

Science Notebooks: Engaging Students with the Scientific Practices

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HIDOE Summer Science Kickstart

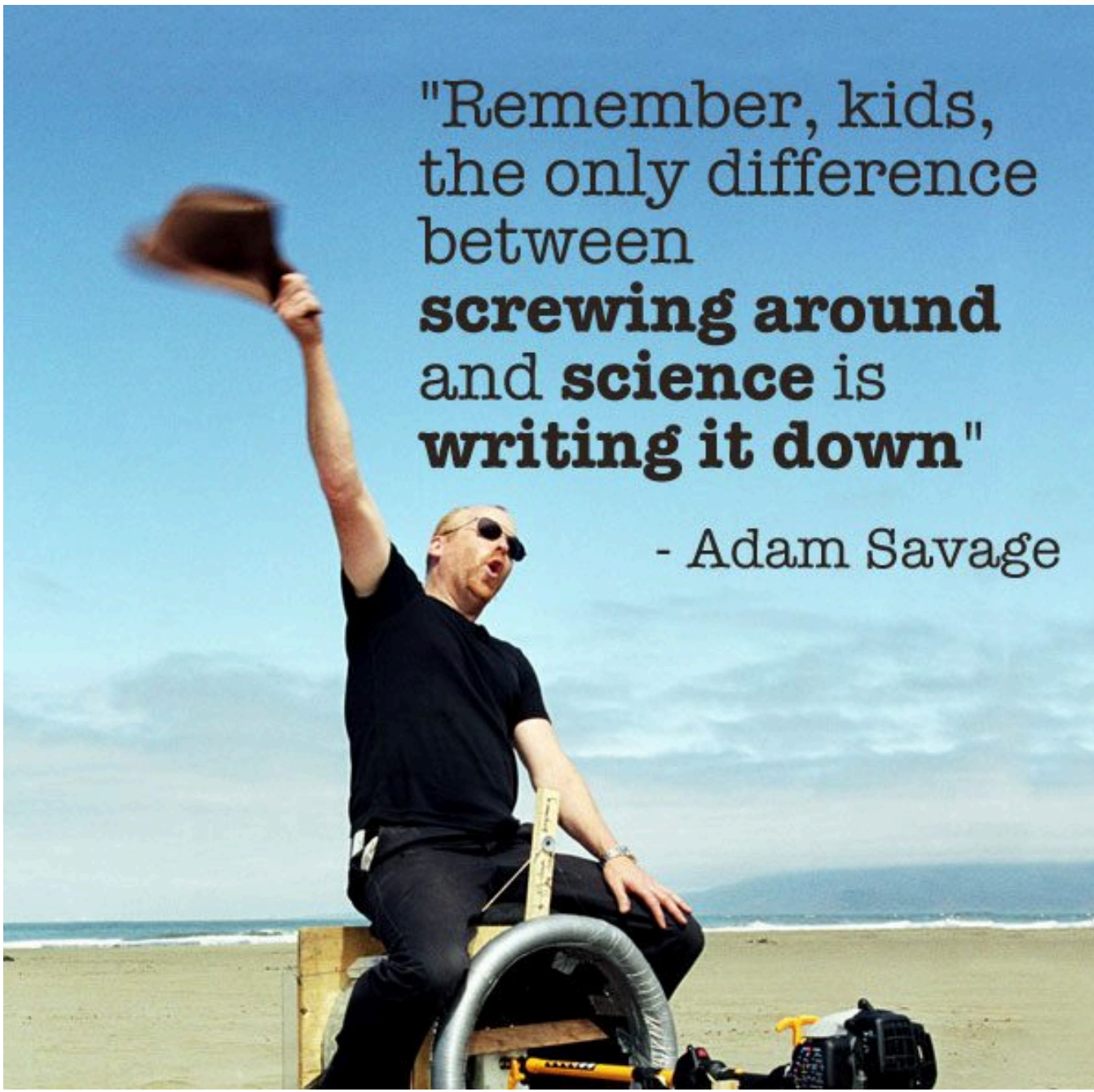
July 17, 2017



“The important but abstract ideas of science...all begin with observing and keeping track of the way the world behaves.”

National Science Education Standards (1996)



A photograph of Adam Savage sitting on a wooden structure on a beach. He is wearing a black t-shirt, black pants, and sunglasses. He is holding a brown hat high in the air with his right hand. The background shows a sandy beach, the ocean, and a blue sky with some clouds. The quote is overlaid on the right side of the image.

