SCIENCE EDUCATORS SESSION 1: SCIENCE DATA LITERACY

Illinois Science Capacity Builders Series

CONTEXT , INTRODUCTIONS, and ROLES:

October - June 2026 Professional Learning

Synchronous virtual sessions, Asynchronous virtual sessions (spring 2026), Face to Face Session (June 2026). All professional learning supported by funds through the Illinois State Board of Education.

IL SCIENCE STEERING COMMITTEE

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Anji Garza, PD & Ed Service Director, ROE 47 (Tech, Chat)
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Brian Gibbs, Educator, Bradley School District 61
Sarah Meador, Director of ROE Services, ROE 8
Dawn Novak, Professional Learning Designer, Northwestern University
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Kristin Rademaker, Professional Learning Specialist, NSTA
Misty Richmond, Middle School Science Teacher, CPS
Richard Stokes, University of Illinois - Springfield
Nicole Vick, Curriculum Developer, Northwestern University
You! Breakout Participant, Speaker

Purpose & Desired Outcome

Purpose

To deepen your understanding of the Illinois Science Standards, build your capacity to teach science, and support greater student success.

Desired Outcome

By the end of this meeting we will have:

- Gained hands-on experience with user-friendly data tools that can be applied both for instructional planning and with students in the classroom.
- Explored strategies for engaging students in analyzing and interpreting science data, fostering critical thinking, inquiry, and evidence-based reasoning.

Participant Guidelines

Cameras on if possible

Participate though chat, hands up feature, and breakout sessions

Resist the temptation to multitask

- Take care of your own needs

Please rename yourself and include your grade level. e.g. 2nd Grade, Anji Garza.

What are the Next Generation Science Standards?

The **Illinois Learning Standards for Science** are aligned to the **Next Generation Science Standards (NGSS)**, which integrate content knowledge with the common practices of scientists and engineers. A distinctive feature of the NGSS is their ***three-dimensional*** learning approach, which intertwines Disciplinary Core Ideas (content knowledge across the domains of Physical Science, Life Science, Earth and Space Science, and Engineering Design), Science and Engineering Practices (what scientists and engineers do to investigate and design solutions), and Crosscutting Concepts (themes that bridge disciplinary boundaries and help students see patterns and connections).

Disciplinary Core Ideas (DCIs)

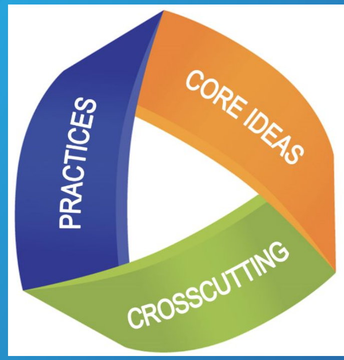
Disciplinary core ideas have the power to focus K–12 science curriculum, instruction and assessments on the most important aspects of science. Disciplinary ideas are grouped in four domains: ***the physical sciences; the life sciences; the earth and space sciences; and engineering, technology and applications of science.***

