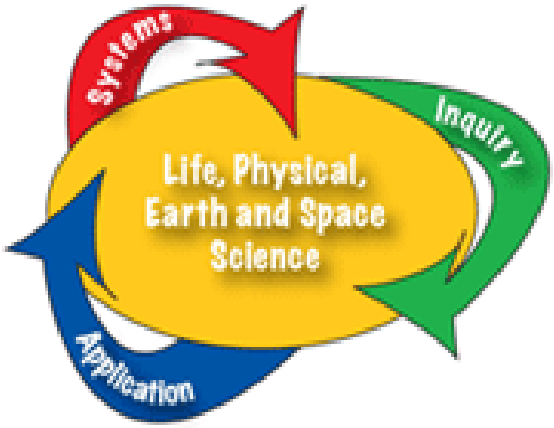
- What do you think are the most powerful aspects of this integrated lesson to support student learning in science, math and literacy?

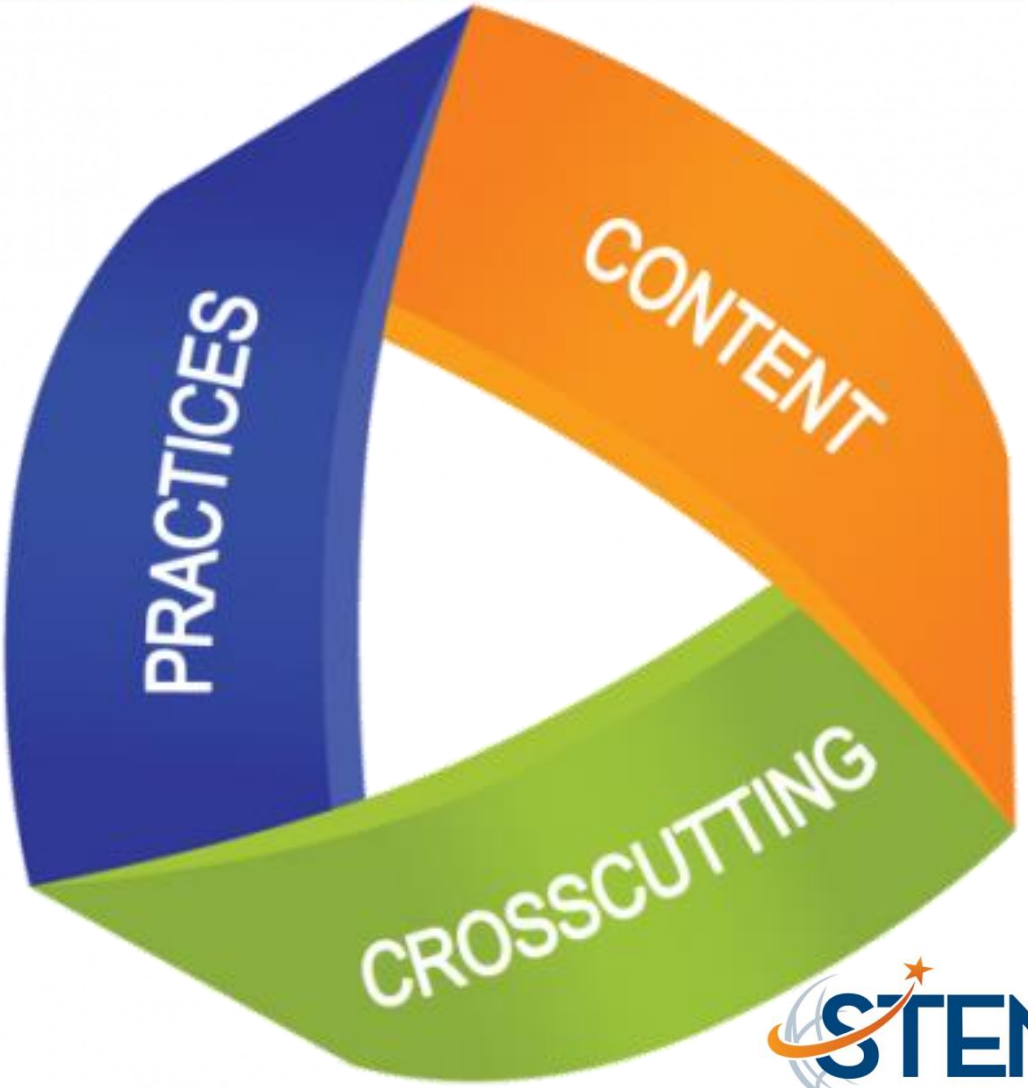
- How can you create a similar integrated experience in the Kindergarten *Wood and Paper* science unit?

3 minute silent reflection

5 minute table talk

# NGSS Standards Walk-Through



# Translating a Standard - The Three Dimensions

**2-LS2 Ecosystems: Interactions, Energy, and Dynamics**

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: Assessment 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.***

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 | Disciplinary Core Ideas | Crosscutting Concepts |
|---|---|---|
| **Developing and Using Models**<br>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.<br>▪ Develop a simple model based on evidence to represent a proposed object or tool. (2-LS2-2)<br>**Planning and Carrying Out Investigations**<br>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.<br>▪ Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question. (2-LS2-1) | **LS2.A: Interdependent Relationships in Ecosystems**<br>▪ Plants depend on water and light to grow. (2-LS2-1)<br>▪ Plants depend on animals for pollination or to move their seeds around. (2-LS2-2)<br>**ETS1.B: Developing Possible Solutions**<br>▪ 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)* | **Cause and Effect**<br>▪ Events have causes that generate observable patterns. (2-LS2-1)<br>**Structure and Function**<br>▪ The shape and stability of structures of natural and designed objects are related to their function(s). (2-LS2-2) |

The three integrated dimensions that support the performance expectation.

