



## Getting Ready for the New MN Science Standards

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By the end of today, you'll have answers for the following questions:

1. What are the key features of the new standards?
2. What are the implications for science teaching and learning?
3. What are opportunities for learning more?

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**Fist to Five**  
 0=this is all new to me  
 5=I know a lot about it

- A Framework for K-12 Science Education
- Science and Engineering Practices
- Crosscutting Concepts
- The new MN Science Standards

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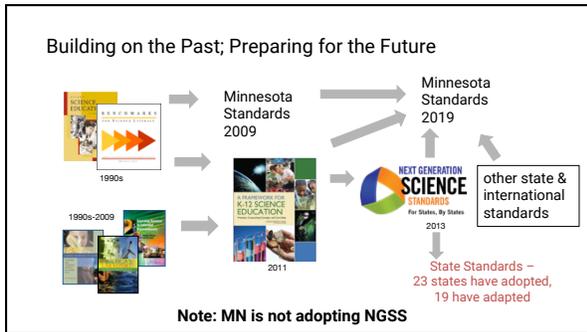
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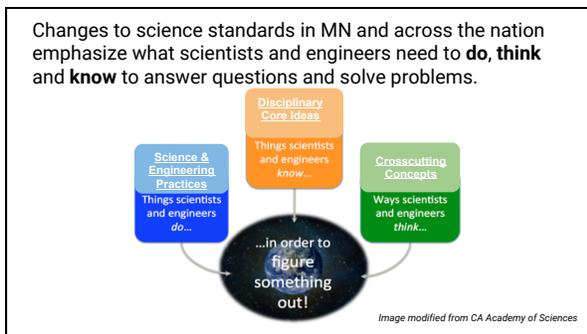
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**Let's compare current and new standards...  
What do you notice?**

	Strand	Substrand	Standard	Benchmark
Old Standard	Life Science	Structure & function in living systems	All living organisms are composed of one or more cells which carry on the many functions needed to sustain life.	Recognize that cells repeatedly divide to make more cells for growth and repair.
New Standard	Developing possible explanations of phenomena or designing solutions to engineering problems.	Developing and using models	Students will be able to develop, revise, and use models to represent their understanding of phenomena or systems as they develop questions, predictions and/or explanations and communicate ideas to others.	Content Area: Life Science Develop and use a model to describe the function of a cell as a whole and describe the way cell parts contribute to the cell's function.

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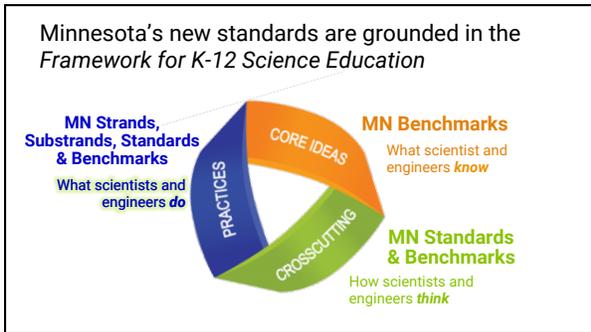
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**What do scientists and engineers do?**

Write action words/phrases on post-it notes to answer the question above

Now: (one per post-it)

1. With your table sort your post-its into groups
2. ~~YOU HAVE 2 MIN TO WRITE DOWN AS MANY AS YOU CAN~~ Define each post-it with a word or phrase
3. Be prepared to share

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Let's compare to the language of the new MN science standards

<p><b>Exploring</b> phenomena or engineering problems</p> <ul style="list-style-type: none"> <li>✓ Asking questions &amp; defining problems</li> <li>✓ Planning &amp; carrying out investigation</li> </ul>	<p>Looking at data &amp; empirical <b>evidence</b> to understand phenomena and solve problems</p> <ul style="list-style-type: none"> <li>✓ Analyzing &amp; interpreting data</li> <li>✗ Using mathematics &amp; computational thinking</li> </ul>
<p><b>Developing</b> possible <b>explanations</b> of phenomena or designing solutions to engineering problems</p> <ul style="list-style-type: none"> <li>✗ Developing &amp; using models</li> <li>✓ Constructing explanations &amp; designing solutions</li> </ul>	<p><b>Communicating</b> reasons, arguments and ideas to others</p> <ul style="list-style-type: none"> <li>ELA Arguing from evidence</li> <li>ELA Obtaining, evaluating &amp; communicating information</li> </ul>

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### Why the shift to practices?

1. Practices are done over and over, grow in complexity and sophistication over time.
2. Practices are not linear steps to follow in sequence, a "scientific method," or cyclical inquiry process.
3. Practices emphasizes that doing science is more than doing hands-on activities. Making meaning is essential for learning to take place.
4. Practices better reflect what scientists and engineers do.

