

New York State Science Learning Standards

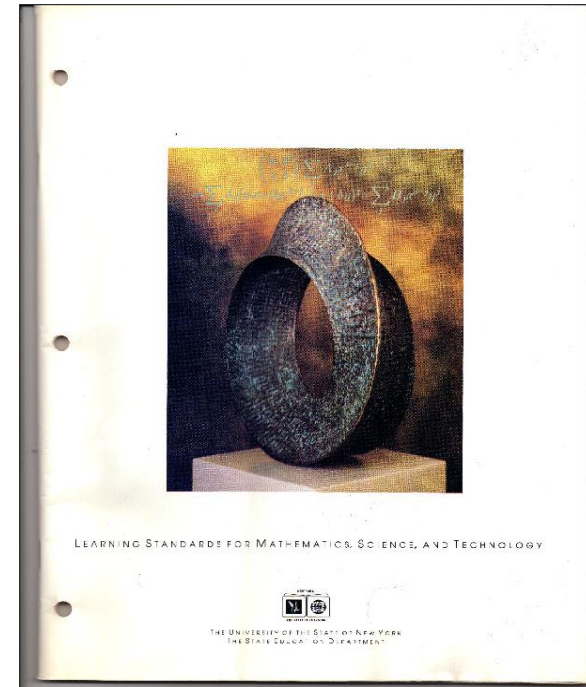
January 9, 2019

Why New Standards?

Our previous standards were more than 20 years old!

Most states based their current K-12 science standards on reports dating back nearly twenty years! Since that time, we've made major advances in science and technology and gained a better understanding of how students learn these subjects.

- ▶ **New York State's *Learning Standards for Mathematics, Science and Technology* (1996)**
- Shift from teaching answers to teaching questions



“Izzy, did you ask a good question today?”

The question that the mother of 1944 Nobel physics laureate Isidor Rabi asked him every day when he got home from school



Building on the Past; Preparing for the Future



Development of
current
NYS Science Learning
Standards
& statewide
assessments

Assessment

Curriculum

Professional
Development

Material and
Resource
Support

Administrative and
Community
Support

How is teaching and learning different with the New York State Science Learning Standards?

How are these standards different and why change?

Current state assessments aren't changing for a while, should we do anything now?

Absolutely: improved teaching practices and student learning



What is new in NYSSLS?

Three Dimensional learning refers to the thoughtful and deliberate integration of three distinct dimensions:

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

Students will learn the science content by doing the Science and Engineering Practices.

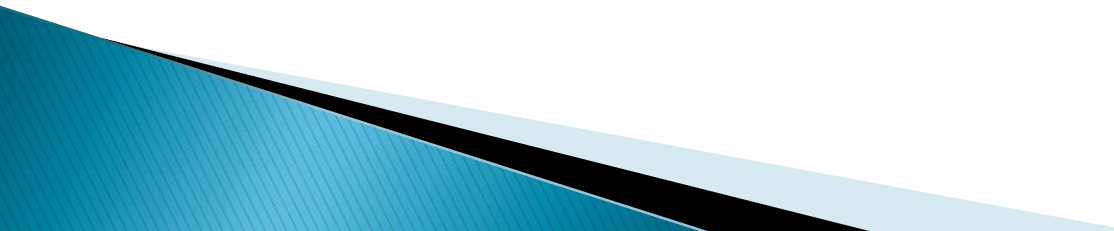
Students constructing understandings by engaging in SEPs



Moving Forward with NYSSLS

- ▶ **Science and Engineering Practices (SEPs)**
 - *How students learn.*
 - Behaviors of scientists and engineers as they question, investigate and solve problems. i.e. inquiry AND engineering design process
- ▶ **Cross Cutting Concepts (CCC's)**
 - *What students look for.*
 - Concepts (ex. patterns) that bridge disciplinary boundaries and need explicit instruction in both science and engineering
- ▶ **Disciplinary Core Ideas (DCI's)**
 - *What students learn.*
 - Physical Sciences; Life Sciences; Earth & Space Sciences; Engineering, Technology & Applications of Science

