

Science FOR Literacy

K-6

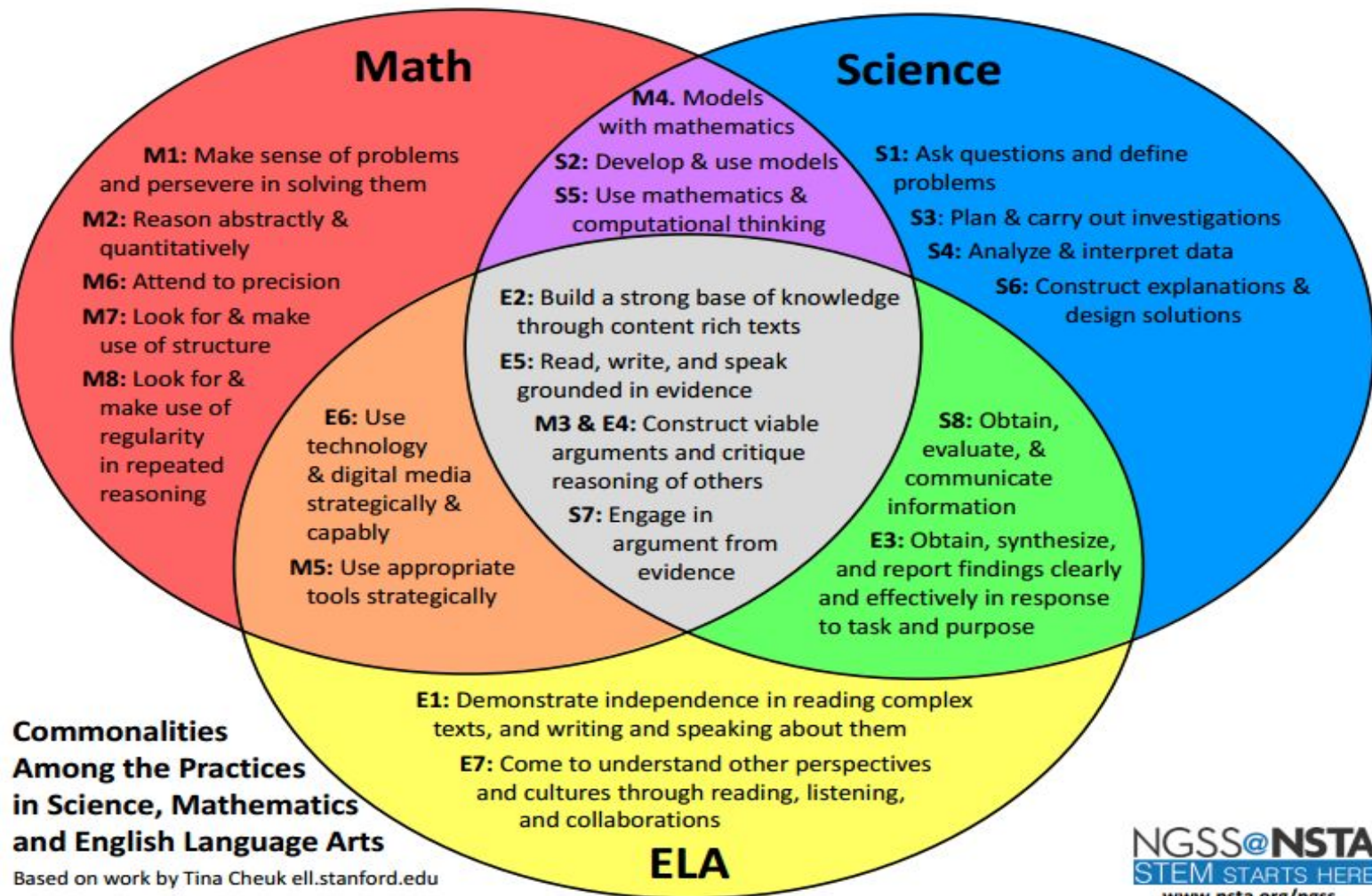


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How are Science and Literacy Interconnected?