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### What do scientists and engineers do? *Getting to Know the SEPs*

- Consider the sample science activity at your table.
- Consider carefully the learning task provided.
- Identify the primary Science and Engineering Practice needed to perform the learning task.
- Be prepared to share.

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### What's your picture about?



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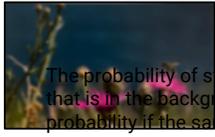
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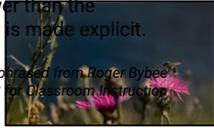
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What's the point?  
How does this relate to teaching SEPs?



The probability of students learning a practice that is in the background is lower than the probability if the same practice is made explicit.



-paraphrased from Roger Bybee  
Translating the NGSS for Classroom Instruction

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Where are the SEPs  
in the new Minnesota Science Standards?

Grade	Strand	Substrand	Standard	Content Area	Benchmark
3	2 Looking at data and empirical evidence to understand phenomena or solve problems	2.1 <a href="#">Analyzing and interpreting data</a>	2.1.1 Students will be able to represent observations and data in order to recognize patterns in the data, the meaning of those patterns, and possible relationships between variables.	Earth and Space Science	3E.2.1.1.1 Record observations of the sun, moon, and stars and use them to describe patterns that can be predicted. Examples of patterns may include that the sun and moon appear to rise in one part of the sky, move across the sky, and set; and stars other than our sun are visible at night but not during the day.

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Any questions about  
Science & Engineering Practices?

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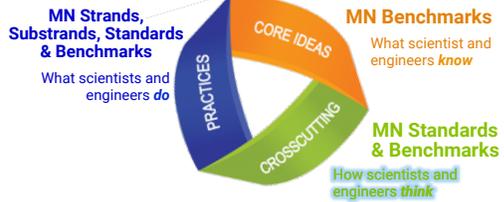
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Minnesota's new standards are grounded in the *Framework for K-12 Science Education*



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**Crosscutting Concepts** provide conceptual frameworks that scientists and engineers use to make sense of the natural and designed worlds.

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Research shows that **novices** and **experts** organize their ideas in different ways.

- ◆ Novices rely on surface features
- ◆ Experts use conceptual frameworks

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Let's consider an example:  
The game of Chess

What do you see?



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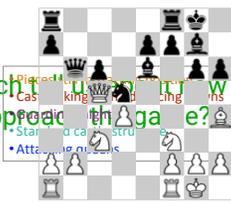
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Experts group pieces based on  
**strategic moves.**



Novices remembered  
**individual pieces.**



Experts search for strategic moves  
Novices search for individual pieces

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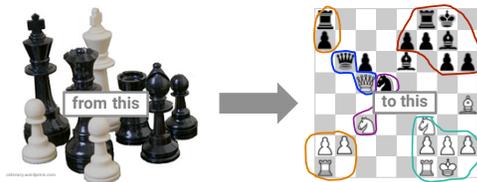
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**Crosscutting concepts** guide learners to think about science the way chess players think about chess.



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There are seven 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

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How do scientists and engineers think?  
Getting to Know the CCCs

- Consider the sample science contexts at your table.
- Identify the primary Crosscutting Concept that connects the contexts.
- Be prepared to share.

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Where are the Crosscutting Concepts in the new MN Science Standards?

Grade	Strand	Substrand	Standard	Content Area	Benchmark
3	2 Looking at data and empirical evidence to understand phenomena or solve problems	2.1 <a href="#">Analyzing and interpreting data</a>	2.1.1 Students will be able to represent observations and data in order to <a href="#">recognize patterns in the data, the meaning of those patterns, and possible relationships between variables</a>	Earth and Space Science	SE.2.1.1.1 Record observations of the sun, moon, and stars and <a href="#">use them to describe patterns that can be predicted</a> . Examples of patterns may include that the sun and moon appear to rise in one part of the sky, move across the sky, and set; and stars other than our sun are visible at night but not during the day.

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How does this translate to practice?

To explore this, let's engage in a science activity as learners.

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*Infectious*

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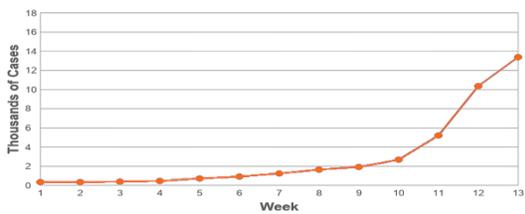
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Cases of Influenza, 2017-2018



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Now, let's think about this activity like educators...

- Consider the SEP and CCC at your group's table.
- How could you build on this activity to create a lesson that incorporates your group's SEP and CCC?
- Be prepared to share.

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Wrapping up...

1. What's something you learned today?
2. How do you see these new standards impacting science teaching and learning at your school?
3. What questions do you still have?

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Want to learn more?

Free MDE workshops throughout the state  
<https://education.mn.gov/MDE/DSE/stds/sci/MDE089199>

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