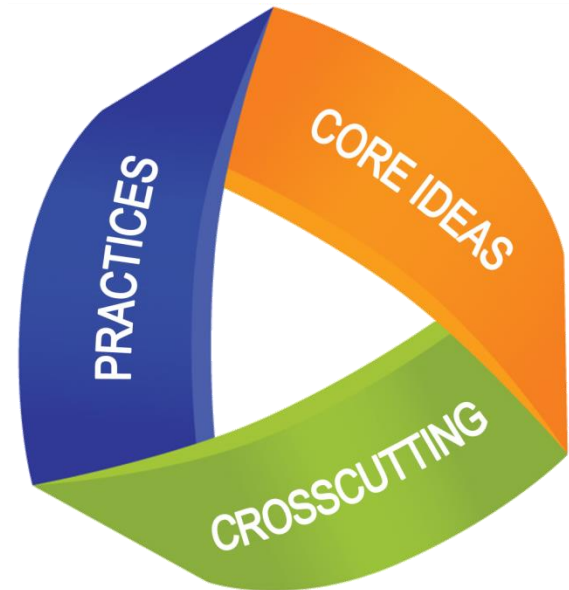
Science and Engineering Practices

1. Asking questions (science)/defining problems (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 (science) and designing solutions (engineering)
 7. Engaging in argument from evidence
 8. Obtaining, evaluating and communicating information
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Seven Crosscutting Concepts

(application across all domains of science)

1. Patterns.
2. Cause and effect: Mechanism and Explanation.
3. Scale, proportion, and quantity.
4. Systems and system models.
5. Energy and matter: Flows, Cycles, Conservation.
6. Structure and function.
7. Stability and change.



New Standards Address Four C's and STEAM

WHAT ARE 21ST CENTURY SKILLS? THESE 4 C's:

C

COMMUNICATION

Sharing thoughts,
questions, ideas &
solutions

C

COLLABORATION

Working together to
reach a goal. Putting
talent, expertise,
and smarts to work

C

**CRITICAL
THINKING**

Looking at problems in
a new way and linking
learning across
subjects & disciplines

