CASTLE COMPLEX EDP PHASE II, YEAR TWO

ENGINEERING PIPELINE SESSION #1: AUGUST 24, 2019

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GRANT EXPECTED **OUTCOME #4**

PROBING QUESTION:

What changes need to be made in planning and delivering instruction with the introduction of the CCSS ELA/Math, and now the NGSS?

MINDSETS AND *CHANGING MINDSETS*

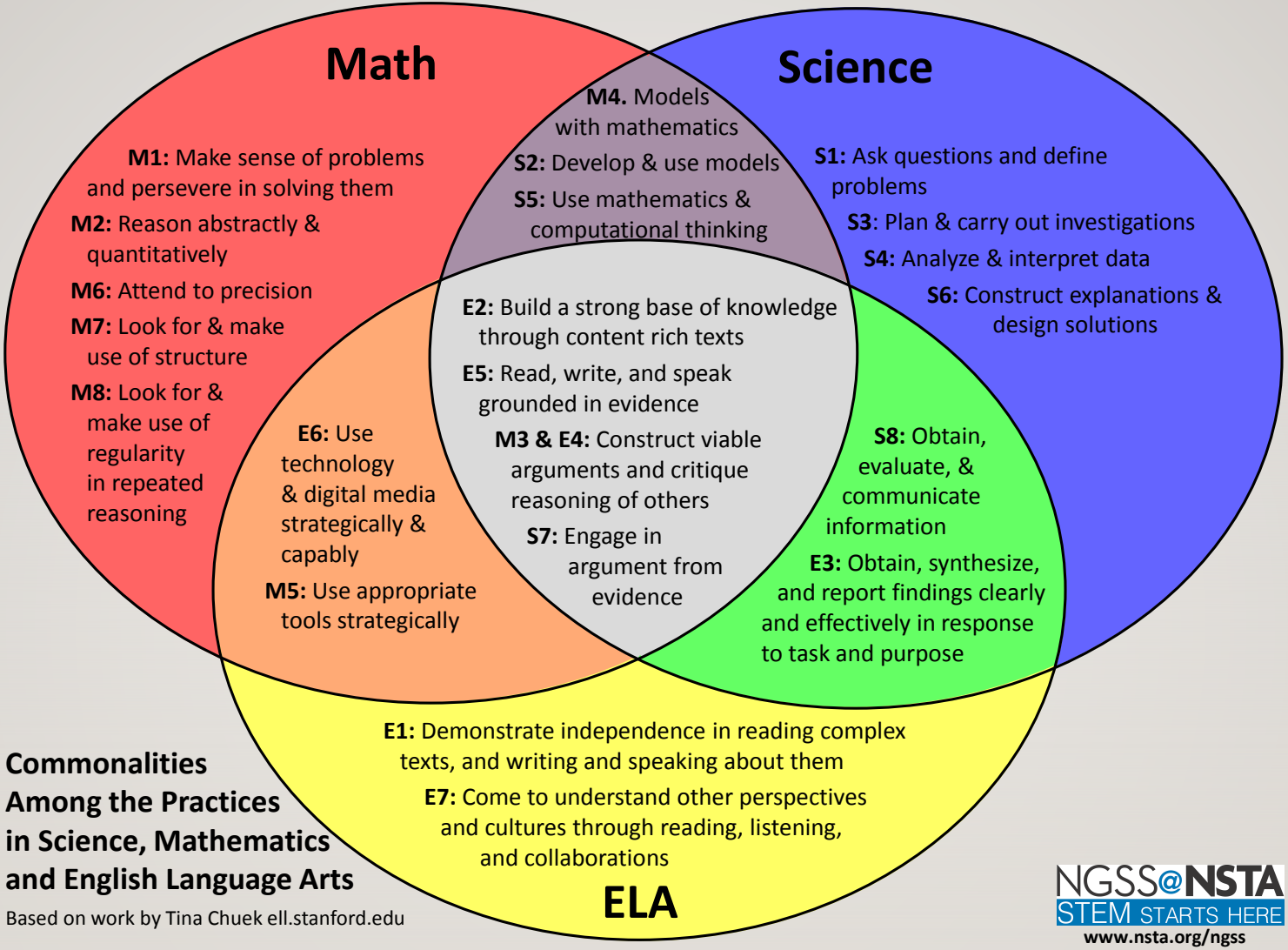
- Student- and Phenomenon-Centered Learning
- Failing Forward and Building Resiliency
- Bridging Scientific Investigation with Engineering Practices

LEARNING TRAJECTORIES IN ENGINEERING EDUCATION

- "Engineering Learning Trajectories: What They Are and Why They Matter" (Boston Museum of Science, 2019)
- Engineering Education and the EDP: Eight Areas Important to Consider Across Grade Level Clusters K-2, 3-5, and 6-8
- Implications Across Content Areas: Integrated approach to planning, implementation, and assessment

THINK-PAIR-SHARE: SMALL GROUP DISCUSSION & SHARE OUT

- With the introduction of the CCSS, what's different?
- What are the Major Shifts?
- How do the Major Shifts impact lesson planning?
- How do the Major Shifts impact instructional delivery?

