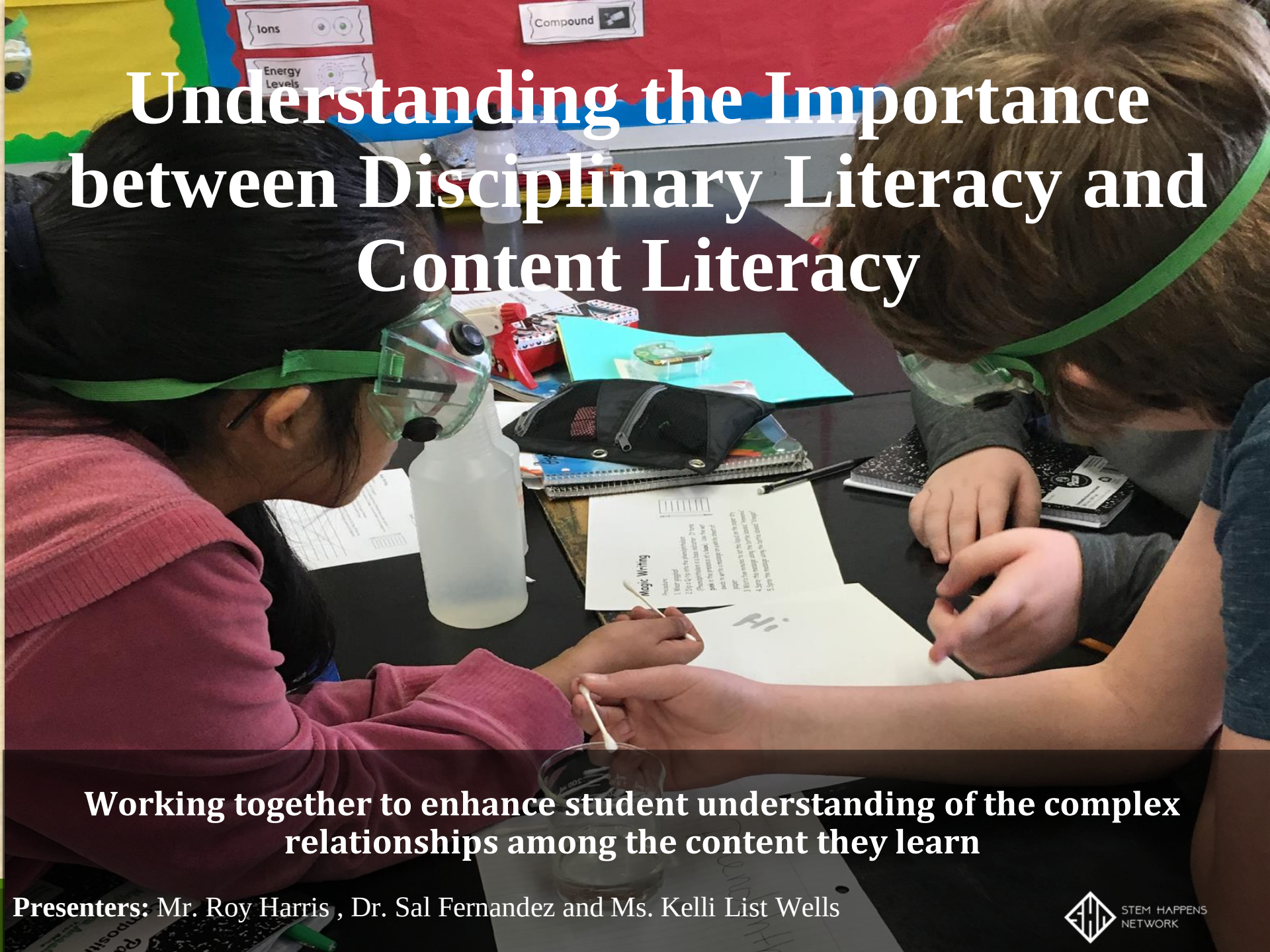




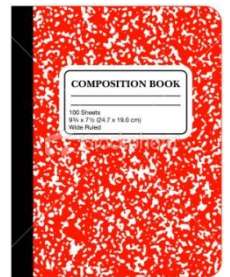
Understanding the Importance between Disciplinary Literacy and Content Literacy