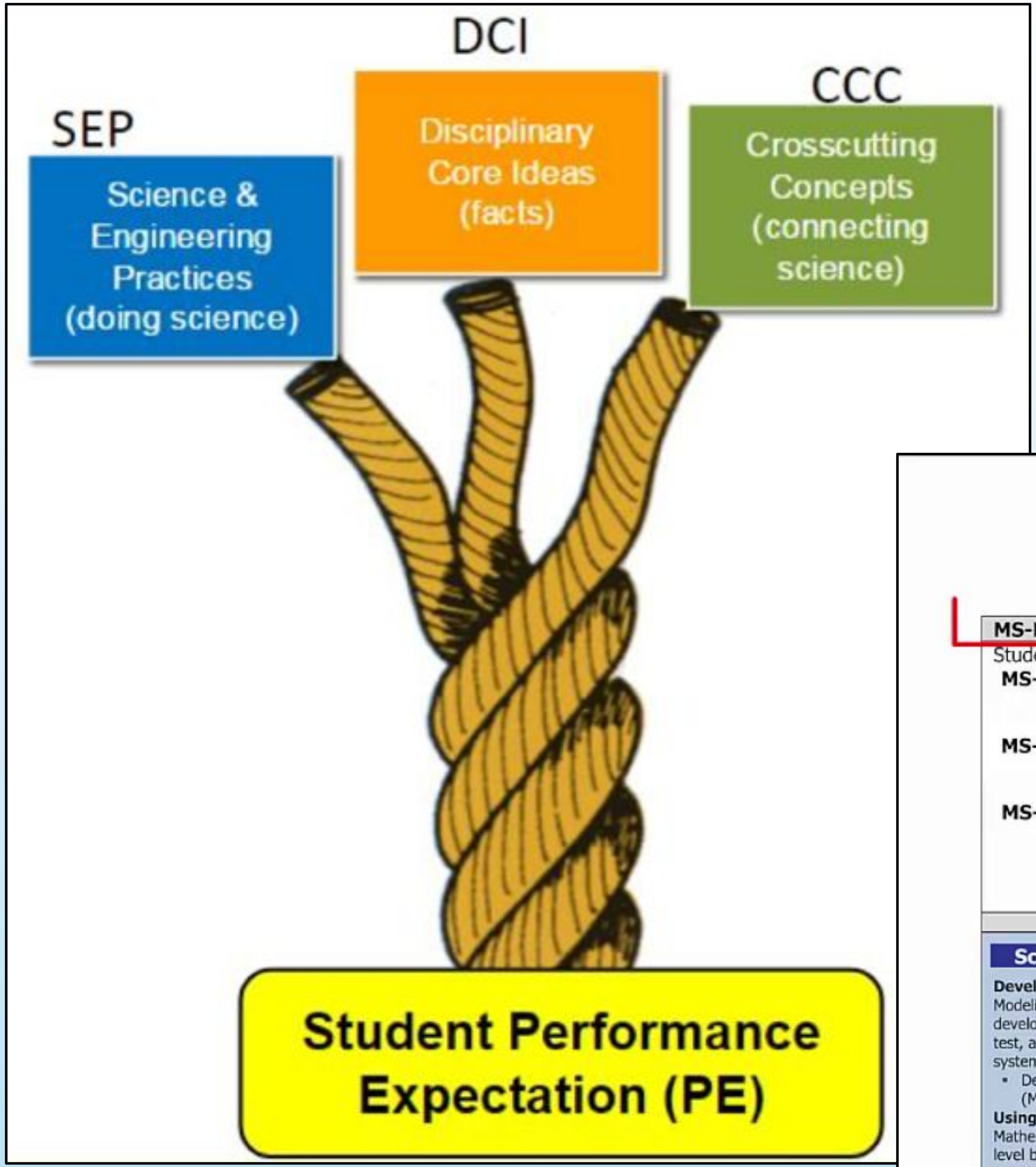
Crosscutting Concepts (CCCs)

Crosscutting concepts have application across all domains of science. As such, they are a way of linking the different domains of science. The Framework emphasizes that these concepts need to be made explicit for students because they provide an organizational schema for interrelating knowledge from various science fields into a coherent and scientifically-based view of the world.

Science and Engineering Practices (SEPs)

The practices describe behaviors that scientists engage in as they investigate and build models and theories about the natural world and the key set of engineering practices that engineers use as they design and build models and systems.





3D Learning → Students learn *content + skills + ways of thinking* **together**, not separately.

Performance Expectations

MS-PS4 Waves and Their Applications in Technologies for Information Transfer

Students who demonstrate understanding can:

MS-PS4-1. Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave. [Clarification Statement: Emphasis is on describing waves with both qualitative and quantitative thinking.] [Assessment Boundary: Assessment does not include electromagnetic waves and is limited to standard repeating waves.]

MS-PS4-2. Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials. [Clarification Statement: Emphasis is on both light and mechanical waves. Examples of models could include drawings, simulations, and written descriptions.] [Assessment Boundary: Assessment is limited to qualitative applications pertaining to light and mechanical waves.]

MS-PS4-3. Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals. [Clarification Statement: Emphasis is on a basic understanding that waves can be used for communication purposes. Examples could include using fiber optic cable to transmit light pulses, radio wave pulses in wifi devices, and conversion of stored binary patterns to make sound or text on a computer screen.] [Assessment Boundary: Assessment does not include binary counting. Assessment does not include the specific mechanism of any given device.]