"Remember, kids,
the only difference
between
screwing around
and **science** is
writing it down"

- Adam Savage

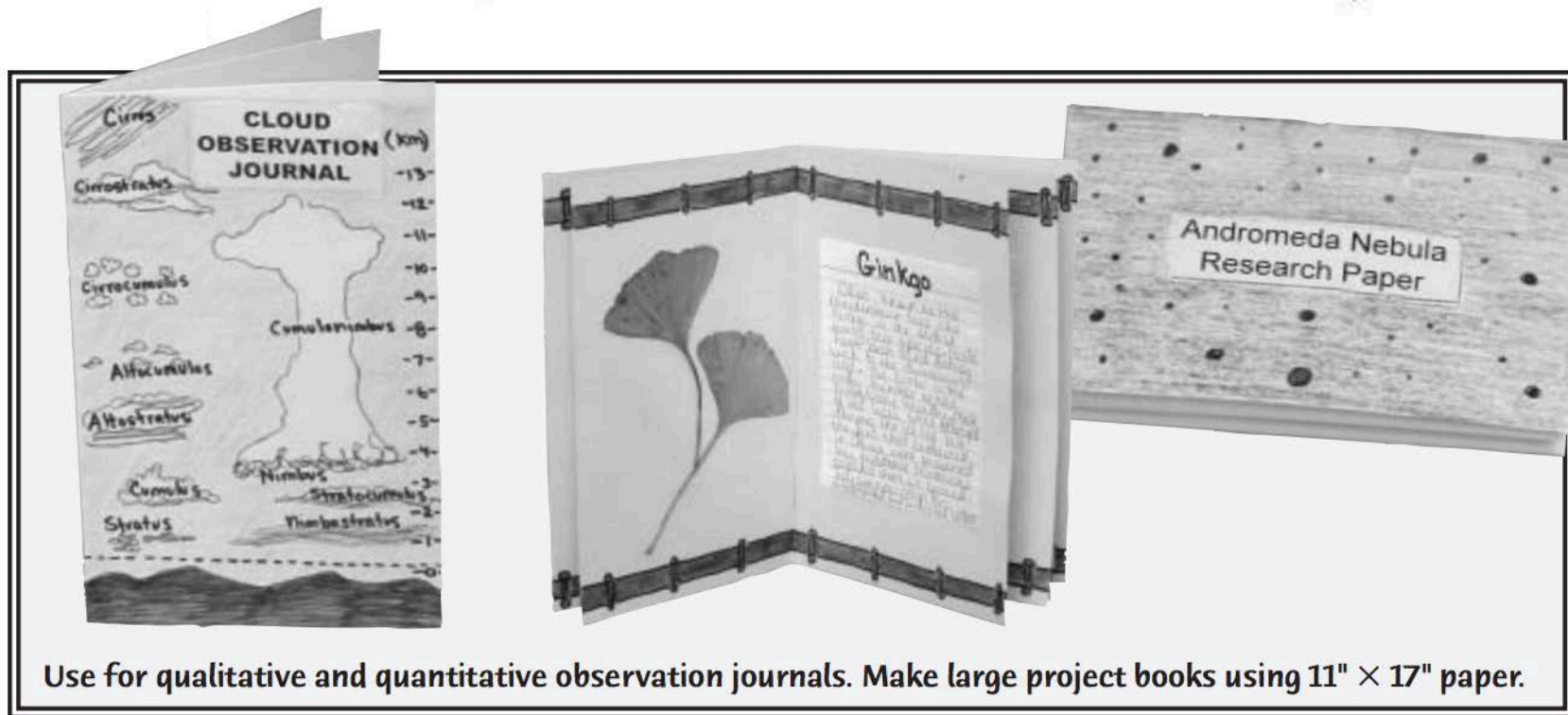


Goals

- Engage in an experience to explore the role of science notebooks
- Consider strategies to help students develop the skills needed to use science notebooks
- Examine how notebooks align with the NGSS and CCSS



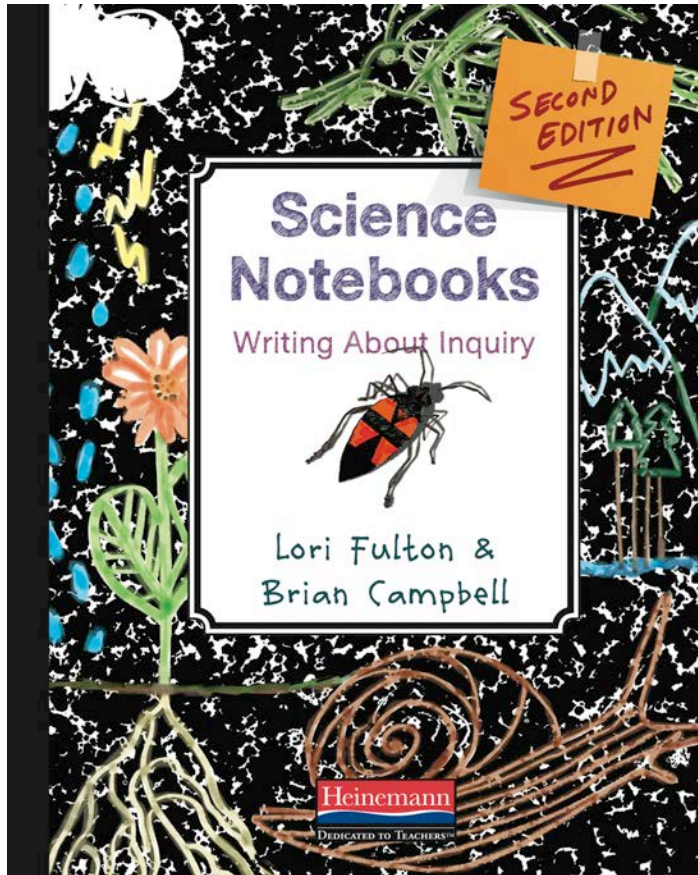
Notebook



Dinah Zike Foldable Bound Book

Image from: <http://www.pjteaches.com/Lessons/PDF/FoldablesInstructions.pdf>

Notebooks are ...