**Working together to enhance student understanding of the complex
relationships among the content they learn**

Presenters: Mr. Roy Harris , Dr. Sal Fernandez and Ms. Kelli List Wells

Agenda

- **A Review of The Three Dimensions of NGSS**
- **The Role of Literacy Across Content Areas- Video**
- **Jigsaw Read- Disciplinary and Content Literacy Activity**
- **What is Disciplinary Literacy**
- **What is Content Area Literacy**
- **Looking at the difference between Disciplinary Literacy and Content Literacy**
- **Some Video samples from the Annenberg Learner Site**
- **Resources**



Before We Begin...Quick Write

- Let's spend a few minutes on some review from the last webinar on NGSS

The Three Dimensions of Science Learning

Within the Next Generation Science Standards (NGSS), there are three distinct and equally important dimensions to learning science.

These dimensions are combined to form each standard—or performance expectation—and each dimension works with the other two to help students build a cohesive understanding of science over time.



The Three Dimensions:

Science and Engineering Practices

- Behaviors scientists engage in to investigate
 - Not just skills – knowledge specific to each practice
- | | |
|--|--|
| <ul style="list-style-type: none">* Asking questions and defining problems* Developing and using models* Planning and carrying out investigations* Engaging in argument from evidence | <ul style="list-style-type: none">* Analyzing and interpreting data* Using math and comp. thinking* Constructing explanations* Obtaining and communicating info |
|--|--|

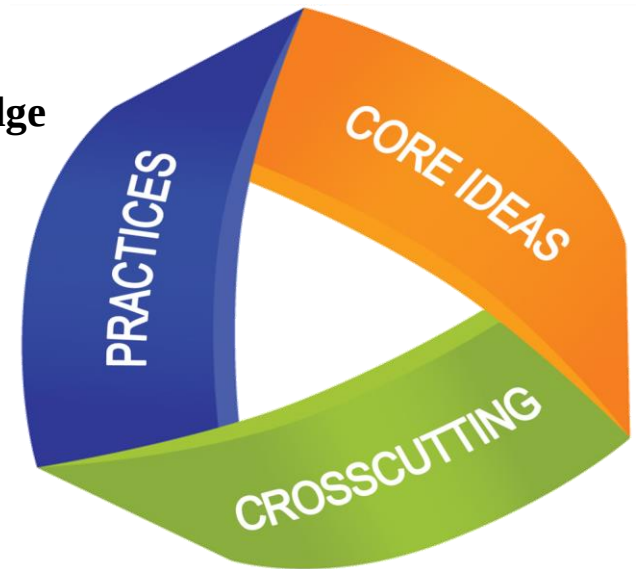
Cross-Cutting Concepts

- Link the different domains of science
- Provide and organizational schema for interrelating knowledge
- Shape “how” a scientist thinks about the world

Disciplinary Core Ideas (DCI's)

The foci of curriculum, instruction and assessment

- Physical Science
- Life Science
- Earth/Space Science
- Engineering, Technology and Application



Three Dimensions

Science & Engineering Practices

1. Ask questions (for science) and define problems (for engineering)
2. Develop and use models
3. Plan and carry out investigations
4. Analyze and interpret data
5. Use mathematics and computational thinking
6. Construct explanations (for science) and design solutions (for engineering)
7. Engage in argument from evidence
8. Obtain, evaluate, and communicate information

