Science and Technology/ Engineering Standards and Collaborative Science Planning: Teacher Professional Development Within and Across Districts

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CAPE COD REGIONAL
STEM NETWORK

Presentation Overview

- Guiding Ideas
- Summer Professional Development
- Promising Pratices

CAPE COD REGIONAL STEM NETWORK

Guiding Ideas

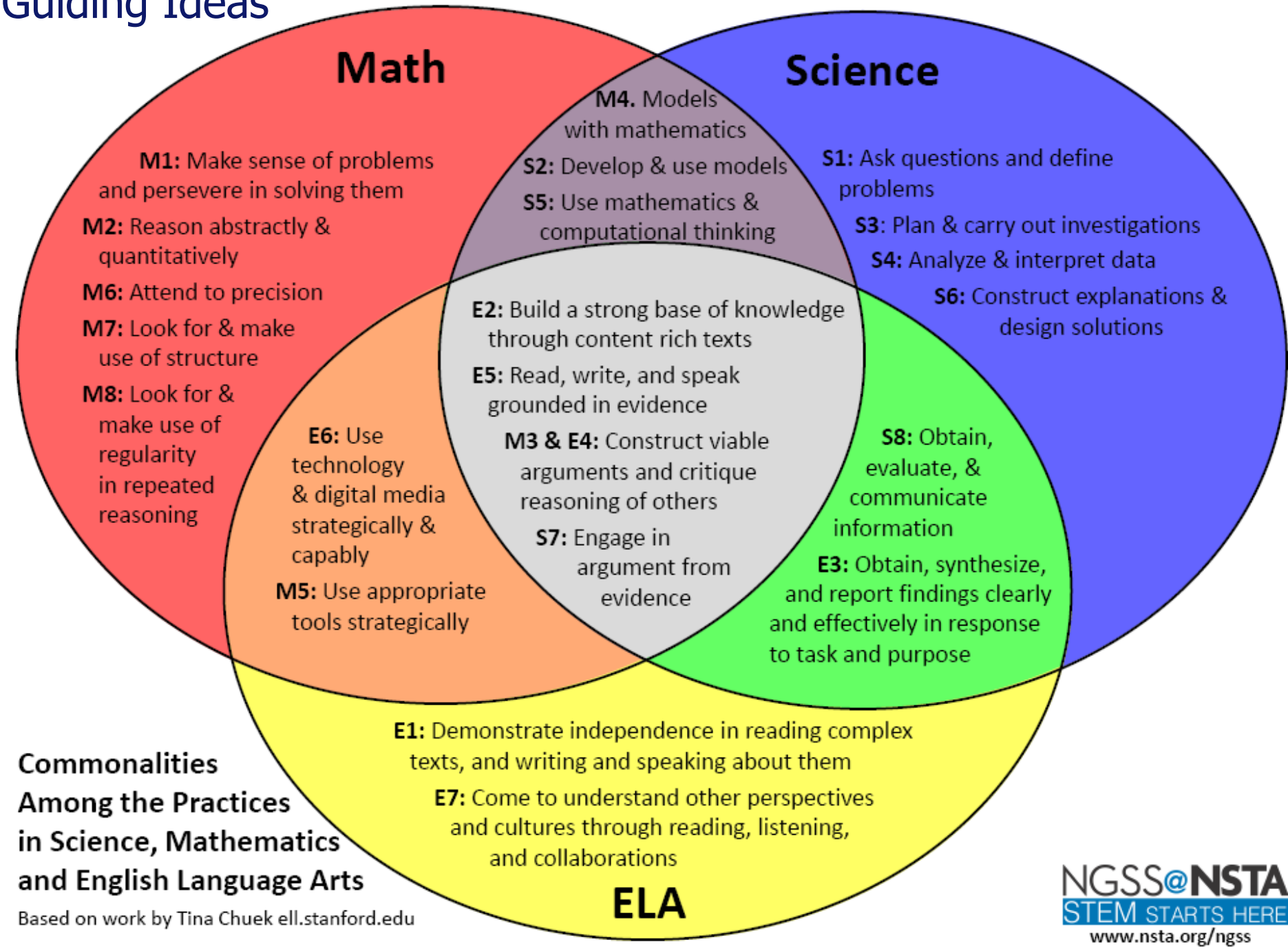
"The more we get together, together, together, the more we get together, the happier we'll be. Because your friends are my friends, and my friends are your friends…."

Implications for curriculum and instruction

Shift in revised standards	Shift in curriculum & instruction
Relevance: Organized around core explanatory ideas that explain the world around us	The goal of teaching needs to shift from facts and concepts to explaining phenomena
Rigor: Central role for science and engineering practices *with* concepts	Inquiry- and design-based learning is not a separate activity; all STE learning should involve engaging in practices to build and use knowledge
Coherence: ideas and practices build across time and between disciplines	Teaching involves building a coherent storyline across time

Adapted from: Brian Reiser, Northwestern University, 2013

Guiding Ideas



Commonalities Among the Practices in Science, Mathematics and English Language Arts

Based on work by Tina Chuek ell.stanford.edu

NGSS@NSTA
STEM STARTS HERE
www.nsta.org/ngss

Thank you!