“meant to be a tool for students to record both their data and thinking as they work with materials... [they] replicate, to a certain degree, the notebooks that scientist keep.” (p. 3)

What are the goals of a science notebook?

- To build and reveal students' thinking about science content
- To replicate the work of scientists
- To serve as a tool to develop and exercise literacy skills



The Role and Purpose of Writing in Science

Scientists

- Documentation
- Explanation
- Reflection
- Communication

(Yore, Florence, Pearson, & Weaver 2006)

Students

- Means to transmit knowledge
- Personal expression
- Social practice

(Rowell, 1997)



Writing in Science

Research demonstrates that

- writing in science promotes the development of conceptual understanding and serves as a vehicle for language development. (Keys, 1999; Rivard, 1994; Ruiz-Primo, Li, Tsai, & Schneider, 2010; Yore, 2000)
- writing should be scaffolded in some way to support students. (Hand, Prain, Lawrence, & Yore, 1999; Ruiz-Primo, Li, Tsai, & Schneider, 2010; Yore, Bisanz, & Hand, 2003)



Format of a Notebook Entry

Date

Title

Tables
Graphs
Organizers

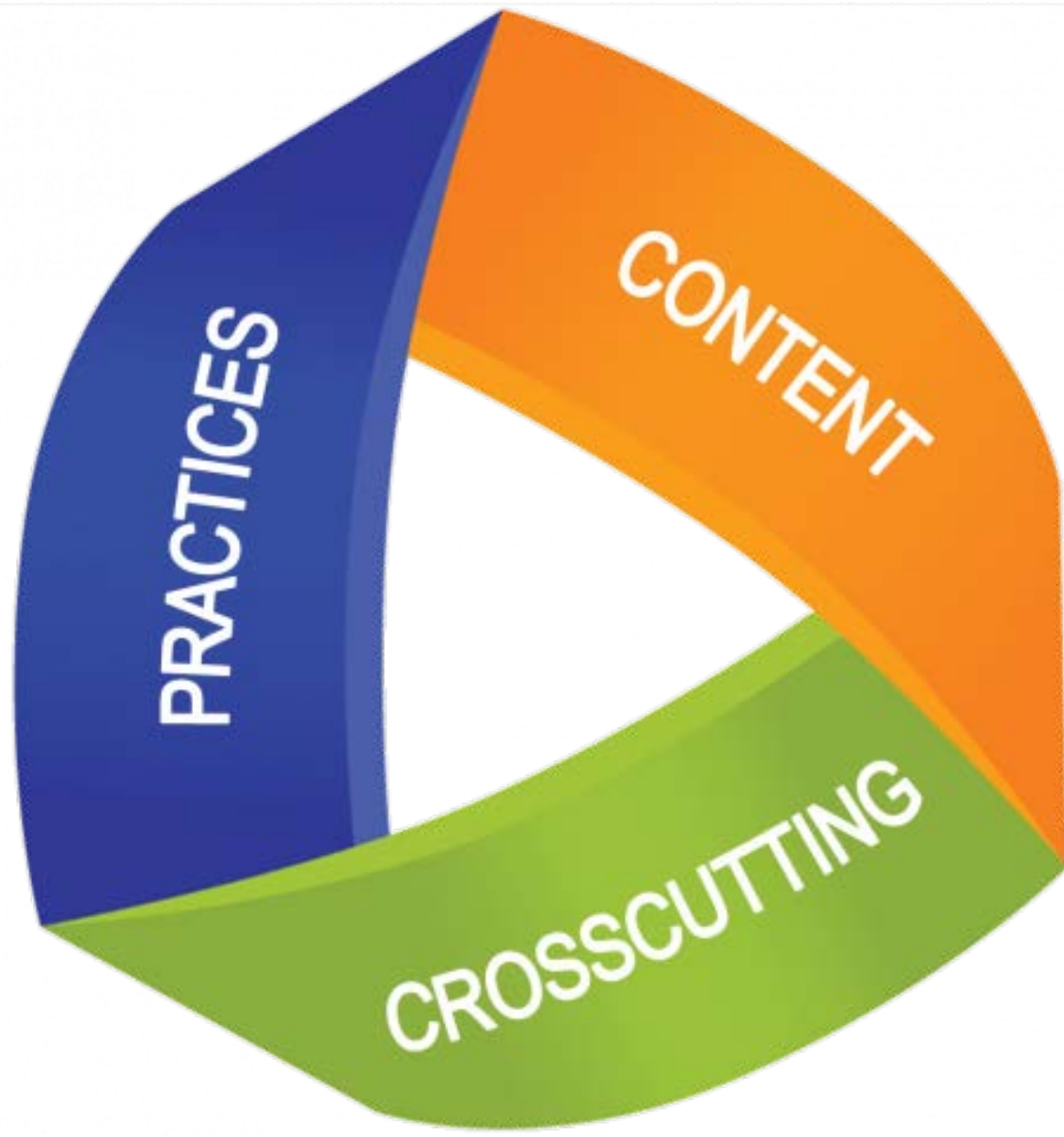
2-2-2009
Spring Rocks.