# Dimension 1: Practices

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

**There is now equal emphasis placed on scientific inquiry and engineering design**

# Dimension 2: 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

# Dimension 3: Disciplinary Core Ideas

| **Life Science** | **Physical Science** |
| --- | --- |
| LS1: From Molecules to Organisms: Structures & Processes<br>LS2: Ecosystems: Interactions, Energy, & Dynamics<br>LS3: Heredity: Inheritance & Variation of Traits<br>LS4: Biological Evolution: Unity & Diversity of Life | PS1: Matter & Its Interactions<br>PS2: Motion & Stability: Forces & Interactions<br>PS3: Energy<br>PS4: Waves & Their Applications in Technologies for Information Transfer |
| **Earth & Space Science** | **Engineering & Technology** |
| ESS1: Earth's Place in the Universe<br>ESS2: Earth's Systems<br>ESS3: Earth & Human Activity | ETS1: Engineering Design<br>ETS2: Links Among Engineering, Technology & Society |

# Model Lesson Review:

- Which NGSS Practices were present in this integrated lesson?

Pull out the NGSS Practice Cards for the practices that were present in this integrated lesson.

Set the other practice cards aside.

# Model Lesson Review:

- Which present NGSS Practices were in the foreground in this integrated lesson?

Sort your present NGSS Practice Cards into two categories:

| Foreground Practices | Background Practices |
| --- | --- |

# NGSS 3D Unit Plans

- Analyzed the NGSS 3 Dimensions in their science units

DCI – Disciplinary core idea
CCC – Cross cutting concept
SP – Science & engineering practice

## Unit: _Animals 2x2_

**NGSS 3D Planning**

| | |
|---|---|
| **Investigation1, Part 1 – Structure of Goldfish**<br><br>*Description of student activity(ies)*<br><br>*Learning the parts (eyes, fins, gills) of the goldfish through observation. Identifying similarities and differences between the fish.* | DCI:<br>**1-LS1.A: Structure and Function**<br>• All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow. (1-LS1-1) |
| | CCC:<br>Structure and Function**<br>Patterns |
| | SP(s):<br>Analyzing and interpreting data |
| | |
| **Investigation1, Part 2 – Caring for Goldfish;**<br><br>*Description of student activity(ies):*<br>*Observing how fish find and eat food to survive. Observing the effects of environmental change (plants, and clean water) on fish behavior.* | DCI:<br>**k-LS1.C: Organization for Matter and Energy Flow in Organisms**<br>• All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow. (K-LS1-1) |
| | CCC:<br>Structure and Function |
| | SP(s):<br>**Analyzing and Interpreting Data**<br>Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.<br>• Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (K-LS1-1) |

# Integrated Lessons

- Collaboratively created K-5 integrated NGSS/CCSS learning experiences (revised unit lessons with formative and/or performance assessments)
  - See Instructional Map-Overviews
- Created K-5 SBA ELA Prompts (narrative, expository and opinion) for revised lessons
  - See Instructional Map-Overviews

**Example: Grade 2 – Balance and Motion Unit Revision**

**New Performance Assessment:**

- **Problem**: "The toy factory needs a child's input on a new toy design. The design must include spinning, rolling and balance in order to move a marble from point A to point B? Follow the Engineering steps to design your toy."

GoldieBlox & Rube Goldberg "Princess Machine"

# Future STEM Science PD:

- Initial-use Science Kit Training – For all new hires and teachers changing grade levels
  - Kit Trainings will happen in the fall (dates TBD) - Emails will be sent to you in September to update you on training dates, times and locations.

- NGSS Awareness Workshops – After-school sessions

- Continued Creation of Integrated STEM Lessons and Performance Assessments – Collaboration with Grade Level or Cross-Grade Level Teams

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# Designated Science Area

Establishing a classroom environment that promotes early learning in science.

# Science Centers in Pre-K and K

- Sparks excitement for and interest in science
- Reinforces content beyond the teacher taught lesson
- Provides equitable access to and practice with science materials
- Encourages open inquiry
- Develops skills in observation, problem solving and reasoning.
- Facilitates collaboration and student dialogue around science content

# Science Center Readings

*"How can I set up a successful science center in my pre-school or kindergarten classroom?"*

In groups of 4:

- Each person in the group reads one of the four articles.
- As you read, highlight passages that resonate with you.
- When you finish reading, use your section of the discussion diamond to silently record ideas from your article about making science centers successful.
- Share out what you wrote with your group.

# Groups Discussion

- What might a Science Center for the Animals 2x2 unit look like?

- How can I set up a Science Center to reinforce content and inquiry practices for the Wood and Paper unit?

# Reflection

- What do you want to make sure you remember from this science session to support your work as you prepare for teaching your first science unit?