

NGSS Update for the Barre Town Curriculum Committee

November 17, 2015

With thanks to Val Sullivan of Lamoille South Supervisory Union for providing the slide deck that evolved to this version.

Warm Up

"Linear or Pinball?"

http://www.calacademy.org/sciencetoday/how-science-works/559179/



Although science is really more "pinball" than "linear", there are some well defined "practices" that are consistent as scientists move from unresolved knowledge to more resolved knowledge.



Vision for Science Teaching and Learning





Learning about science and engineering involves integration of the knowledge of scientific explanations (i.e., content knowledge) and the practices needed to engage in scientific inquiry and engineering design. Thus the framework seeks to illustrate how knowledge and practice must be intertwined in designing learning experiences in K-12 science education."



Conceptual Shifts in the NGSS



- 1. K-12 Science Education Should Reflect the Interconnected Nature of Science as it is Practiced and Experienced in the Real World.
- 2. The Next Generation Science Standards are student performance expectations NOT curriculum
- 3. The science concepts build coherently from K-12.
- 4. The NGSS Focus on Deeper Understanding of Content as well as Application of Content
- 5. Science and Engineering are Integrated in the NGSS from K–12.
- 6. NGSS content is focused on preparing students for the next generation workforce.
- 7. The NGSS and Common Core State Standards (English Language Arts and Mathematics) are Aligned.



Next Generation Science Standards



Concepts across disciplines



1. Disciplinary Core Ideas

Three broad categories:

- Physical sciences
- Earth and space science
- Life sciences



2. Crosscutting Concepts



Crosscutting Concepts

- 1.Patterns
- 2.Cause and effect
- 3.Scale, proportion, and quantity
- 4.Systems and system models
- 5. Energy and matter
- 6.Structure and function
- 7. Stability and change







3. Scientific and Engineering Practices



What is Engineering?

- Dictionary definition of engineering:
 - The application of science and mathematics by which the properties of matter and the sources of energy in nature are made useful to people.
- Working definition of engineering:
 - The creative process of analyzing and solving a problem to enhance the quality of life.

Engineering Practices

- Engineering practices are a natural extension of science practices.
- Science instruction often includes opportunities for engineering practices.
- NGSS provides meaningful connections of science and engineering in the Practices.
- These are science standards, so need to talk about the reasoning behind the design.





Common Core Connections

Math

M1. Make sense of problems & persevere in solving them

M6. Attend to precision

M7. Look for & make use of structure

M8. Look for & express regularity in repeated reasoning /

S2. Develop and use models

S5. Use mathematics & computational thinking

M4. Model with mathematics

E2. Build strong content knowledge

E3. Obtain, synthesize, and report findings clearly and effectively in response to task and purpose

E5. Read, write, and speak grounded in evidence

E6. Use technology & digital media strategically & capably

M2. Reason abstractly & quantitatively

M3. & E4. Construct viable arguments & critique reasoning of others

M5. Use appropriate tools strategically

S6. Construct explanations & design solutions

S7. Engage in argument from evidence

S8. Obtain, evaluate & communicate information

E1. Demonstrate independence in reading, writing, speaking, listening, and language use with complex texts

ELA

E7. Come to understand other perspectives & cultures

S1. Ask questions & define problems.

S3. Plan & carry out investigations

S4. Analyze & interpret data

Science

Adapted from: Working Draft v2, 12-06-11 by Tina Cheuk, ell.stanford.edu

NGSS Work in the Barre Supervisory Union

- Supervised/supported by science specialist Deanna Bailey (formerly of Barre Town)
- We have some passionate science teachers!
- NGSS-aligned curriculum development:
 - Takes place in cross-school, grade-alike teams
 - Supervised by Deanna
- Instructional support as needed (e.g., two new Barre Town science teachers received a day of training from Deanna)

NGSS Professional Development

PD on staff development days:

- Three science half-days for K-8 teachers
- Offered by BSU teachers who are graduates of the Vermont Science Initiative
- Offerings supported by Deanna

NGSS at Spaulding

Science department is developing curriculum:

- New three-course sequence featuring integrated science
- Working independently of Deanna.