Sand Gravel Pebble

I told Priscila The Sand Was Kindr and The gravel Was first grade and The Pebble Was Fin grade. because The Sand is littal and The gravel is mede am and The Pebble is big. Rocks break apart and get smaller and smalle.

Drawing

Written
Explanation
/Thinking



Activity

Hawaiian Beach Sands

Adapted from: <https://coast.noaa.gov/psc/sea/content/hawaiian-beach-sands-crime-scene-bio.html>



Hawaiian Beach Sands

- Place a small sample of sand onto a piece of paper.
- Separate the particles, using a toothpick.
- Use a magnifying glass to observe the particles.
- Tape samples of the particles into your notebook.
- Record your observations.
 - What does the sand look like?
 - What does the sand feel like?



Vinegar Test

- Place a small amount of sand into the lid and add a few drops of vinegar.
- Observe and record what happens.



Science Talk



Where do you think the sand came from?

Write Your Explanation



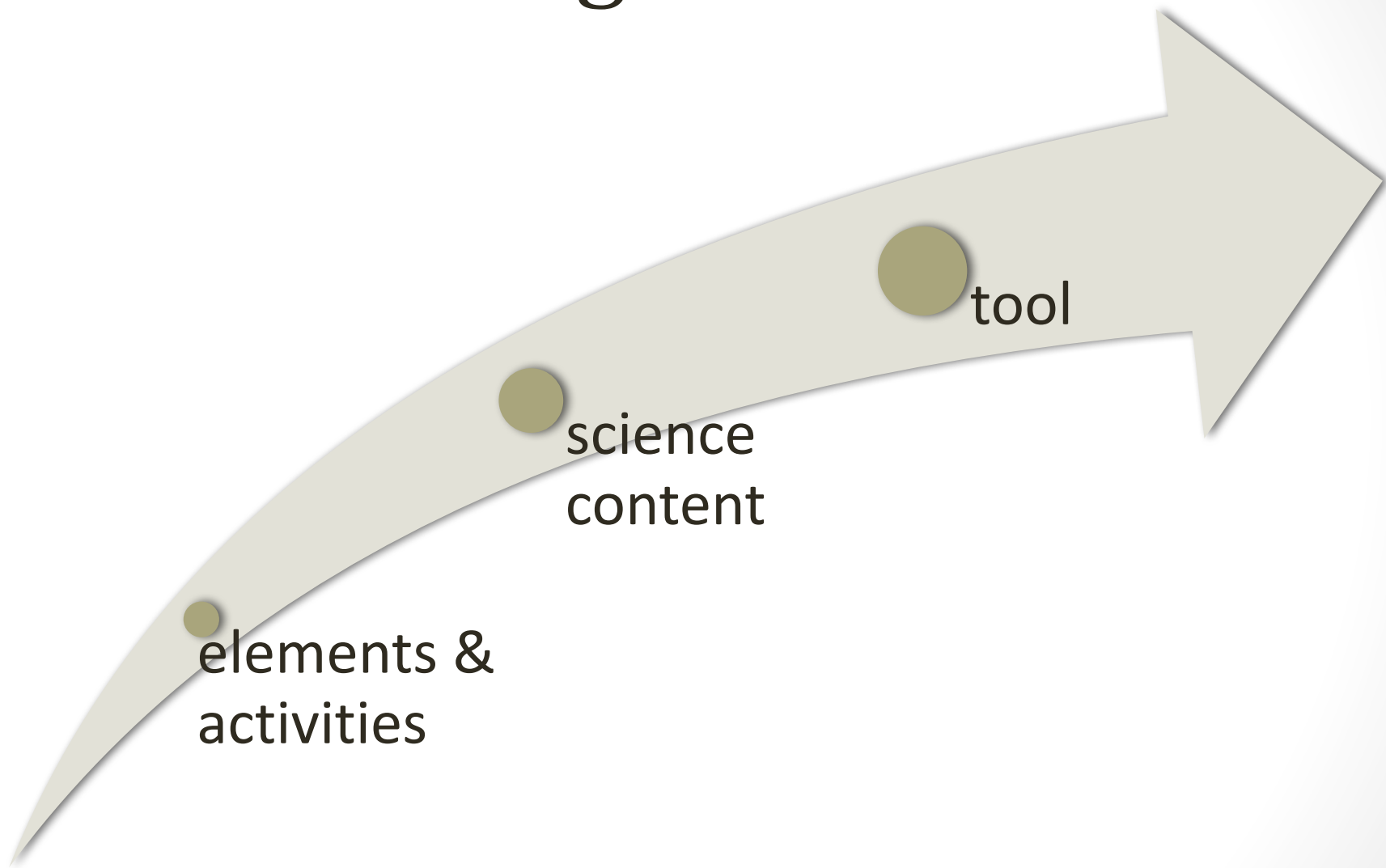
Where do you think your sand came from?

I think _____ sand is _____ (volcanic or biological). Our observations and tests show _____ (what did you observe). I think this because _____ (what in the reading supports your idea).

What instructional practices supported the development of your science notebook?



