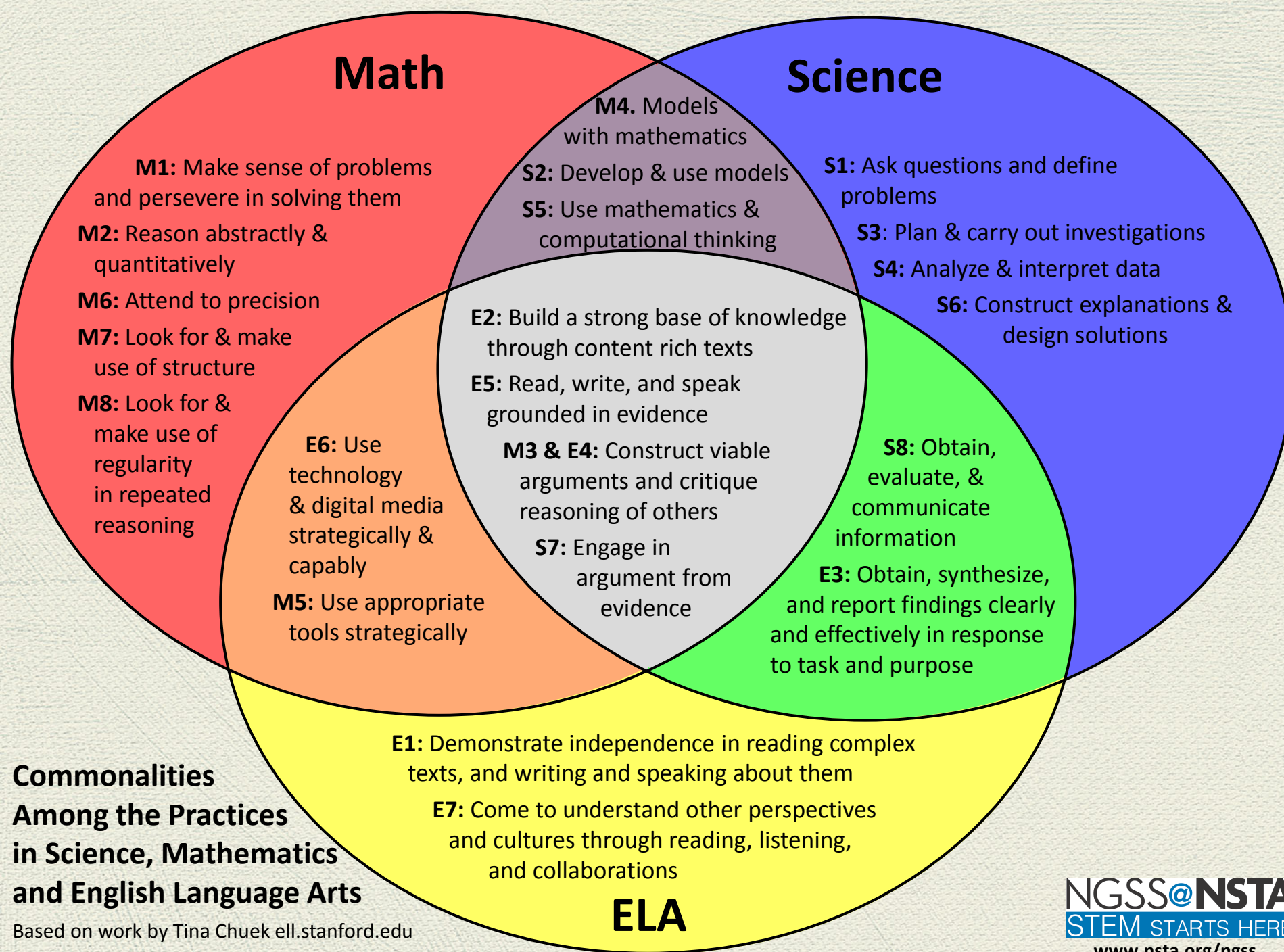


Mini-Rockets

April 9, 2016

CCSS-Math & ELA + NGSS Practices

- ◆ Commonalities Among the Practices in Science, Mathematics, and Language Arts Venn Diagram Handout
- ◆ CCSS-Math: Mathematical Practices
- ◆ CCSS-ELA / Literacy: Student Portraits
- ◆ NGSS: Science & Engineering Practices



Practices in Mathematics, Science, and English Language Arts*

| Math | Science | English Language Arts |
|---|--|--|
| <p>M1. Make sense of problems and persevere in solving them.</p> <p>M2. Reason abstractly and quantitatively.</p> <p>M3. Construct viable arguments and critique the reasoning of others.</p> <p>M4. Model with mathematics.</p> <p>M5. Use appropriate tools strategically.</p> <p>M6. Attend to precision.</p> <p>M7. Look for and make use of structure.</p> <p>M8. Look for and express regularity in repeated reasoning.</p> | <p>S1. Asking questions (for science) and defining problems (for engineering).</p> <p>S2. Developing and using models.</p> <p>S3. Planning and carrying out investigations.</p> <p>S4. Analyzing and interpreting data.</p> <p>S5. Using mathematics, information and computer technology, and computational thinking.</p> <p>S6. Constructing explanations (for science) and designing solutions (for engineering).</p> <p>S7. Engaging in argument from evidence.</p> <p>S8. Obtaining, evaluating, and communicating information.</p> | <p>E1. They demonstrate independence.</p> <p>E2. They build strong content knowledge.</p> <p>E3. They respond to the varying demands of audience, task, purpose, and discipline.</p> <p>E4. They comprehend as well as critique.</p> <p>E5. They value evidence.</p> <p>E6. They use technology and digital media strategically and capably.</p> <p>E7. They come to understanding other perspectives and cultures.</p> |

* The Common Core English Language Arts uses the term “student capacities” rather than the term “practices” used in Common Core Mathematics and the Next Generation Science Standards.