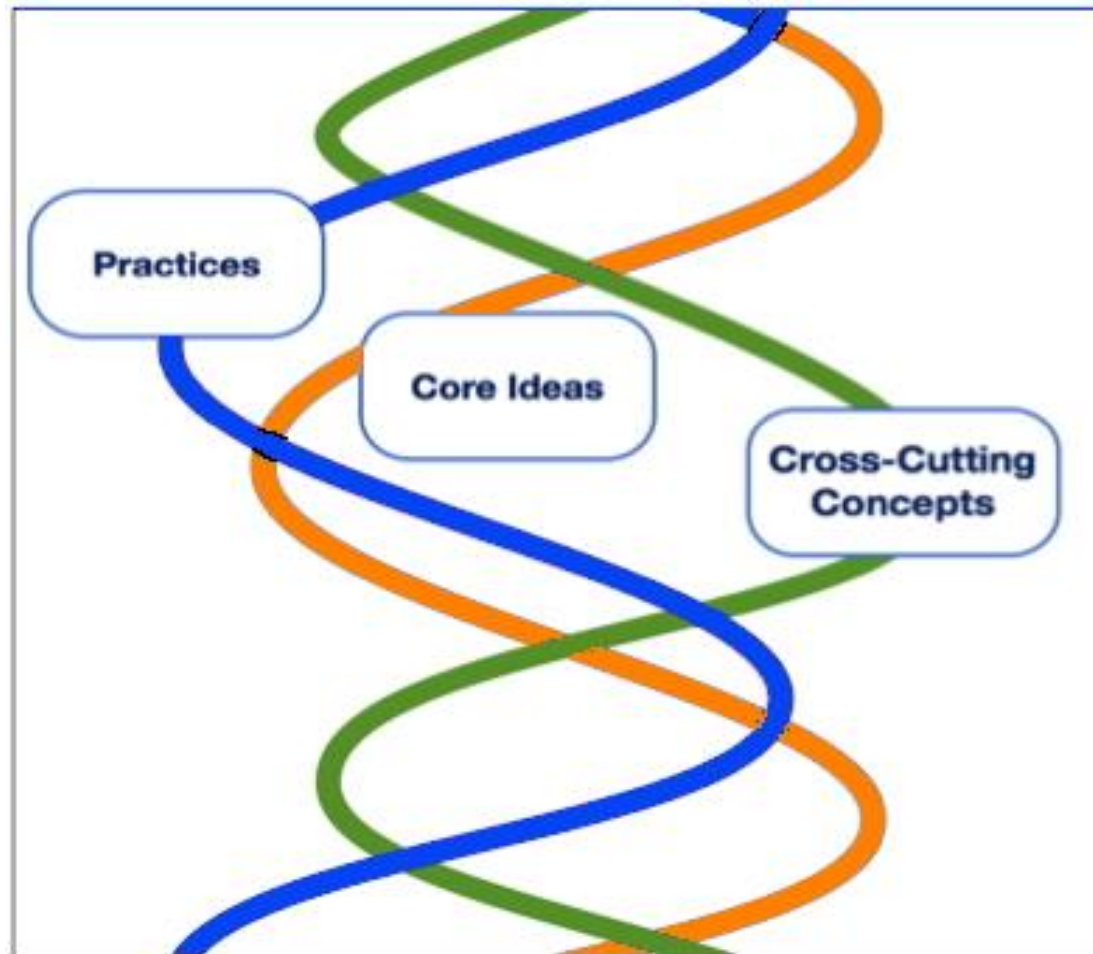
Crosscutting Concepts

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

Core Ideas

1. Physical Sciences
2. Life Sciences
3. Earth and Space Sciences
4. Engineering, Technology and Applications of Science

Three Dimensions Intertwined



Disciplinary Core Ideas

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

What Are Performance Expectations?



Performance Expectations state what students should be able to do in order to demonstrate that they have met the standard, thus providing clear and specific targets for curriculum, instruction, and classroom assessment.

Look at the next slide and jot down in your notebook some of the commonalties that you see?

FIGURE 1

Alignment between mathematical practices and scientific and engineering practices.