Notebook Progression



Science Notebook Strategies

Supports

- Class notebook
- Focus questions
- Word walls
- Notebook readings
- Vocabulary cards
- Talk before writing
- Important details
- Blogging
- Notebook as a tool – use during science talks
- Notebook review – examine others' notebooks
- Notebook as a reference – look for information

Scaffolds

- Sentence frames/starters
- Teacher created checklists
- Dictation
- Think alouds
- Pictures/visual prompts
- Worksheets – ideas on how to record/organize
- Exemplars/non-exemplars
- Modeled writing
- Audio record responses
- Small group writing
- Student created checklists



Class Notebook

10-9-08 brassica

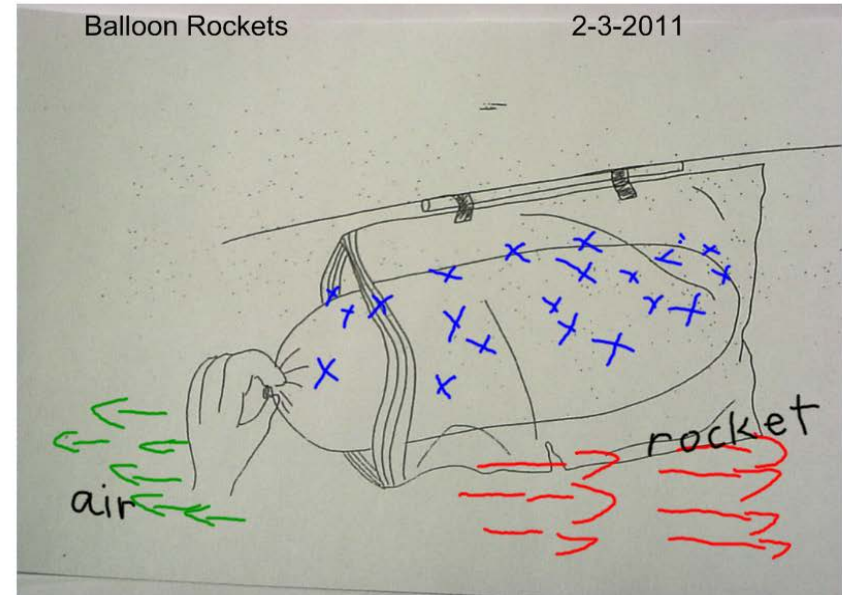
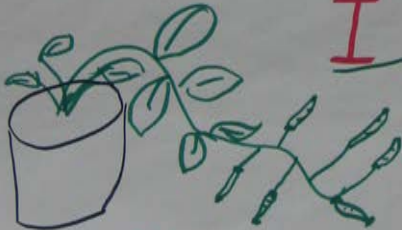
I think the plant grows again inside the plant. -Aracely

I think when the pollen falls into the soil it will make a new plant -Chris

I wonder what the new green things are on the brassica?

I see some green things. -Chris

I know I have 16 green things.



When you *inflate* the balloon it gets bigger **because** air takes up space. -Lou

I observed that when you inflate the balloon it might pop if you put too much air in it **because** the air doesn't have any more space to go. -Kimmy

When you launch the rocket the air escapes backward and the rocket moves forward **because** the air pressure from the balloon makes the rocket go forward. -Luis