Mini Rockets

- ◆ How does mass affect the performance of a mini rocket?
- ◆ Materials
 - ◆ Plastic pipettes
 - ◆ Bendy straw and straight straw
 - ◆ Masking tape
 - ◆ Measuring tape
 - ◆ Scissors

Mini-Rockets Construction

- ◆ Work in pairs for this activity.
- ◆ Attach the end of the bendy straw over the larger pipette. Secure with masking tape. Take the straight straw and fit it over the bendy straw to make a mini-rocket. Cover the end of the rocket straw with a small piece of masking tape to make it air tight. The mini rocket is launched by sharply pressing on the pipette bulb.
- ◆ Caution - take care not to aim at others

Mini-Rocket Activity

- ◆ First - make a prediction of how far you think the mini rocket will travel on your first attempt.
- ◆ Record the length of the straw rocket and distance traveled on the provided chart.
- ◆ What variables should we take into consideration for measuring distance traveled? launching the rocket?

Mini-Rocket Activity

- ◆ For a second attempt, cut off part of the bottom of the mini rocket straw. Measure the straw, then launch it & measure the distance traveled. Record the information.
- ◆ For each subsequent trial, cut the rocket straw and measure the length before launching.

Discussion

- ◆ How did the length of the mini rocket (and thus the mass) affect the distance the rocket traveled?
- ◆ What questions do you have after completing this activity?
 - ◆ What could you do to explore these questions?
- ◆ What CCSS - mathematical practices did you use in this activity?
- ◆ What NGSS - science and engineering practices did you use in this activity?
- ◆ What CCSS-ELA / Literacy practices did you use in this activity?

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5 E - Lesson Plan Model

- ◆ Engage
- ◆ Explore
- ◆ Explain
- ◆ Extend / Elaborate
- ◆ Evaluate

5Es and the Mini Rockets

- ◆ What parts of this activity align with 5E Model?
- ◆ How could the activity be strengthened with literacy strategies - reading, writing, speaking & listening?
- ◆ In what parts of the 5E model could they be embedded?

Science Content

- ◆ Current TN State Science Standards - 7th Grade

- ◆ SPI 0707.11.2 Determine the amount of force needed to do work using different simple machines.
- ◆ SPI 0707.11.3 Apply proper equations to solve basic problems pertaining to distance, time, speed, and velocity.
- ◆ SPI 0707.11.4 Identify and explain how Newton's laws of motion relate to the movement of objects

- ◆ Proposed TN State Science Standards based on Framework for K-12 Science Education - 8th Grade

- ◆ 8.PS2: Motion and Stability: Forces and Interactions

- ◆ 3) Create a demonstration of an object in motion and describe the position, force, and direction of the object.
- ◆ 4) Plan and conduct an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.
- ◆ 5) Evaluate and interpret that for every force exerted on an object there is an equal force exerted in the opposite direction.

Informational Texts

| Grade Band | Current Lexile Band | "Stretch" Lexile Band* |
|------------|---------------------|------------------------|
| K-1 | N/A | N/A |
| 2-3 | 450L-725L | 420L-820L |
| 4-5 | 645L-845L | 740L-1010L |
| 6-8 | 860L-1010L | 925L-1185L |
| 9-10 | 960L-1115L | 1050L-1335L |
| 11-CCR | 1070L-1220L | 1185L-1385L |

- ◆ *How do Airplanes Fly?* ReadWorks - Lexile 1070
- ◆ NYC Dept. of Education Grade 8 - Literacy in Science Straw Rockets Unit
 - ◆ Includes links to several texts - 3 linked to wiki.
 - ◆ Includes text-based questions, links to videos, assessments, etc.

Paraphrasing

- ◆ “Paraphrasing Telephone” (*p. 31 NYCDOE packet*)
- ◆ In the same small groups, students will play a game of “Telephone” using a short text. In a line, the first student will read the excerpt, and then tell the next person what the text is about. The last person will write down what has been passed along as the “gist” of the text. Students will share out and compare the accuracy of each explanation and paraphrase.

Sample Short Text

- ◆ At 9:47 a.m. on February 20, 1962, John Herschel Glenn Jr. lifted off from Cape Canaveral, Florida, in Friendship 7. He was ready to do something that no American had done before—fly a spacecraft around the Earth. After nearly five hours in space, orbiting the Earth three times, Glenn landed the spacecraft safely in the Atlantic Ocean. He was an instant hero. 2012 marks the fiftieth anniversary of the historic flight.
- ◆ <http://www.timeforkids.com/photos-video/video/historic-space-flight-28511>

Questions:

- ◆ What did you observe in this activity?
- ◆ What happened to the explanation as it was passed along?
- ◆ How accurate do you think the paraphrase was? How can you improve it?
- ◆ What were the difficulties for the first reader? The middle listeners? The writer?

Jigsaw Reading

- ◆ In groups, do a jigsaw reading of How do Airplanes Fly?
Write down two important facts that you read. In a share-out, students will state the facts from their part of the reading, and explain why they feel this is important. A group reporter will take notes for the large group share-out.

Large Group Discussion

- ◆ Why were the facts that you found important? How did you know?
- ◆ What words were difficult for you?
- ◆ What does paraphrasing mean?
- ◆ The most useful tools for paraphrasing the text of another author are synonyms, changes in voice or perhaps in word form, and the packing or unpacking of word groups. These strategies enable us to acknowledge that the intellectual content of a text is someone else's, but the information is in our own words.