- The following Venn Diagram, created by Stanford University Graduate Student Tina Chuek, shows the overlap of the Next Generation Science Practices, the Common Core Standards for Mathematical Practice, and the Common Core English Language Arts Capacities.
 - ELA “capacities” are similar to “practices” as indicators of student performance expectations, which is the term used in the mathematics and NGSS standards.

<http://nstahosted.org/pdfs/ngss/ExplanationOfVennDiagram.pdf>



The 4 Domains: Listening, Speaking, Reading and Writing

Which of the following classroom examples represent ELA and Science Integration?

1. Having a science center in the room with objects, pictures, books, and building materials.
2. Teaching science vocabulary explicitly.
3. Requiring students to keep a science notebook.
4. Analyzing data from an investigation.
5. Reading science texts and summarising main points
6. Debating which team's engineering design solution is best.

-Adapted from Carla Zembal-Saul "Beyond the Blender Metaphor of Integration"

A Few Grade-Level Examples:

What grade levels do we have in here?

Link Examples for K-5 videos: <https://psu.app.box.com/v/nstaK-5webinarvideos>

As we watch the video(s) note examples of the four ELA domains:

- Reading?
- Writing?
- Speaking?
- Listening?

Let's hear some ideas!

-Adapted from Carla Zembal-Saul "Beyond the Blender Metaphor of Integration"

An Alternative to K-W-L: K-L-E-W-S

KNOW

What do we think we know about...?

LEARNING

What are we learning?

EVIDENCE

What's our evidence?

WONDER

What new wonderings do we have?

SCIENCE WORDS

What science words and ideas help us explain?

Initial ideas about the phenomena

Statements framed as claims that address the question

Analyzed data from the investigation

Testable questions that emerge from investigation

Vocabulary introduced AFTER students begin sense making

3rd Grade Classroom Example

ADAPTATIONS

What makes it an insect?

What we think we NOW

(Claims) earning

Evidence

Wondering

Science words?

Concepts

Insects have:

- 3 body parts - head, thorax, abdomen
- exoskeleton
- antennae
- 6 legs
- most have wings

Are cockroaches insects?

Yes, they are insects because they have 6 legs, 3 body parts (head, thorax, abdomen), antennae and an exoskeleton.

Do cockroach species have individual differences?

Cockroaches do have differences because we were able to identify our three cockroaches.

Do variations in color help some individuals of a species to survive?

Color can help some individuals to survive better than others because their colors help them to camouflage from their predators.

How do changes in a population occur over time?

Variations in traits help some members of a species to survive and have offspring with helpful traits. Over time the population changes to adapt to its habitat.

What makes an animal an insect?

What are the body parts of an insect?

How many legs does an insect have? Are their legs like straight lines?

Do insects have skin and bones?

What is the difference between moths and butterflies?

Are spiders insects?

What kind of larva do moths have?

Why do moths like light?

How many legs on a caterpillar?

Do all adult insects have wings?

Do any insects have only one pair of wings? What color of grasshoppers did survive the most change in the fall? Why?

Do insects have blood?

By looking closely we found differences such as black dots on the bottom of the abdomen, dark hair all over, and a shorter antenna.

to "grasshoppers" that were colored green survived because they blended with the grass, compared to a "red grasshoppers" that were well lit because their color made them stick out.

The brown and the yellow "beetle" survived the most because they camouflaged with the habitat and they were able to reproduce. The brown beetle increased from 40 to 100 and the yellow ones went from 100 to 10. The green "beetles" stood out in the habitat, so they got eaten more by predators. It decreased.

Adaptations are features that help plants or animals survive. They can be structural or behavioral.

Camouflage: a living thing that has a shape or color that helps it blend with its surroundings.