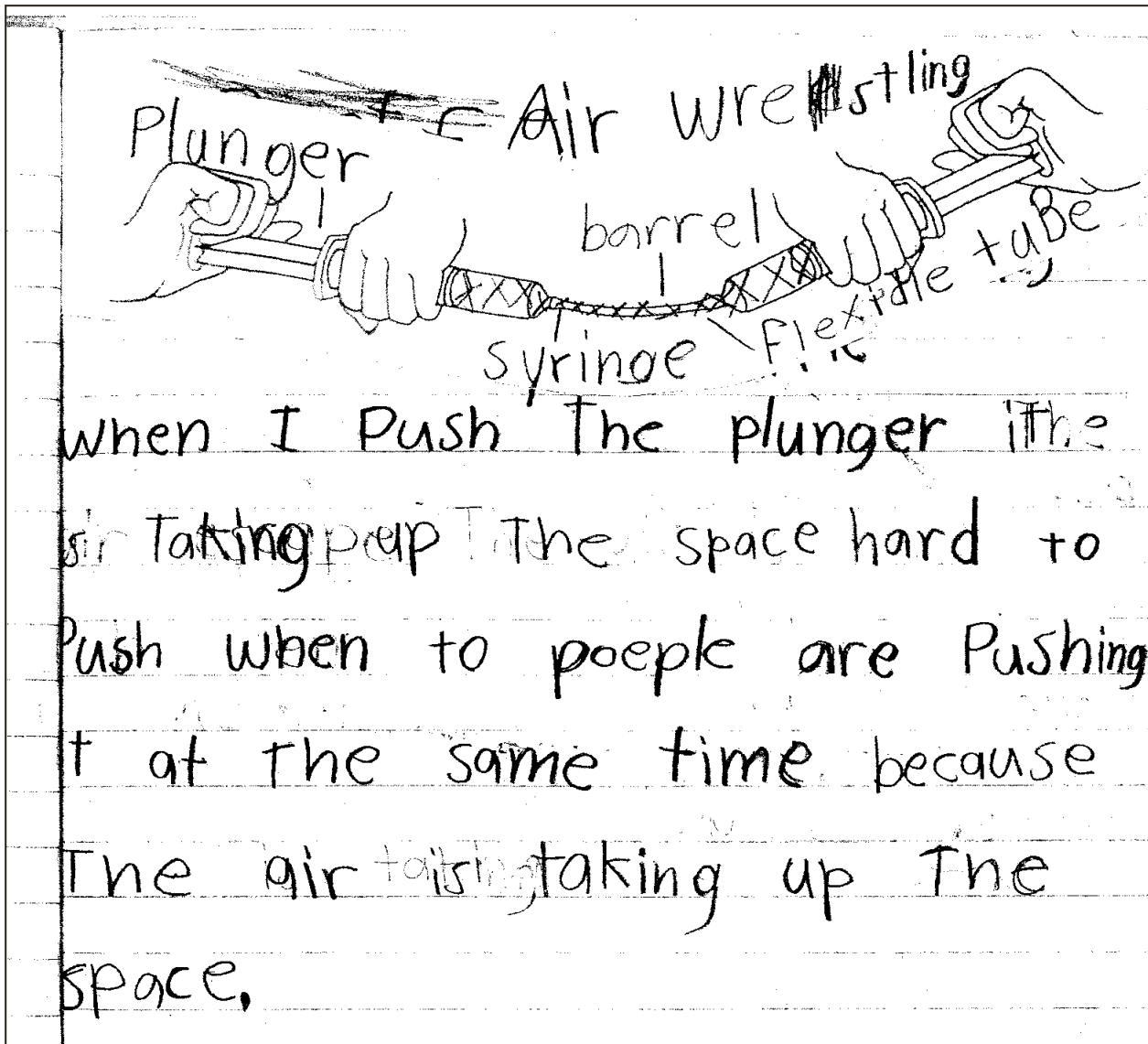
Important Details



Sentence Starters/Frames

- I notice ...
- I wonder ...
- I think ... because ...
- Cornmeal is a ... because ... My evidence to support this is ...
- ... is a (conductor/insulator) because ... I know ... is a (conductor/insulator) because I ...

Picture/Visual Prompts



Modeled Writing

9-28-10 Waxworms and Mealworms

6 legs in the
front of their body

13 segments

burrow

larva

need food, air, space, and water

tickle when you hold them

pupate

waxworms

food is called medium

~~feels~~ body is squishy

white

move slowly

mealworms

food is called wheat bran

body is hard

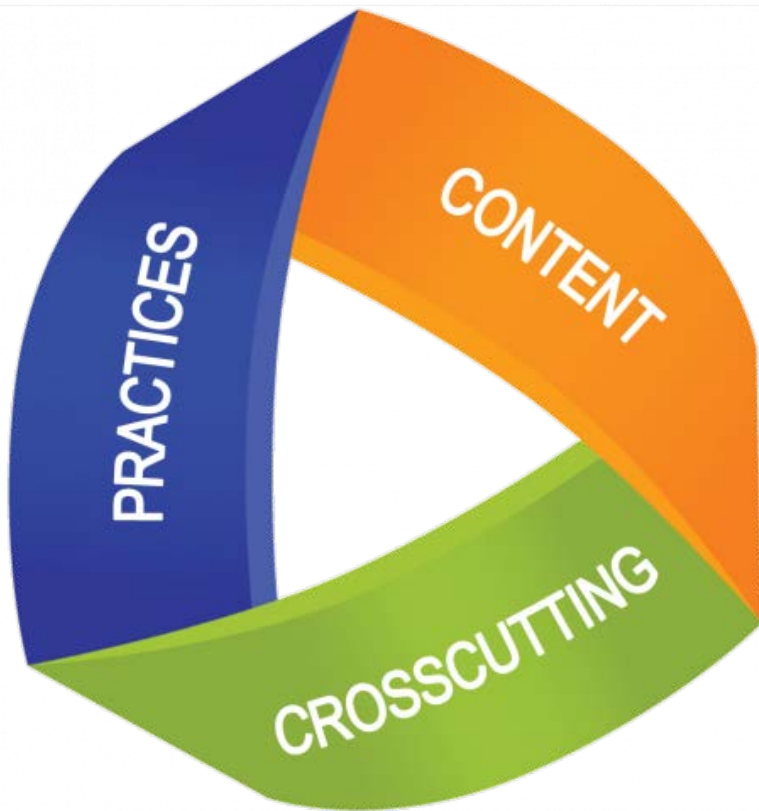
brown

move quickly

Small Group Writing



How does the science notebook align with the practices of NGSS and the CCSS?