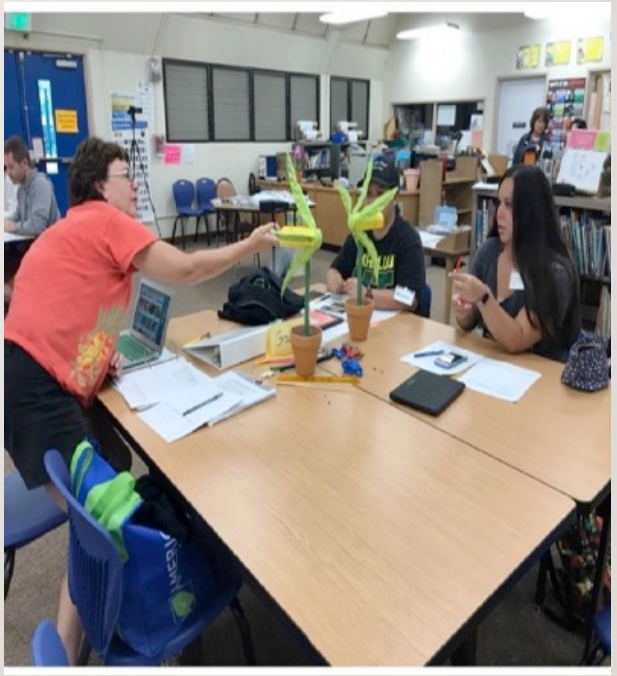


Commonalities Among the Practices in Science, Mathematics and English Language Arts

Based on work by Tina Chuek ell.stanford.edu

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

NGSS EXTRACTS



Year One (2018-2019) EDP Phase II Project

WHAT A STUDENT WILL BE ABLE TO DEMONSTRATE:

Take the Example from today's EDP Solar Oven Activity:

- Grade 4-PS3 Energy:

PE: 4-PS3-4. Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.

- Middle School MS-PS3 Energy

PE: MS-PS3-4. Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.

WHAT IS TO BE ASSESSED?

- **Performance Expectations combine practices, core ideas, and crosscutting concepts into a single statement of what is to be assessed. They are not instructional strategies or objectives for a lesson.**
- **To be assessed:**

SEP + DCI + CCC = Performance Expectations

4-PS3 Energy

PE: PS3-4. Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.

Science and Engineering Practices (SEPs)	Apply scientific ideas…design, test, and refine…	**What will students be doing with respect to this practice?** **Students consider the many possibilities of what they must uncover to further investigate the problem**
Disciplinary Core Ideas (DCIs)	…device that converts energy…	***What are the bigger ideas from this science topic and content? What should students be able to know and understand by the end on a larger scale?**
Crosscutting Concepts (CCCs)	…from one form to another.	***On a broader scale, describe what students will do to understand the broader concepts that cut across all subject areas and are connected to the real world.**

Bridging Scientific Inquiry with the EDP: Scientific & Engineering Practices (SEPs)

1. Asking questions (for science) and defining problems (for engineering)
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations (for science) and designing solutions (for engineering)
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

THE NGSS AND THE 3 DIMENSIONS

Unpacking the **Performance Expectations (PEs)**

- **Science and Engineering Practices (SEPs)**
- **Disciplinary Core Ideas (DCIs)**
- **Crosscutting Concepts (CCCs)**

CONNECTING PERFORMANCE EXPECTATIONS, LEARNING TARGETS, AND ASSESSMENTS IN ENGINEERING EDUCATION

- Identifying clear Learning Targets from the unpacked Grade Level Performance Expectation
- Using the Notebook: (a) to ensure that the EDP is overtly and appropriately addressed (Rigor); and (b) as an Assessment Tool to ensure engagement and student connections to place, culture, and the real world (SEL, ʻĀina, and Relevance)
- Using the Notebook for Formative *and* Summative Assessments