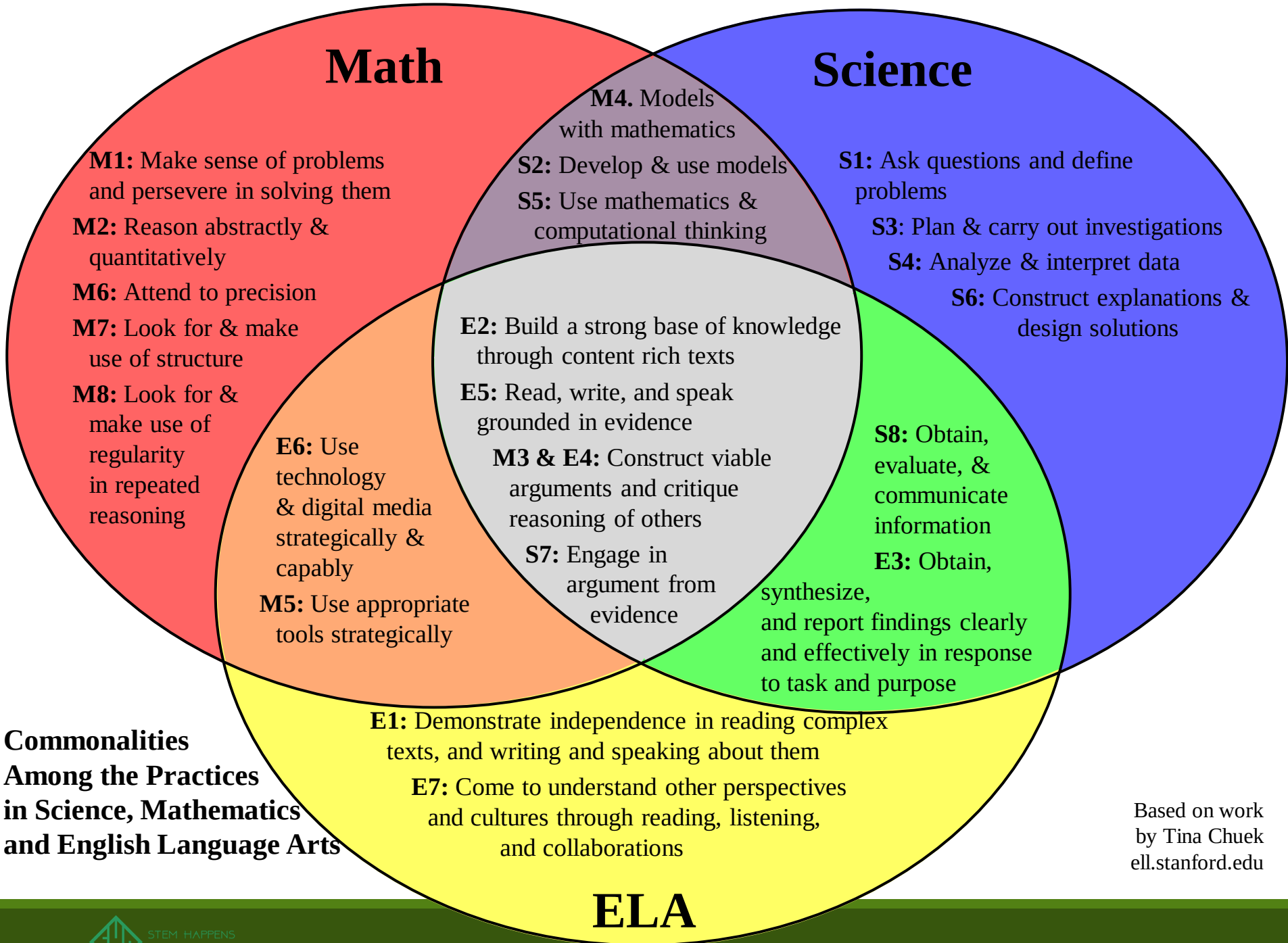
Mathematical Practices (MP)	Science and Engineering Practices (SEP)
1. Making sense of problems and persevering in solving them	1. Asking questions and defining problems 3. Planning and carrying out investigations
2. Reason abstractly and quantitatively	2. Developing and using models 3. Planning and carrying out investigations 5. Using mathematics and computational thinking
3. Construct viable arguments and critique the reasoning of others	5. Using mathematics and computational thinking 6. Constructing explanations and designing solutions 7. Engaging in argument from evidence 8. Obtaining, evaluating, and communicating information
4. Model with mathematics	2. Developing and using models 3. Planning and carrying out investigations
5. Use appropriate tools strategically	2. Developing and using models 3. Planning and carrying out investigations 4. Analyzing and interpreting data
6. Attend to precision	3. Planning and carrying out investigations 8. Obtaining, evaluating, and communicating information
7. Look for and make use of structure	4. Analyzing and interpreting data 6. Constructing explanations and designing solutions 7. Engaging in argument from evidence
8. Looking for and expressing regularity in repeated reasoning	5. Using mathematics and computational thinking 6. Constructing explanations and designing solutions