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Developing and Using Models
Modeling in 6–8 builds on K–5 and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems.
- Develop and use a model to describe phenomena. (MS-PS4-2)

Using Mathematics and Computational Thinking
Mathematical and computational thinking at the 6–8 level builds on K–5 and progresses to identifying patterns in large data sets and using mathematical concepts to support explanations and arguments.
- Use mathematical representations to describe and/or support scientific conclusions and design solutions. (MS-PS4-1)

Obtaining, Evaluating, and Communicating

Disciplinary Core Ideas

PS4.A: Wave Properties
- A simple wave has a repeating pattern with a specific wavelength, frequency, and amplitude. (MS-PS4-1)
- A sound wave needs a medium through which it is transmitted. (MS-PS4-2)

PS4.B: Electromagnetic Radiation
- When light shines on an object, it is reflected, absorbed, or transmitted through the object, depending on the object's material and the frequency (color) of the light. (MS-PS4-2)
- The path that light travels can be traced as straight lines, except at surfaces between different transparent materials (e.g., air and water, air and glass) where the light path bends. (MS-PS4-2)
- A wave model of light is useful for explaining brightness, color, and the frequency-dependent bending of light at a surface between media. (MS-PS4-2)

Crosscutting Concepts

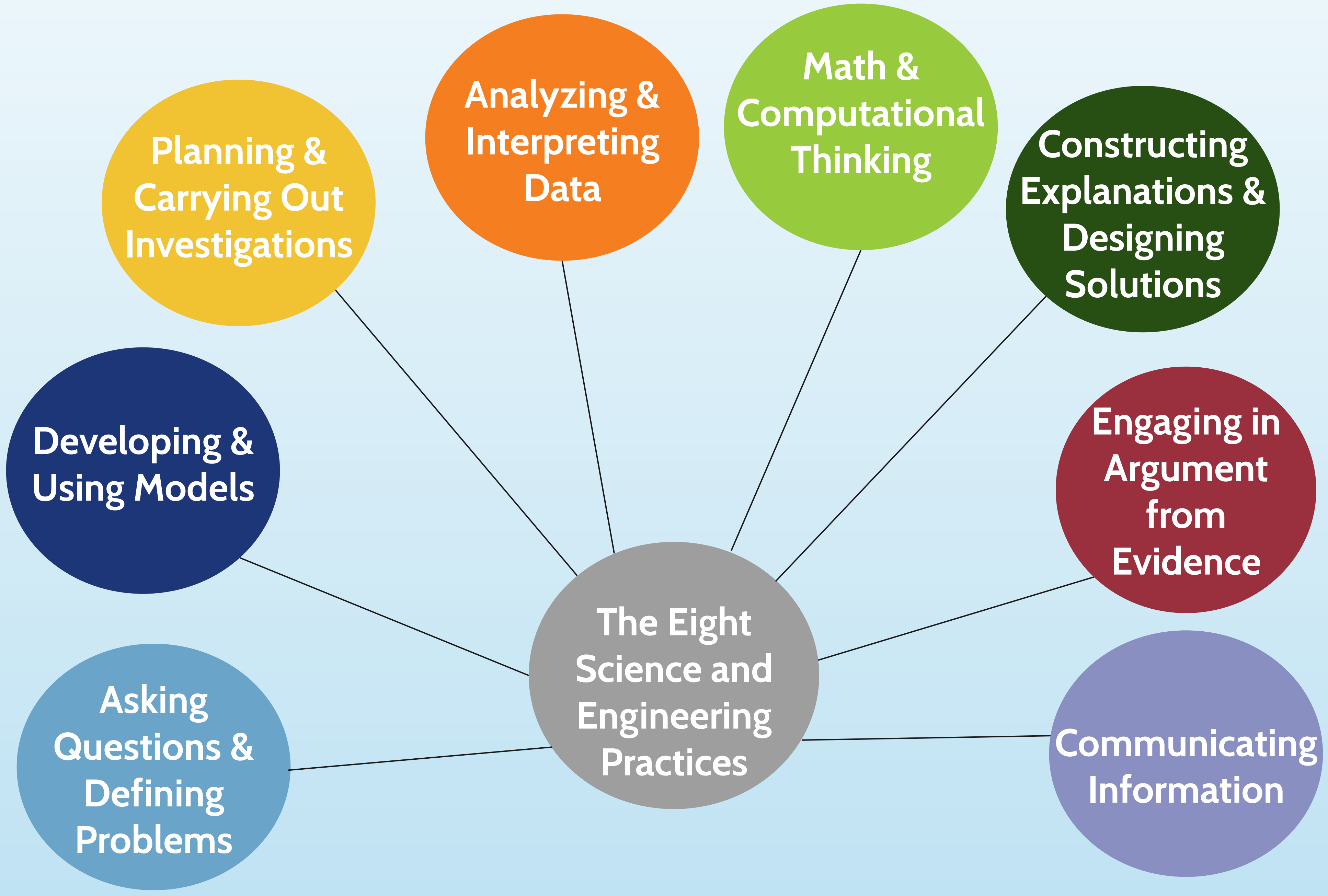
Patterns
- Graphs and charts can be used to identify patterns in data. (MS-PS4-1)