Traits: inherited characteristics

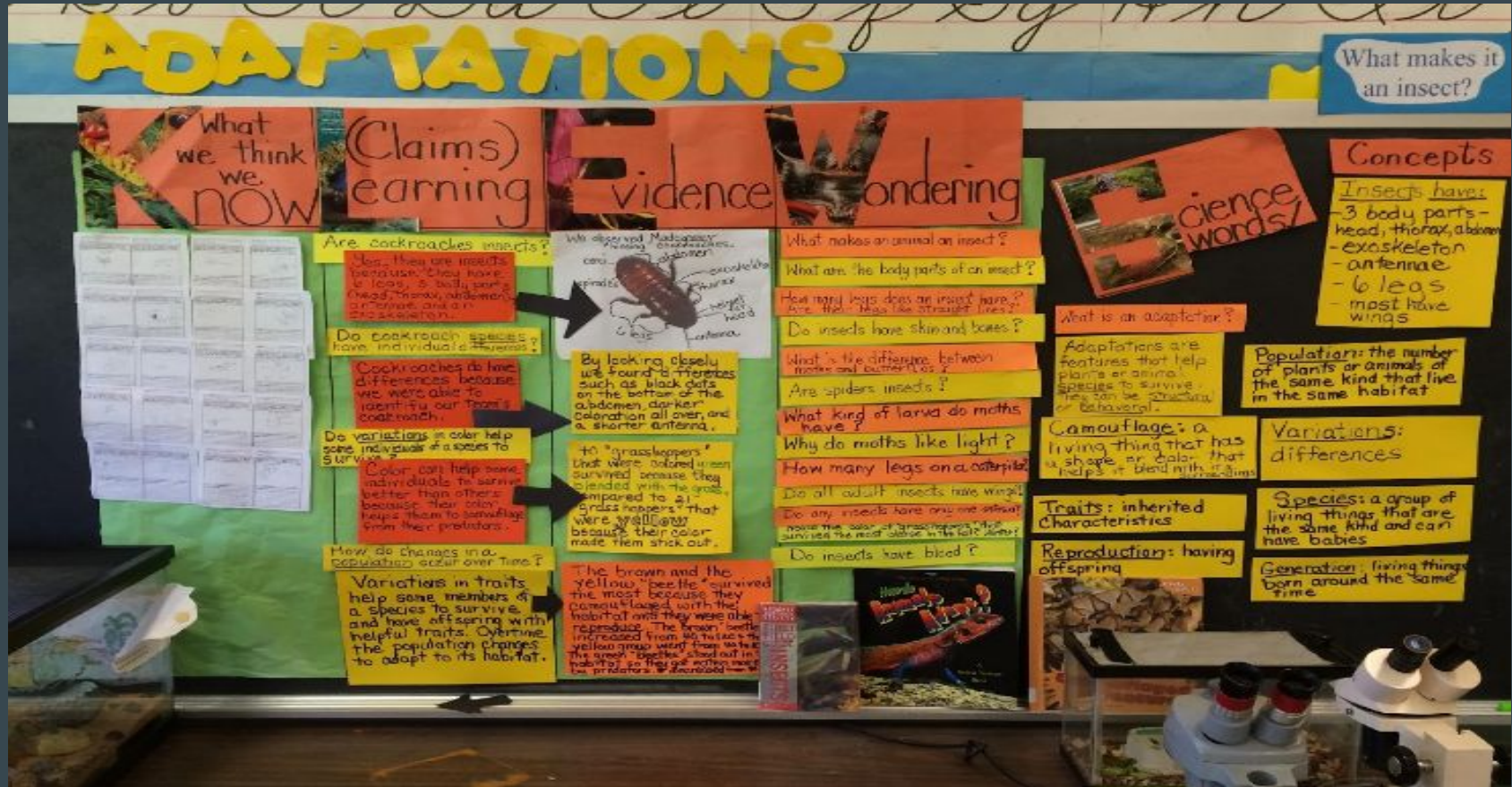
Reproduction: having offspring

Population: the number of plants or animals of the same kind that live in the same habitat.