- ✓ Now spend a few minutes looking at the following slide.
- ✓ What similarities do you see in across math, science and literacy?

Practices in Mathematics, Science, and English Language Arts*

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

* 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. SOURCE: NGSS @ NSTA



Based on work
by Tina Chuek
ell.stanford.edu

Quick Write

**How Do You Define
Disciplinary Literacy?**

“The Role of Literacy Across the Content Areas”

As you are watching jot down a few things in your notebook that resonate with you



<https://youtube/oYEIxyFWjPc>



Jigsaw Read Disciplinary and Content Literacy

For today's webinar you will read a short paragraph from each of the chosen articles. These articles are only a short summary and snippet of the actual articles that will be complete in the resource section and you can access for utilizing them in Professional Development with groups with these actual research-based articles.

Article 1: What is Disciplinary Literacy?

Article 2: The Importance of Disciplinary Literacy?

Article 3: Disciplinary Literacy is not the Same as Content Area Reading

Jot down in your notebook any take away you get from reading each article.

Article 1

What IS Disciplinary Literacy? Reading & Writing in the Disciplines

How Does Disciplinary Literacy Differ from Content-Area Literacy?

Content-Area Literacy

While the early grades of learning to read include a great deal of narrative text, children, also encounter expository texts for learning in the content-area curriculum. As students move through the grades, they learn to use a general set of strategies, such as practicing, questioning, and summarizing a text, to support their comprehension and response to texts across the curriculum. These strategies are often used as procedures for study skills to learn and retain content information. Content-area literacy, therefore, refers to a basic set of strategies for reading and responding to texts with little differentiation among the content-area subjects. For example, students may learn to use the same techniques for determining important information, making references, asking questions, and summarizing in science, social studies, and math. The reading strategies are the same across subject areas, only the content differs.

Disciplinary Literacy

In contrast, disciplinary literacy focuses on teaching students the differences among the various texts used in different disciplines and the specialized reading practices required for comprehension and critical analysis of ideas within each. Some of these differences include specialized vocabulary, types of language used to communicate ideas, text structures, text features (e.g. boldface headings and vocabulary, diagrams, charts, photographs, captions) and sources of information within and across disciplines.

Article 2

The Importance of Disciplinary Literacy

By Erica R. Hamilton & Elizabeth Petroelje Stolle, GVSU Faculty

What does it mean to read, write, think, and communicate like a scientist? What about as a historian, writer, musician, artist, engineer, or mathematician? In today's diverse and global world, these are questions secondary teachers and their students should be considering. Doing so supports students' literacy, learning, and ability to more readily engage in the disciplines they study. These considerations also serve to develop teachers' instruction so they can apprentice students to negotiate and create texts in discipline-specific .

For example, within an English classroom, students will read and write narratives, poetry, and play scripts. Additionally, secondary students will read and write about scientifically-based phenomena in their science classroom, navigate primary and secondary sources in their history classroom, and perform and explain mathematical computations in their math classroom.