Structure and Function
- Structures can be designed to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used. (MS-PS4-2)
- Structures can be designed to serve particular functions. (MS-PS4-3)

Connections to Engineering, Technology, and Applications of Science

Influence of Science, Engineering, and

Science and Engineering Practices (SEPs)



These practices, outlined in the ***Next Generation Science Standards***, emphasize hands-on, iterative processes rather than a single, linear "scientific method"

Science and Engineering Practice 4

8
minutes

Analyzing and Interpreting Data

Small Breakout Group:

Analyze the progression of elements for the practice:

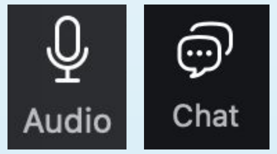
- What do you notice about what is unique with your practice for your grade band?
- What questions do you have?

Scientific investigations produce data that must be analyzed in order to derive meaning. Because data patterns and trends are not always obvious, scientists use a range of tools—including tabulation, graphical interpretation, visualization, and statistical analysis—to identify the significant features and patterns in the data. Scientists identify sources of error in the investigations and calculate the degree of certainty in the results. Modern technology makes the collection of large data sets much easier, providing secondary sources for analysis.

Science and Engineering Practice 4

Analyzing and Interpreting Data

Unmute or in chat:



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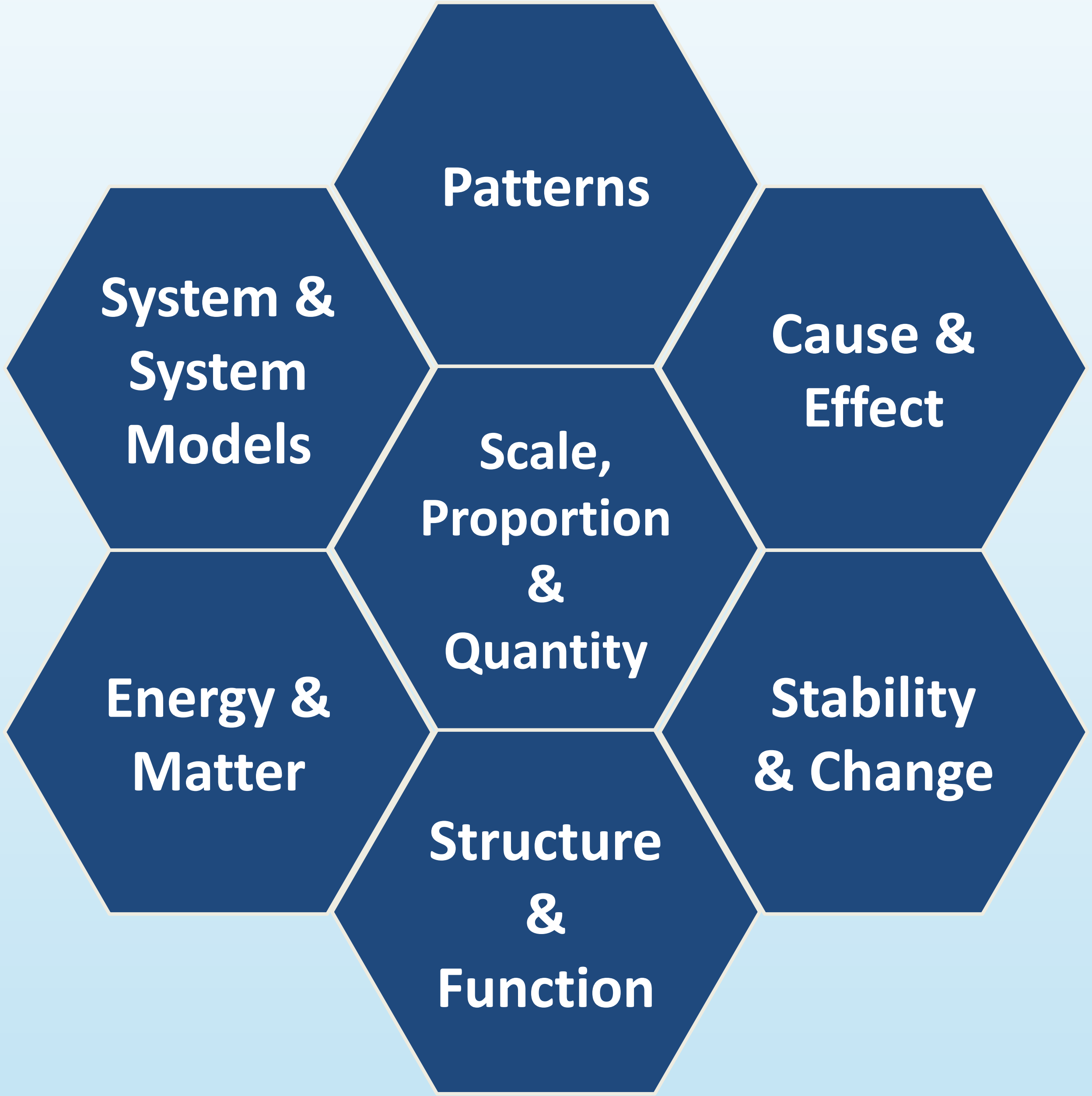
Crosscutting Concepts (CCCs)