COMMON CORE
STATE STANDARDS INITIATIVE
PREPARING AMERICA'S STUDENTS FOR COLLEGE & CAREER

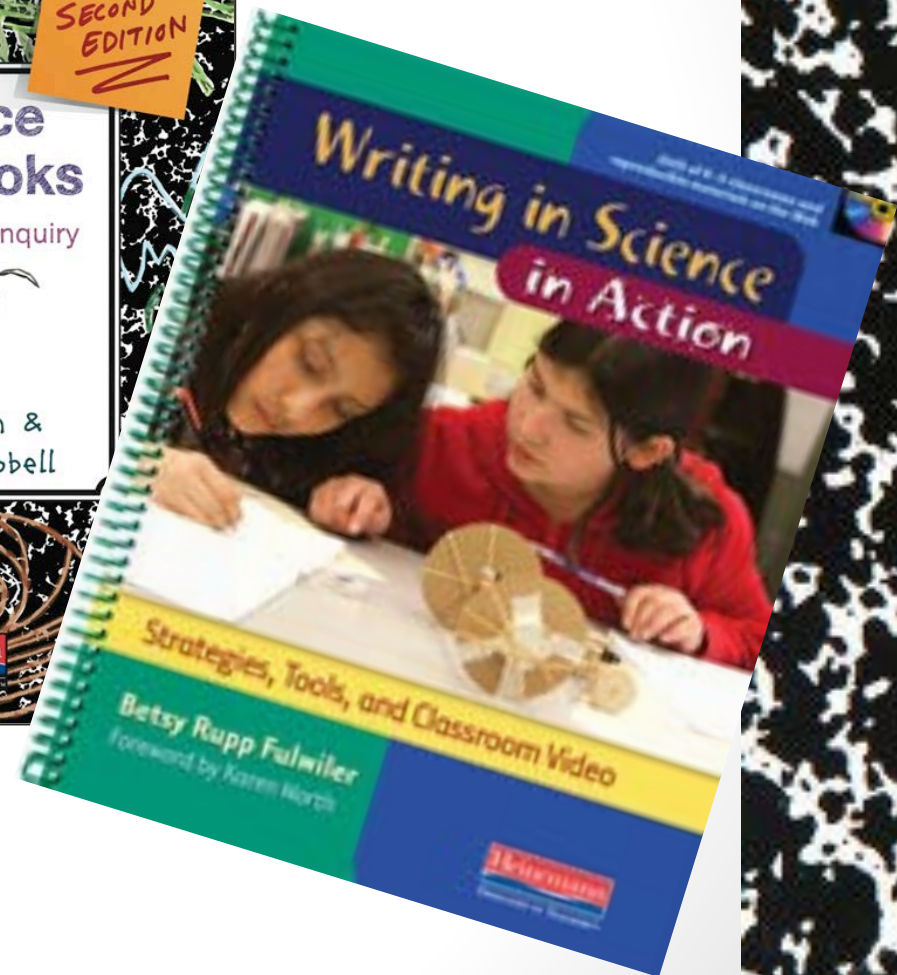
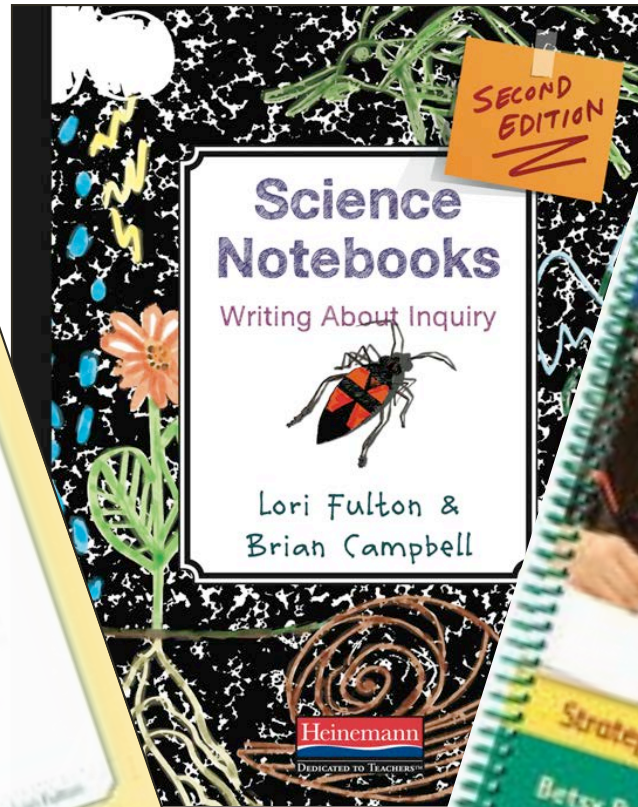


“Getting students to use science notebooks to their fullest extent allows students to develop and reveal their thinking about scientific concepts, replicate the work of scientists and engineers, and develop and exercise language skills.”