Disciplinary literacy requires students to read and write in specialized ways for specialized purposes determined by the discipline . Each discipline requires students to employ particular knowledge, tools, and abilities to communicate, create, and use information within that discipline.

So, what are the broader implications of disciplinary literacy? Disciplinary literacy pushes students to move beyond reading, writing, listening, and viewing solely for academic purposes, namely to complete school-based homework and pass tests.

Article 3

Disciplinary Literacy Is NOT The Same As Content Area Reading By Tim Shanahan

In the study we looked specifically at history, science (chemistry), and mathematics.

The study was based on the theory that it would be useful to account for such information when teaching students to read. The idea is that if students were taught to read history in a way that corresponds to how historians read they'd be better equipped to handle such materials. Obviously the first step in that journey is to identify those disciplinary differences, and our work was in that vein.

Which raises an important point: Disciplinary literacy is distinct from “content area” reading. Disciplinary literacy is more aimed at what we teach (which would include how to read and use information like a scientist), than how we teach (such as how can students read the history book well enough to pass the test). The idea of disciplinary literacy is that students not only have to learn the essential content of a field, but how reading and writing are used in that field. On the other hand, content area reading focuses on imparting reading and study skills that may help students to better understand and remember whatever they read.

Accordingly, a disciplinary literacy teacher may try to get students to engage in author-centered readings or sourcing since that is what historians do when they read; while a content area literacy teacher would push for students to use Cornell notes or KWL, since such techniques can help readers to remember more information from a history text. Disciplinary literacy strives to get students to participate in the reading and discourse of a particular discipline, while content area literacy strives to get students to read and study like good students.

Do you hear these quotes all the time?

“Literacy across the content areas”

“All teachers are teachers of reading”

Content Area Reading

Content area literacy emphasis

All teachers are teachers of reading

Teachers receive cross-disciplinary training in how to teach reading using content area instructional materials

Championed since 1940's by the reading community

Disciplinary Literacy Reading

Not just a hip, new name for “content area reading”

Disciplinary reading refers to the specialized ways of knowing and communicating in the different disciplines

Students need to be taught these specialized routines – thus the science teacher, while not a reading teacher, needs to impart those specialized routines!

Where Does Content Area Reading Come From?



In the 1920's, the idea of “every teacher is a teacher of reading” is first raised.



Good rhetoric, BUT . . . The fundamental idea is that reading experts know the necessary reading skills and that THOSE should be taught across the curriculum.



Leads to the development of lots of general approaches – KWL charts, SQ3r (survey, question, read, recite and review), etc.

What's the Difference?

Content Area Reading

- General reading strategies (KWL charts, summarizing, note-taking)
- Focus on learning from the text – know how to study the book
- Strategies proven to be most successful with remedial or younger students; not much benefit for high achieving students
- Use of literary texts
- Graphics or visuals taught generally or ignored

Discipline Specific Literacy

- Specialized reading strategies
- Focus on the specialized barriers in the text - how to read like a historian or scientist
- Strategies shown to be successful with a wider range of learning benefits
- Use of only disciplinary texts
- Graphics or visuals taught specifically to the discipline

Compare the Two: Jot down notes That resonate with you

Content Area Reading

- The focus is on learning from the text
- The idea is not to read books like a chemist, but to know how to study books – including chemistry books
- Emphasis on literacy learning tools, i.e. response journals, reading logs, etc.

Disciplinary Reading

- The focus is on the specialized problems of a subject area
- Demand for precision
- Deeper attention to tier 3 vocabulary
- Major strategies are corroboration, nominalization (turning processes into nouns)

**In content area
reading, we use
reading and writing to
study/learn
information**

SUMMARY



**In disciplinary reading, we must ask
how does literacy help us make
meaning within a discipline**

What is Disciplinary Literacy in One Sentence:

Disciplinary Literacy means the use of reading, reasoning, investigating, speaking, and writing required to learn and form complex knowledge in particular academic areas.