These 7 crosscutting concepts, outlined in the ***Next Generation Science Standards***, unify the study of science and engineering through their common application across fields; and core ideas in the major disciplines of natural science.

Crosscutting Concept 1

8
minutes

Patterns

Observed patterns in nature guide organization and classification and prompt questions about relationships and causes underlying them.

Patterns figure prominently in the science and engineering practice of "Analyzing and Interpreting Data." Recognizing patterns is a large part of working with data. Students might look at geographical patterns on a map, plot data values on a chart or graph, or visually inspect the appearance of an organism or mineral.

Small Breakout Group:

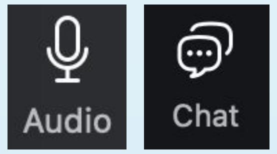
Analyze the progression of elements for the crosscutting concept:

- What do you notice is unique about how students use the crosscutting concept for your grade band?
- What questions do you have?

Crosscutting Concept 1

Patterns

Unmute or in chat:



- What do you notice is unique about how students use the crosscutting concept for your grade band?
- What questions do you have?

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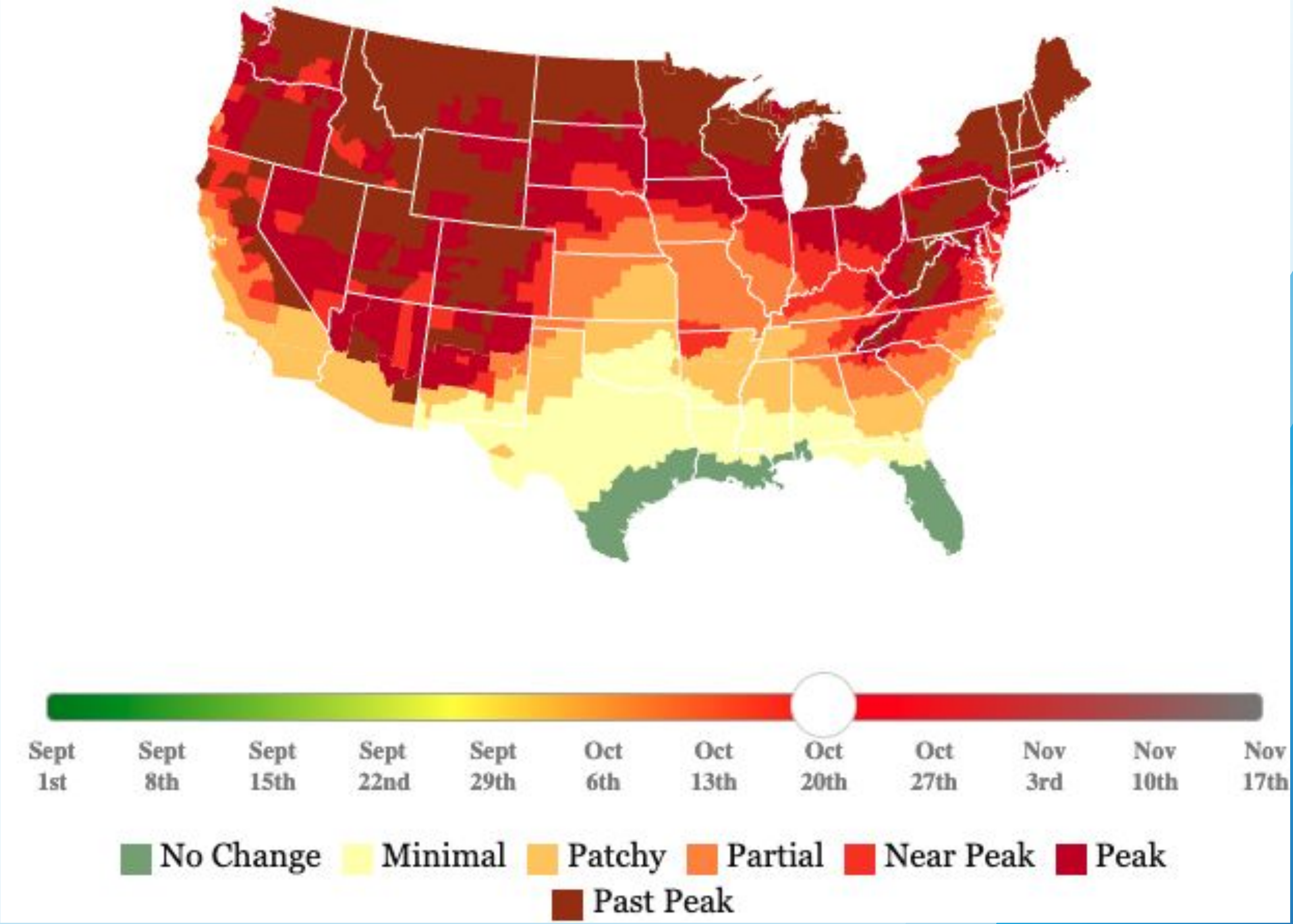
Data Analysis Strategies & Tools to Use Tomorrow