C

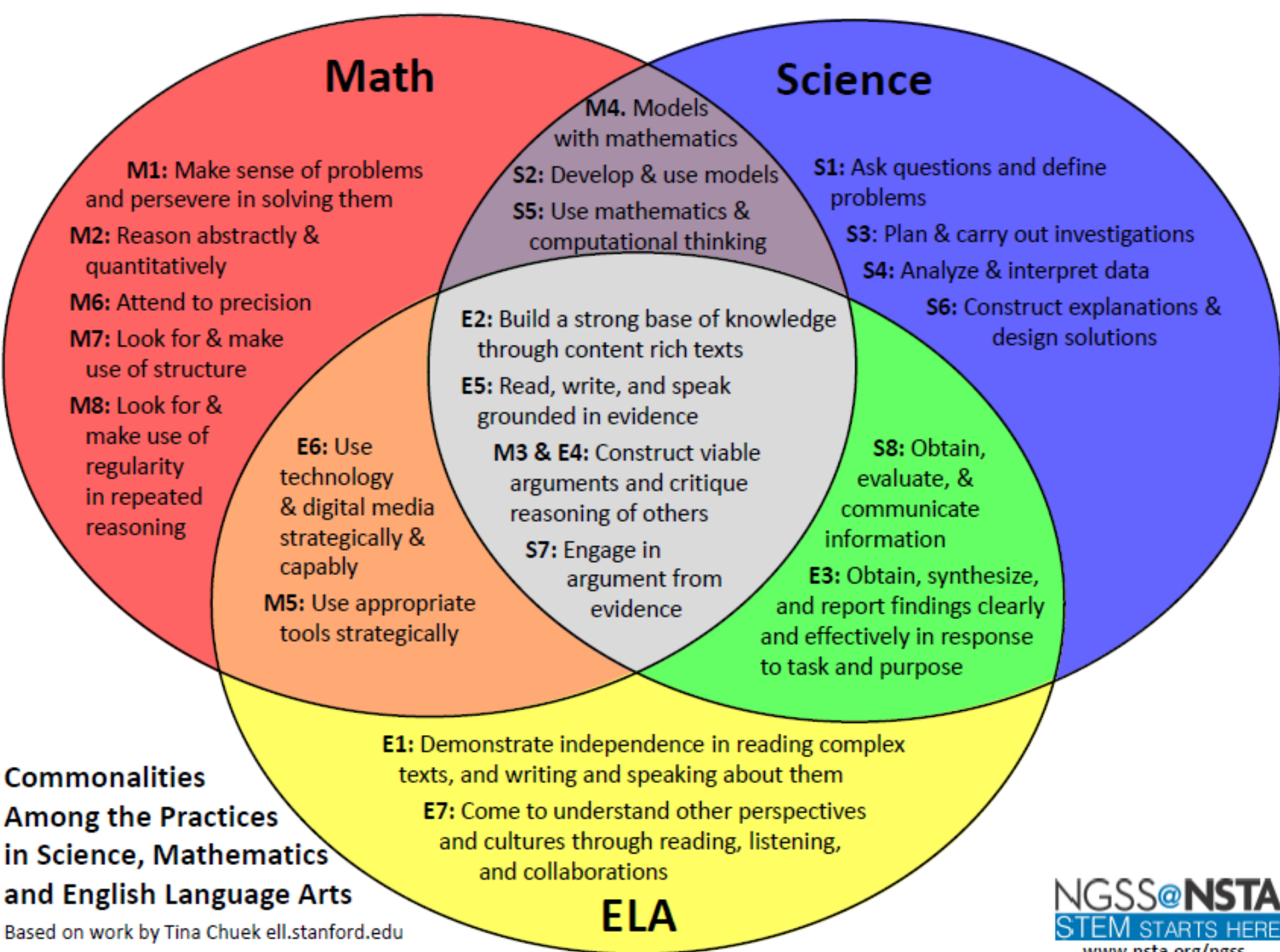
CREATIVITY

Trying new approaches
to get things done equals
innovation & invention

Disciplinary Core Ideas

Life Science	Physical Science
LS1: From Molecules to Organisms Structures and Processes	PS1: Matter and Its Interactions
LS2: Ecosystems: Interactions, Energy, and Dynamics	PS2: Motion and Stability: Forces and Interactions
LS3: Heredity: Inheritance and Variation of Traits	PS3: Energy
LS4: Biological Evolution: Unity and Diversity	PS4: Waves and Their Applications in Technologies for Information Transfer
Earth & Space Science	Engineering & Technology
ESS1: Earth's Place in the Universe	ETS1: Engineering Design
ESS2: Earth's Systems	ETS2: Links Among Engineering, Technology, Science, and Society
ESS3: Earth and Human Activity	

SCIENCE EDUCATION WILL INVOLVE LESS:	SCIENCE EDUCATION WILL INVOLVE MORE:
Rote memorization of facts and terminology	<u>Facts and terminology learned as needed while developing explanations and designing solutions supported by evidence-based arguments and reasoning</u>
Learning of ideas disconnected from questions about phenomena	<u>Systems thinking and modeling to explain phenomena and to give a context for the ideas to be learned</u>
Teachers providing information to the whole class	<u>Students conducting investigations, solving problems, and engaging in discussions with teachers' guidance</u>
Teachers posing questions with only one right answer	<u>Students discussing open-ended questions that focus on the strength of the evidence used to generate claims</u>
Students reading textbooks and answering questions at the end of the chapter	<u>Students reading multiple sources, including science-related magazine and journal articles and web-based resources; students developing summaries of information</u>
Pre-planned outcome for “cookbook” laboratories or hands-on activities	<u>Multiple investigations driven by students' questions with a range of possible outcomes that collectively lead to a deep understanding of established core scientific ideas</u>
Worksheets	<u>Student writing of journals, reports, posters, and media presentations that explain and argue</u>
Oversimplification of activities for students who are perceived to be less able to do science and engineering	<u>Provision of supports so that all students can engage in sophisticated science and engineering practices</u>



Moving Forward with NYSSLS

Elementary Science will be more important than ever!!

Logical development of the 3D through the grade levels.

NGSS has a K-12 Progressions in Appendices
This is a strength of NGSS which is also NYSSLS
Themes develop as children mature.

Scope and Sequence

Grade	Physical Science	Earth & Space Science	Life Science
5	Structure and Properties of Matter	Earth Systems	Matter and Energy in Organisms and Ecosystems
		Space Systems: Stars and the Solar System	
4	Energy	Earth Systems: Processes that Shape the Earth	Structure, Function and Information Processing
	Waves: Waves and Information		
3	Forces and Interactions	Weather and Climate	Interdependent Relationships in Ecosystems
			Inheritance and Variation of Traits: Life Cycles and Traits
2	Structure and Properties of Matter	Earth's Systems: Processes that Shape the Earth	Interdependent Relationships in Ecosystems
1	Waves: Light and Sound	Space Systems: Patterns and Cycles	Structure, Function, and Information Processing
K	Forces and Its Interactions: Pushes & Pulls	Weather for Kindergarten	Animals, Plants and Their Environment: Survival, life cycles
	Matter and Its Interactions: Solids and Liquids		

What's happening now??