Disciplinary Literacy for Students in Science

Scientific literacy involves being able to:

**inquire,
investigate,
problem solve,
think,
read,
write,
talk,
and learn**



Ask a scientist about the big ideas and driving questions in science.

Science Reading

Text provides the knowledge that allows prediction of how the world works

Full understanding needed of experiments or processes

Close connections among prose, graphs, charts, formulas, etc.

Major reading strategies include corroboration and transformation

Technical, abstract dense, tightly knit language

Nominalization (turning processes into nouns)

Disciplinary Literacy for Students in Mathematics

The goal of using literacy skills in mathematics is to foster a deeper conceptual understanding of the mathematics.

Literacy Skills in Mathematics

Reasoning and Explaining

Argument can be defined as writing to support claims in an analysis of substantive topics or texts using valid reasoning and relevant and sufficient evidence. Integrating and evaluating information in diverse media and formats is critical to writing arguments. Reasoning and explaining mathematical concepts is simply writing or speaking an argument utilizing information from various mathematical texts.

Make, justify (prove) and present arguments by...

Using objects, drawing, and diagrams

Applying Context

Using Examples and Nonexamples

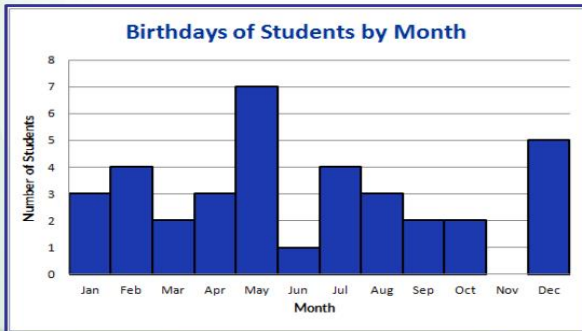
Critique the reasoning of others by...

Listening to Others' Solutions and Responding

Asking Questions to Clarify or Improve Arguments

Making Connections

"Mathematical Text" in the Form of a Graph



"What conclusions can you obtain from the graph?"



"Use evidence from the graph to convince someone else of your conclusion?"

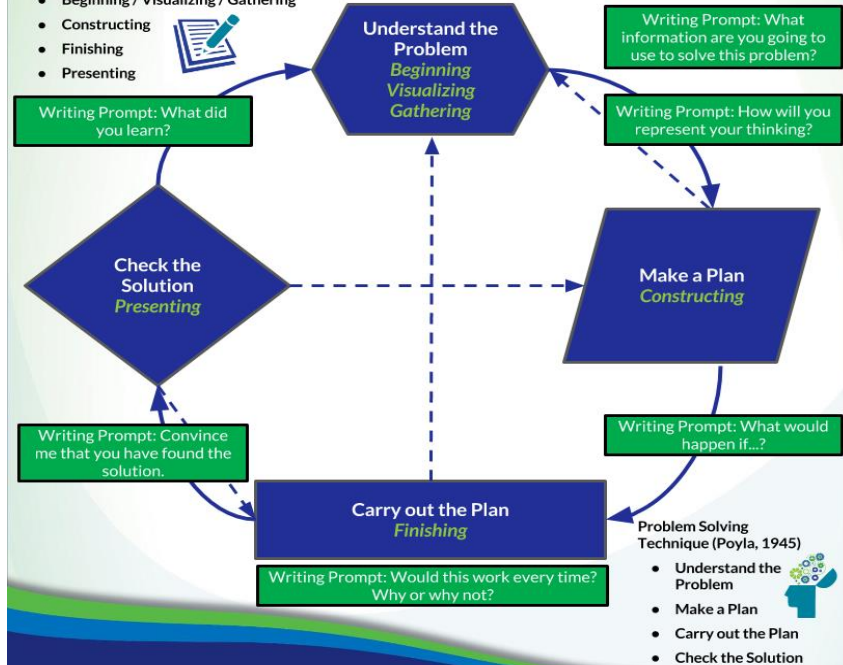
Literacy Skills in Mathematics

Problem Solving and Perseverance

Writing is a process of making linguistic choices. Problem solving in mathematics is a process of choosing an appropriate strategy. The writing process can be used to further understand the mathematics and persevere in the problem solving process.