Analyzing data with the I^2 strategy –WIS/WIM

First, make observations:

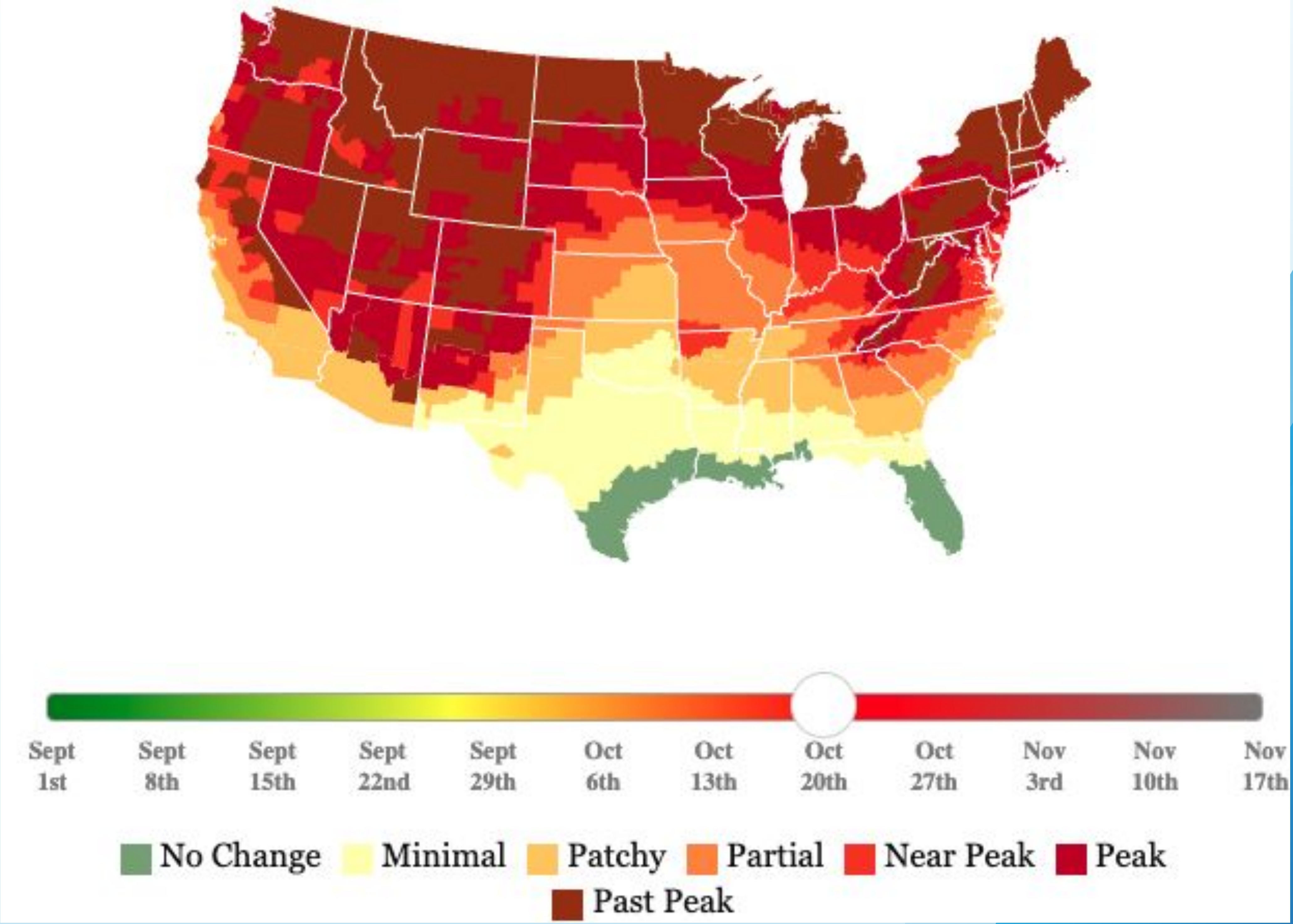
a. Draw an arrow to something you notice in the graphs.
b. Write "What I see" (or WIS), then write your observation in a complete sentence.
c. Share your observations.