Variations: differences

Species: a group of living things that are the same kind and can have babies

Generation: living things born around the same time



-Adapted from Carla Zembal-Saul "Beyond the Blender Metaphor of Integration"

What can be included as a science text?

- Non-fiction texts (written, read-aloud, video/multi-media formats)
- Models
- Graphs, charts, tables, diagrams, student drawings
- Student talk as text

Dr. Zembal-Saul reminds us:

“Sensemaking in science necessarily involves literacy practices; authoring, reading, critiquing, summarizing a variety of texts.”

Activity Time!

In the following example activity, as you work please consider how the ELA domains could be integrated if you were to use this in your own classroom.

- What reading practices could you facilitate before, during and/or after this activity? Whole group read-aloud, small group strategy practice?
- What writing practices could you facilitate before, during and/or after this activity? Informational/Expository? Persuasive/Argument?
- What opportunities do students have to speak and listen? (think about the science practices: obtain, evaluate and communicate information; engage in argument from evidence; etc.) (Talk Activities Flow Chart & A/B Partners Protocol)
- How could you use the KLEWS strategy throughout this activity/a larger unit?

Bird Beak Adaptations

NGSS Strands:



	K-2	3-5	6-8
LS3.A Inheritance of traits	Young organisms are very much, but not exactly, like their parents and also resemble other organisms of the same kind.	Different organisms vary in how they look and function because they have different inherited information; the environment also affects the traits that an organism develops.	Genes chiefly regulate a specific protein, which affect an individual's traits.
LS3.B Variation of traits			In sexual reproduction, each parent contributes half of the genes acquired by the offspring resulting in variation between parent and offspring. Genetic information can be altered because of mutations, which may result in beneficial, negative, or no change to proteins in or traits of an organism.

Your Task:

- You are tasked to design and build the most efficient bird beak to collect the most amount of “food”
 - Design Constraints
 - Time of construction
 - Material cost
 - Beak must be composed of multiple parts but work as one piece
 - You may only put one piece of food in your stomach at a time

Adapted from Dustin Coli (dcoli@washoeschools.net) and Leigh Metcalfe (lmcalfe@washoeschools.net)

Your Task Continued

- As a group, you will be feeding on a variety of different foods.
 - Each person will be designing a beak that will give them an advantage for feeding.
 - You will have a limited feeding season.
- Take a moment to reflect on a few beaks you have observed on bird in your neighborhood/school.
 - What shapes are seen in different beaks?
 - What food do you see those birds eating?
 - How does their beak work?

Adapted from Dustin Coli (dcoli@washoeschools.net) and Leigh Metcalfe (lmetcalfe@washoeschools.net)

Order of Completion

1. Define the problem; plan the solution; gather materials. (5-7 minutes)
2. Build your beak. (10 minutes)
3. Conduct three 30-second trials (one type of food, record on table).
4. Reflect and redesign. (5-7 minutes)
5. Rebuild your beak. (10 minutes)
6. Conduct three 30-second trials (one type of food, record on table).
7. Reflect. (3-5 minutes)

Back to the Teacher Perspective...

As you were completing the activity, how and where could the ELA domains be integrated if you were to use this in your own classroom?

- What reading practices could you facilitate before, during and/or after this activity? Whole group read-aloud, small group strategy practice?
- What writing practices could you facilitate before, during and/or after this activity? Informational/Expository? Persuasive/Argument?
- What opportunities do students have to speak and listen (think about the science practices: obtain, evaluate and communicate information; engage in argument from evidence; etc.)
- Could you use the A/B Partners Protocol or any activities from the Talk Activities Flow chart?
- How could you use the KLEWS strategy throughout this activity/a larger unit?

Thank you!

Please feel free to contact me with questions or for additional resources!

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