Characteristics of Effective Writing Instruction (Burke, 2008)

- Beginning / Visualizing / Gathering
- Constructing
- Finishing
- Presenting





Turn

TALK

and

Think about if you as a teacher, teaches your students “Learning to Read” or “Reading to Learn” in your content area...

Do you use “content area-literacy” or “disciplinary literacy” in your teaching methods at present?

Put it all together

	Content Area Reading	Disciplinary Literacy
Source	Reading Experts since the 1920's	Wider Range of experts since the 1990's
Nature of Skills	Generalizable	Specialized
Students	Remedial	Whole distribution
Texts	Often encourages uses of literary text	Only focuses on disciplinary text
Role of graphics	Ignored or taught generally	Specific to the discipline

From the Annenberg Learner Site

Reading & Writing in the Disciplines

PROFESSIONAL DEVELOPMENT - READING & WRITING IN THE DISCIPLINES

1. WHAT IS DISCIPLINARY LITERACY?

A FREE COURSE YOU MAY BE INTERESTED IN TAKING

“When students enter middle and high school, their teachers expect that they have learned the basic skills and strategies for reading and comprehending text. Students who are still working to develop these proficiencies may need assistance from their classroom teachers and, in some cases, from specialists in reading or special education, to support their reading and writing in the classroom.

However, even students who have developed effective literacy practices in the early years may not have the reading and writing skills they need to successfully read and write the complex texts required in middle and high school. They have learned basic strategies for comprehension of texts across subject areas and genres, including making connections, asking questions, making inferences, summarizing, and monitoring understanding. Yet they still may struggle in identifying and using specialized reading practices to understand, analyze, and interpret important ideas in discipline-specific texts.” - From the Annenberg Learner Site

<https://www.learner.org/series/reading-writing-in-the-disciplines/what-is-disciplinary-literacy/>

Some Samples from the Annenberg Learner Site

Talking Like a Mathematician

<https://www.learner.org/series/reading-writing-in-the-disciplines/what-is-disciplinary-literacy/talking-like-a-mathematician/?jwsourc=em>

Science in the Real World: A Biotech Startup

<https://www.learner.org/series/reading-writing-in-the-disciplines/what-is-disciplinary-literacy/science-in-the-real-world-a-biotech-startup/>

Annotating across the Discipline of Science

<https://www.learner.org/series/reading-writing-in-the-disciplines/big-ideas-in-literacy-science/annotating-across-disciplines/?jwsourc=em>

Creating a Classroom Culture NYC School Grade 9

<https://www.learner.org/series/reading-writing-in-the-disciplines/big-ideas-in-literacy-science/creating-a-classroom-culture/?jwsourc=em>

Some Resources

***Video on The Role of Literacy Across the Content Areas** <https://youtube/oYEIxyFWjPc>

***Article 1: What is Disciplinary Literacy?**

<https://www.learner.org/series/reading-writing-in-the-disciplines/>

<https://1drv.ms/b/s!AmdEQEoXGOGHqnKjGIPB5QNNz70u?e=Tyqnc9>

***Article 2: The Importance of Disciplinary Literacy?**

<https://scholarworks.gvsu.edu/cgi/viewcontent.cgi?article=1254&context=colleagues>

<https://1drv.ms/b/s!AmdEQEoXGOGHqnByUVX-8ACM86SG?e=3SdLPZ>

***Article 3: Disciplinary Literacy is not the Same as Content Area Reading**

<https://www.cdl.org/disciplinary-literacy-is-not-the-same-as-content-area-reading/>

<https://1drv.ms/b/s!AmdEQEoXGOGHqnOPbBIP6XdYeyGB?e=FRWGoG>

***Annenberg Learner Site**

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Our Website.... www.STEMHappensNetwork.com

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