Analyzing data with the I^2 strategy – WIS/WIM

Now, interpret your observations:

1. Think about what each observation means.
2. Write "What it means" (or WIM) and then add your explanation next to the observation.



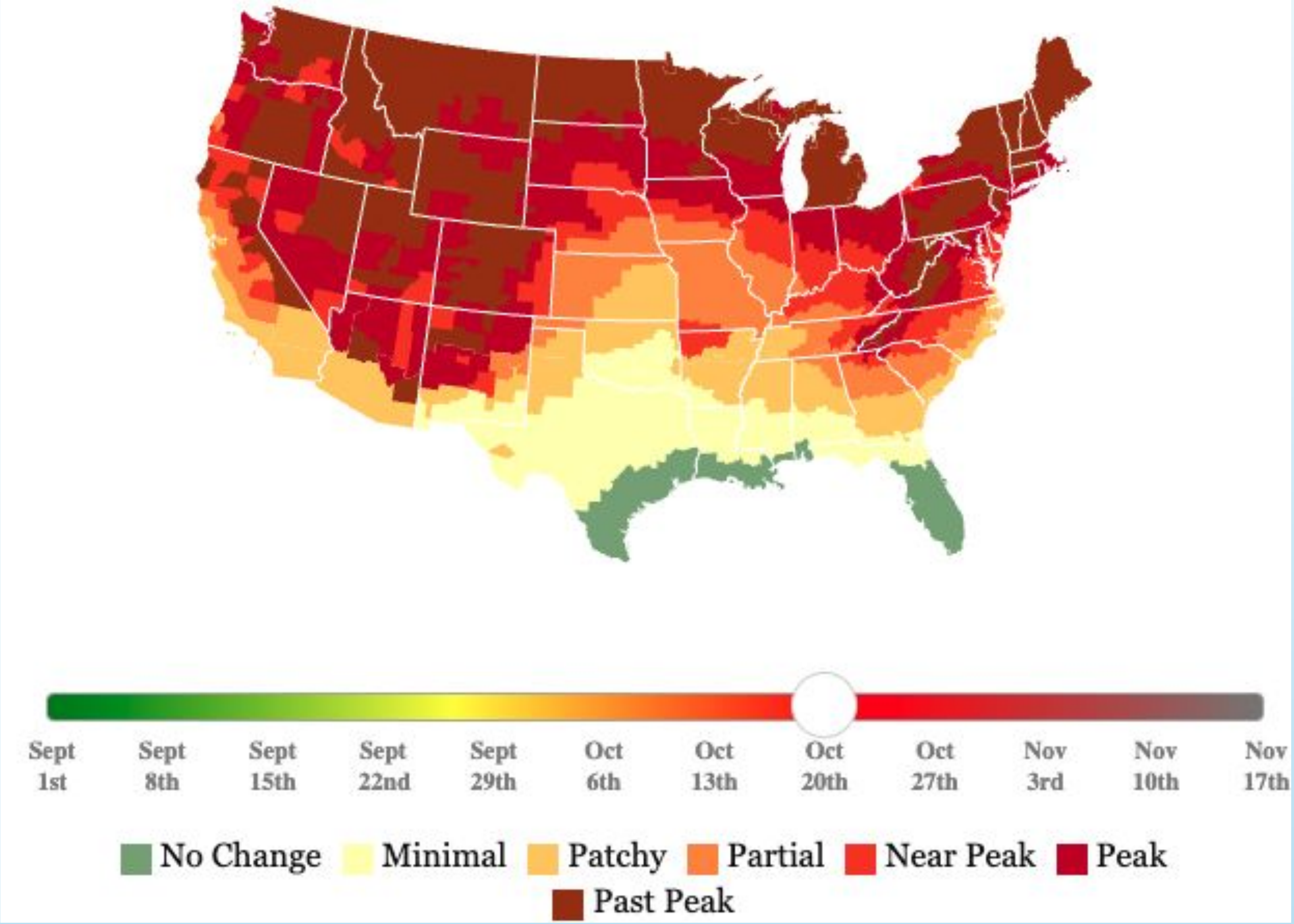
Analyzing data with the Notice & Wonder Strategy

Create a T chart in your notebook like the image on the right.
As we observe the data record something you notice as well as a question you are wondering about as you see that.

