High School MCAS Biology
Through the Garden and Food System

Anna Cotton M.Ed
High School Science Teacher
Martha’s Vineyard Regional High School

Suzie Scordino
Farm to School Educator
Island Grown Schools
Think - Pair - Share

- What is engagement?
- How is engagement relevant to learning science?
Why this model? How can you use this talk?

- Engagement
- Content
  - Big Picture
  - Thematic content connections
- Authentic Assessment
  - End product
  - Short term
  - Skill development
Topics Template

- Scaffold Presentations
- Works on writing skills
- Increases buy in and purpose for book and picture taking
- Developed with student input after reflection on coffee table books
- Will use separate template for garden
Project Vine And IGS

A school year of science in the garden
PROJECT VINE & ISLAND GROWN SCHOOLS
How do we do this?

- **Planning**
  - Yearlong plan with standards
  - Garden Timing
  - Weekly garden time
- **Organizing lab activities**
- **Organizing content connections**
- **Textbook and resource connections**
- **MCAS Biology quizzes and tests**
- **Strategy instruction in annotated reading, writing and executive functioning**
- **Scaffold year end project and blog posts**
● Garden jobs:
  ○ Saving seeds
  ○ Sowing seeds of cool hardy crops
  ○ Transplanting cool hardy crops for cold frames
  ○ Harvesting vegetables from the garden and making simple recipes - salsa, salads
  ○ Harvesting herbs from the garden to dry
  ○ Turning compost
  ○ Amending the soil and the perennial herbs/fruit trees with compost and/or fish emulsion
  ○ Planting garlic and mulching it
  ○ Taking soil samples and examining them
  ○ Vermicomposting - our worm bin and developing a lesson to teach to preschoolers
Plant varieties, genetics, why study biology? - making salsa, comparing breeding of heirloom tomato to grocery store/hot house tomatoes and pros and cons of both
Classification of living things - making labels with “Family” on one side and “Genus species” on the other, using seed catalogs to find the scientific names of their plant, comparing and contrasting plant families.
Fall

ECOLOGY, SOIL FOOD WEB, 
SOIL SCIENCE

- Soil particle separation, soil testing, soil pH, soil amendment recommendations, soil food web, compost system

Identify Your Soil Type

The Jar Test

1. Fill a clear glass jar halfway with your soil sample.
2. Fill the remaining half with water, leaving 1/8 of air.
3. Attach lid, then shake the jar vigorously until you have broken up any clumps of soil.
4. Set the jar aside to rest, undisturbed, overnight.

After 24 hours your jar’s contents will have settled into distinct layers:

- SAND
- SILT
- CLAY

The jar contains layers of soil:

- Water
- Clay
- Silt
- Sand

The jar is separated into layers:
## What's Eating My Plant?
How to Recognize Common Pests by the Leaf Damage They Cause

<table>
<thead>
<tr>
<th>Damage</th>
<th>Pest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deformed leaves, sucking damage</td>
<td>Aphids</td>
</tr>
<tr>
<td>Discolored leaves, sucking damage</td>
<td>Thrips and mites</td>
</tr>
<tr>
<td>Chewed or skeletonized leaves</td>
<td>Beetles, caterpillars, and sawflies</td>
</tr>
<tr>
<td>Leaf galls (abnormal plant growths)</td>
<td>Cynipid wasps, certain aphids, psyllids, and mites</td>
</tr>
<tr>
<td>Leaf mines (white patterns on leaves)</td>
<td></td>
</tr>
<tr>
<td>Folded leaves</td>
<td></td>
</tr>
<tr>
<td>Rolled leaves</td>
<td></td>
</tr>
<tr>
<td>Chewed leaves, slimy trails</td>
<td></td>
</tr>
</tbody>
</table>

**Fall**

---

**Interactions** - Examining plants in the garden and determining pest damage

**Tomato hornworm**
Fall

Cycling of matter - examining the root nodules of legumes for nitrogen fixing bacteria, as well as their leaf cell structure under microscope.
• Garden jobs:
  ○ Processing saved seeds
  ○ Using dried herbs
  ○ Developing our seed order from seed catalogs
  ○ Pruning the fruit trees and grape vines
  ○ Food science, examining food and food system concepts, making food together
  ○ Sowing seeds indoors
  ○ Preparing beds for planting, amending the soil
Winter

Chemistry of Life - Making butter, cooking eggs, comparing fats, bread making
Winter Biochemistry - food science, sourdough bread, butter, cheese, fermentation, microorganisms

Cells and Energy - Cheese making tour, ginger bug soda, bread baking
● Garden jobs:
  ○ Food science, examining food and food system concepts, making food together
  ○ Preparing beds for planting, amending the soil based on soil analysis
  ○ Sowing seeds indoors
  ○ Sowing seeds outdoors
  ○ *Awareness of the calendar - seeding crops early or late for school year harvest and observation
**Heredity** - GMOs in our food, genetics in the garden with Mendel pea experiment, hatching chicks, evolution selective breeding and varieties
Think - pair - share

● What’s one thing you’ll take back to your classroom?
● What resource do you need to make it happen?
● Can we help?
Next steps

- Start small
- Pick one food based activity
- Find your own theme
- Pick an authentic assessment
Questions?

12/7 - Inoculating mushroom logs with shiitake spores
- Plant and Soil Science eLibrary University of Nebraska [http://croptechology.unl.edu/pages/](http://croptechology.unl.edu/pages/)
- Process Oriented Guided Inquiry Learning (POGIL) activities [https://www.pogil.org/](https://www.pogil.org/)
- Chef’s Table Dan Barber Blue Hill at Stone Barns Episode available on Netflix
- Schmoker, M.J (2011). *Focus: Elevating the essentials to radically improve student learning*. Alexandria, Va; ASCD
Anna Cotton M.Ed
acotton@mvrhs.org
High School Science Teacher
Martha’s Vineyard Regional High School

Suzie Scordino
suzie@igimv.org
Farm to School Educator
Island Grown Schools