- Thank you for:
  - Taking your time to plan for student science learning and success
  - Engaging in this important work this summer
  - Being excited about bringing science curriculum, units, and lessons back to your school and to our students.

Summer Professional Development

Agenda

CAPE COD REGIONAL STEM NETWORK

Monday	Tuesday	Wednesday
9:00 am: Overview	9:00: Research Jigsaw	9:00: Memorabilia, overview, new business
9:30: Document review	9:30: Lingering questions	9:30: Action plan and group share
10:00: Activity and Group analysis	10:00: 5-to-3 Key Ideas and writing prompt	10:00: Team work on units (and quick break)
10:45: Break		
11:00: Organizing and reviewing standards	11:00 Lesson database tool and resource review	11:30: Museum/organization introductions and expo. Lunch together in Solarium
12:30 pm: Exit ticket and break for lunch	12:30 pm Lunch with someone new!	
1pm: Group work on unit design	1pm: Group work on unit, lessons, or lesson database	1:00 pm: Group work on units and long-term planning
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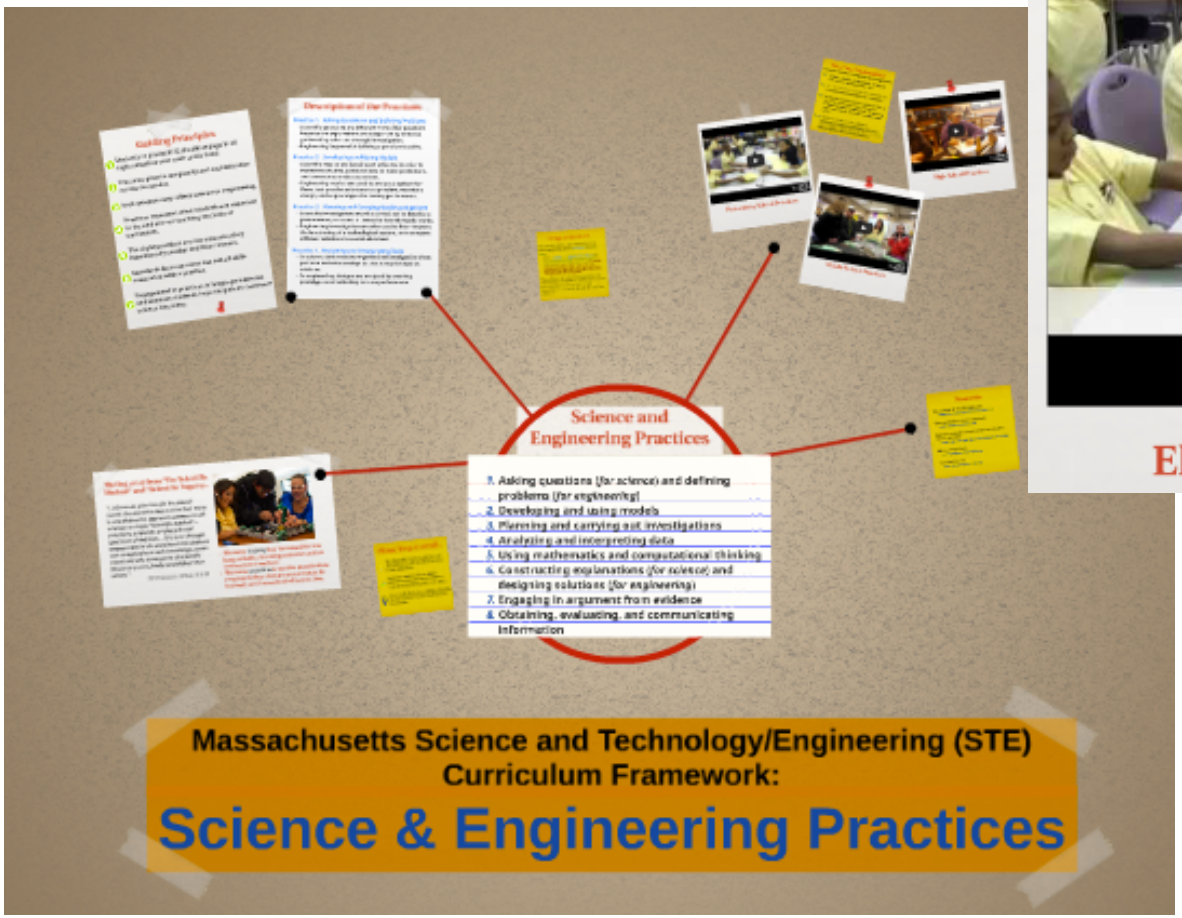
https://prezi.com/jmivhdgewzeg/scientific-practices/



Where does it come from?