Fulton & Campbell, 2014, p. 7



Professional Resources



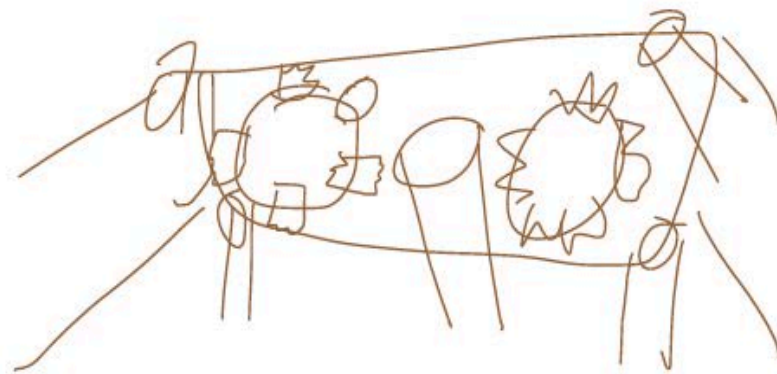
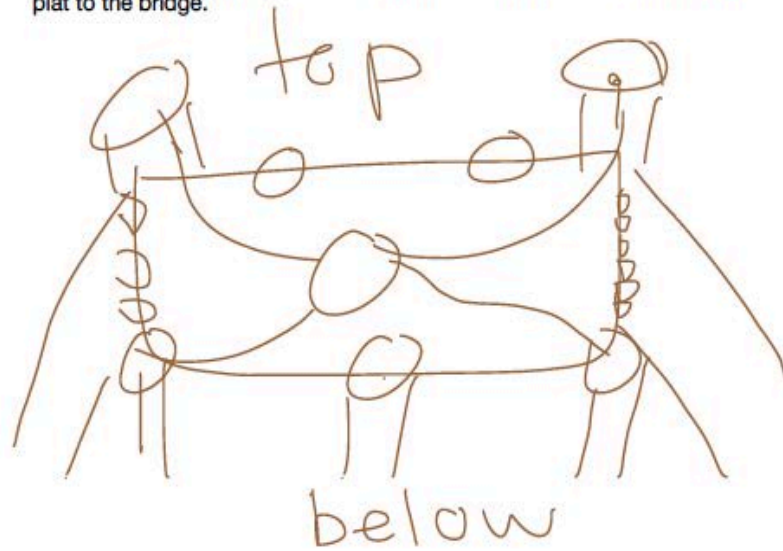
Mahalo!

Questions/Comments

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We improved our bridge and added more tape and added another paper plat to the bridge.



This is our bridge. It was spouse to be a suspension bridge but it looks more like a beam bridge. We added plats so it would be more sturdier.



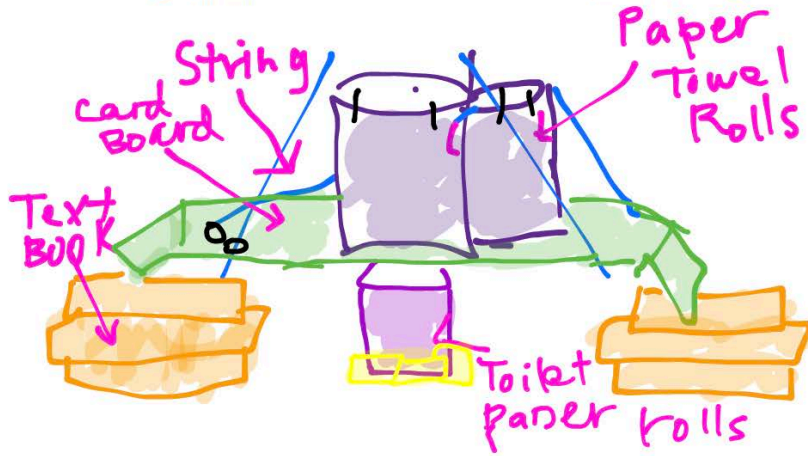
This is a picture our bottom of the bridge.



🙄 FAILURE



😊 Getting Better



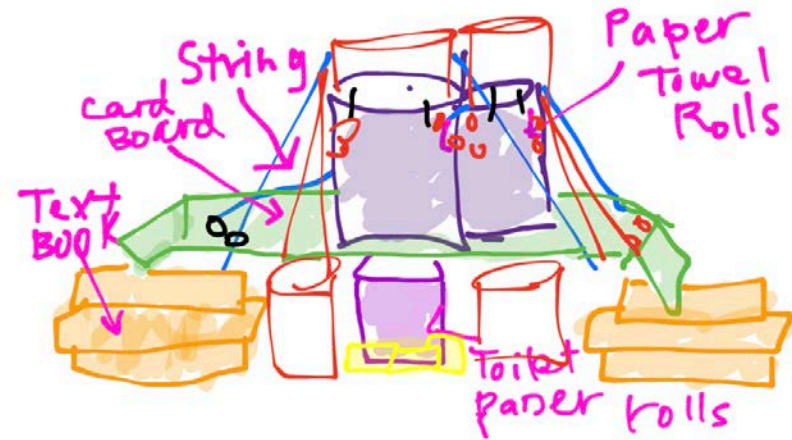
We decided to create a cable-stayed bridge.

Cables

We added more cables and made it more stable. We wanted to lift the middle so it is at least 3 inches of the text book. We were having a hard time balancing middle.



Since we didn't have a budget today we were able to improve on our project a lot. I think that we thought of a lot of great ideas that we can use.



👉 Improvements



Group 1



Group 2



Group 3



Ours



This is our bridge it is holding 500 pennies.

10
Catapult challenge

- 1 clothes pin
- 2 rubber bands
- 1 spoon
- 2 Popsicle sticks

This is our plan for the catapult.



This is our catapult so far.

When the catapult is like this it shoots very high.



And when it is like this it shoots like this it shoots farther.