NYS Comprehensive Science Standards Implementation Plan

Pinpoints 3 phases – systematic transition to new standards aligned with the Strategic Plan for Science.

Phase I: Initial transition–raise awareness and build capacity

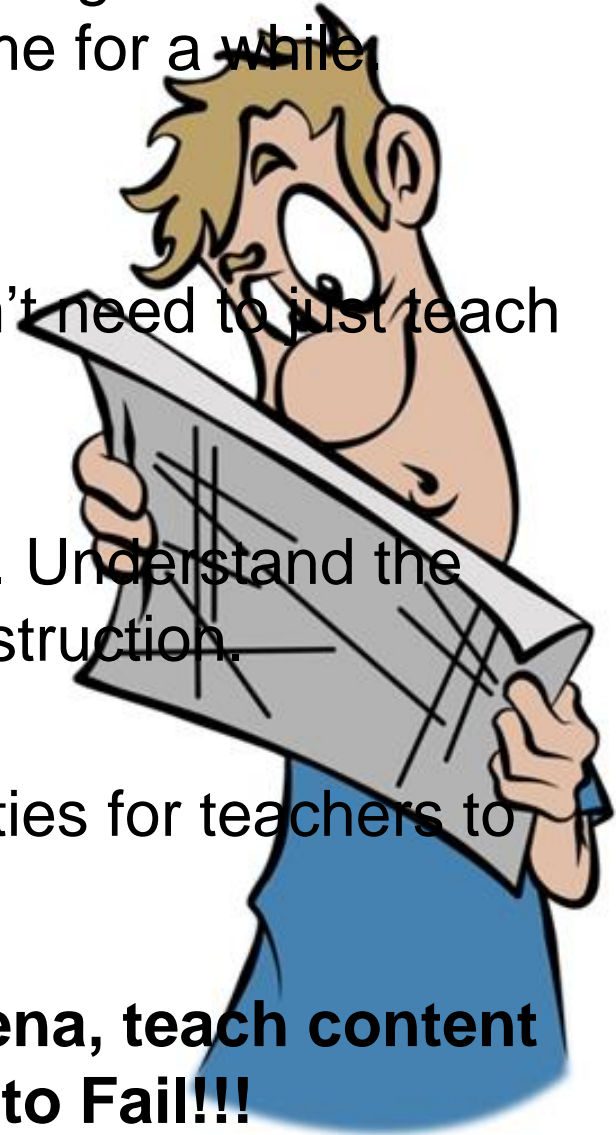
Phase II: Transition and implementation (**We are in this phase currently**)

Phase III: Implementation and Sustainability

Not a timeline. Earliest new state assessments?? Grade 4 test moves to grade 5 in 2022??

Transition to NYSSLS for classrooms

- ▶ NY adopted NYSSLS July 1, 2017 but... Regents exams based on the Science Cores will stay same for a while.
- ▶ Then why do anything?
- ▶ Improved teaching and learning! We don't need to just teach to the cores and exams.
- ▶ Begin by adapting what is currently done. Understand the Conceptual shifts to student driven 3D instruction.
- ▶ Look for Professional Learning opportunities for teachers to adapt to NYSSLS.
- ▶ **Start changing lessons. Use phenomena, teach content by engaging in practices. Permission to Fail!!!**



Your old science class!



Mr. Green's Science Class is soooo **BORING!**



What NYSSLS looks like in action

<https://www.teachingchannel.org/videos/claims-evidence-science-lesson-achieve>

OUR “WHY”...

The top 10 skills in 2020 will be:

1. Complex problem solving
2. Critical thinking
3. Creativity
4. People management
5. Coordinating with others
6. Emotional intelligence
7. Judgment and decision-making
8. Service orientation
9. Negotiation
10. Cognitive flexibility

The World Economic Forum has produced [a report](#) that predicts what the employment landscape will look like in 2020 after talking to chief human resources and strategy officers from leading global employers.

OUR WHY...



“Stop Teaching Answers

Start Teaching Questions!”

Erno Rubik