- http://www.learner.org/vod/vod_window.html?pid=77

- Think-Pair-Share
  - I hand you a maple seed.
  - Imagine you plant it in the ground and a tree grew.
  - I hand you a piece of that tree.

  - Use your composition notebook and respond:

    Where did all that stuff come from?

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Origin of Tree Mass

How are these different? What do you think these differences mean for teaching and learning?

2001/2006 STE	Draft revised STE
Gr. 3-5, LS #11: **Describe how energy derived from the sun is used by plants to produce sugars (photosynthesis)** and is transferred within a food chain from producers (plants) to consumers to decomposers.	5-LS1-1. Support an argument with evidence that **plants get the materials they need for growth and reproduction chiefly through a process in which they use air, water, and energy from the sun to produce sugars and plant materials**.
Gr. 6-8, LS #16: **Recognize that producers (plants that contain chlorophyll) use the energy from sunlight to make sugars from carbon dioxide and water through a process called photosynthesis.** This food can be used immediately, stored for later use, or used by other organisms.	MS-LS2-3. Develop a model to describe the **cycling of matter among living and nonliving parts of an ecosystem including through the process of photosynthesis** and cellular respiration.
HS, LS 2.4: **Identify the reactants, products, and basic purposes of photosynthesis** and cellular respiration. Explain the interrelated nature of photosynthesis and cellular respiration in the cells of photosynthetic organisms.	HS-LS1-5. Use a model to illustrate **how photosynthesis uses light energy to transform carbon dioxide and water into oxygen and chemical energy stored in the bonds of glucose and other carbohydrates**.

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Review the Standards

- Take time to review the Massachusetts Draft Science and Technology/Engineering Standards in your folder.
- Use the following prompts to guide you:
  - What do you notice when you review the standards in the grade level that you are most familiar with?
  - Which of these standards do you want your students to know?
  - What questions do you have? Please post questions on the easels.
  - Review the self-assessments.
- Make any notes in your composition notebook.
- Record any questions on post-it notes

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Activity and Group Analysis:

How does a string phone work?

Activity (~~20 min.~~ 6 min.)

- Identify your partner.
- Together, choose a string phone.
- Spread out around the room, and investigate how you can send and receive clear messages from your partner using the string phone.
- Choose another string phone model(s) and compare clarity.
- Be prepared to share 2 ideas with the group.

Assessing Models (~~10 min.~~ 5 min.):

- What does the **string phone model** represent well?
- What does it misrepresent?
- What does it not represent?

Activity Analysis (~~10 min.~~ 4 min.):

- What does the **string phone model *activity*** represent well?
- In this activity, which practice(s) was/ were intentionally targeted?
- How could you address a specific MA draft standard using this activity within a lesson at your grade level?

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Organizing Standards

- **Goal: To review the standards and explore how to organize them in a template across the year for one grade.**
- What does it mean to plan across the year?
  - Curriculum process tips http://pd.rubicon.com/2015/06/26/whats-your-curriculum-process-tip/
- Understanding by Design is **not** a pacing guide.
  - It is a learning plan to ensure **alignment** between and among the content standards, our instruction, and the assessments we use to evaluate student understanding: https://grantwiggins.wordpress.com/2012/01/04/on-pacing-guides/

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Organizing Standards

- **Goal: To review the standards and explore how to organize them in a template across the year for one grade.**
- Use any of the following documents to help you think through the standards and your grade level:
  - "Drafting a year of Science." Two different charts are provided
  - "Science Curriculum Topics and Shifts Chart." Chart and prompts.
- Be prepared to respond to the following prompts:
  - Are you organizing standards by disciplinary core ideas or practices? Or both? Why?
  - What do you notice when you look across grades?
- We have computer labs, TECH 203 and 204

Exit ticket before lunch

- Complete, "What's your plan?" worksheet.
- Add any other questions to chart paper

Unit Design Work

- Goal: Plan out and begin work on designing a unit.
- Possible Steps:
  - Review the Understanding by Design packet and templates
  - Decide on a process as a group
  - Work together and let me know what questions or supports you need.

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Continue….

- Work as a group on your unit
- Develop/refine resources
- Work on the database
- Decide on another task that will move your work forward

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Ticket to Exit

Use an index card, please use one side for each of the following prompts:

+	Δ
Something that worked well for you today	**Something that could be improved**

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Promising Practices

- Focus on content
- Opportunities for active learning
- Coherence with other learning activities
- Collaboration and collective participation
- Duration
- Modeling relationships, professionalism, and practices

Which of these promising practices feels like it would be least challenging to implement across your school or district level PD?

Which would be most challenging? What sort of supports would you need in order to implement this practice in PD opportunities?

Where do we go now?

- As a group, review what you have done and articulate next steps.
- Use the template to draft action plan
- Be prepared to share with the group so we can note points of synergy across districts

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