I notice....	I wonder....

Analyzing data with the Notice & Wonder Strategy

Foliage Map Shows When Fall Colors Will Peak in 2025



Record some things you notice and wonder about this data on your "Notice & Wonder" chart.

10
minutes

In Breakout Groups:

- Look at the examples for each grade band
- How do you think each of the data analysis strategies could be used to support students for each of the grade level examples?
- Share some of your takeaways in our shared space.

Next Steps

- Follow up email from Anji Garza, includes slides, agenda, and video recording
- Access and analyze your science data; contact your ROE/ISC for help analyzing data and setting goals for growth
- Encourage your teachers to attend the educator sessions each month.
- Join us for the next session in November.
- Complete the Science Survey and share with teachers.

Join us for an engaging 1.5-hour virtual session designed for educational leaders who are passionate about strengthening science instruction across their schools and districts. Through a rich case study, participants will explore what high-quality science education looks like in practice and what systems and supports are needed to make it a reality.

During this interactive session, we will:

- Examine the key components of three-dimensional, phenomenon-based science instruction.
- Analyze a real classroom case study to identify indicators of effective teaching and learning.
- Use the NSTA Walk-Through Tool, grounded in the Sensemaking Tool, to practice observing and reflecting on science instruction through a leadership lens.
- Reflect on how leadership decisions—such as professional learning design, curriculum adoption, and assessment practices—shape the quality of science education.
- Collaborate with peers to envision actionable next steps for supporting teachers and students in developing deep, meaningful science understanding.

This session provides a practical framework and shared language for recognizing and promoting excellence in science education—empowering leaders to guide their schools toward more equitable, engaging, and standards-aligned instruction.

This workshop is provided at no additional cost through a partnership with the Illinois State Board of Education.

To register:
https://forms.fillout.com/t/eGfXMqJE19us?workshopid=recSBsQ0xfihHZhXu

ILLINOIS STATE BOARD OF EDUCATION

Data Literacy & Student Data Analysis Tools

Monday, October 27
4:00 - 5:30 p.m. | Zoom

This session will help teachers understand science assessment data and provide hands-on practice with practical data tools that can also be used with students in the science classroom. Teachers will explore strategies to help students analyze and interpret science data effectively, enhancing inquiry and scientific thinking in the classroom.

Register Now

Audience:
K-12 science educators, pre-service teachers

This training is supported by ISBE and provided at no additional cost to participants.

To register for this opportunity visit https://www.roe47.org/page/pl-opportunities-workshops

ILLINOIS STATE BOARD OF EDUCATION

NOVEMBER SCIENCE LEARNING FOR EDUCATORS!

THIS TRAINING PROVIDED AT NO ADDITIONAL COST THROUGH A PARTNERSHIP WITH THE ILLINOIS STATE BOARD OF EDUCATION.

A TALE OF TWO CLASSROOMS: WHAT SHOULD SCIENCE LOOK LIKE?

NOVEMBER 10 | 4:00 - 5:30 P.M. | ZOOM

What does high-quality science teaching really look like in action? In this interactive session, teachers will compare two contrasting classroom scenarios to uncover the key features of effective, student-centered science instruction.

Together, we'll explore:

- How students engage with phenomena and make sense of the world through science and engineering practices.
- The differences between traditional, teacher-directed lessons and classrooms that foster curiosity, questioning, and evidence-based reasoning.
- What it means for instruction to be three-dimensional and aligned to today's science standards.

Through video analysis and collaborative discussion, participants will build a shared vision of what powerful science learning looks and feels like—and identify strategies they can bring back to their own classrooms the next day.

Register Now

HOW DO I GET THERE FROM HERE?

NOVEMBER 17 | 4:00 - 5:30 P.M. | ZOOM

You know what high-quality science instruction should look like—now it's time to make it happen. This session focuses on the how: the concrete steps teachers can take to move their instruction toward more authentic, three-dimensional learning experiences.

Participants will:

- Reflect on their current practice and identify growth areas using the vision from Session 1.
- Explore strategies for engaging students in meaningful sensemaking through phenomena and inquiry.
- Learn how to scaffold learning without losing rigor or curiosity.
- Using data and standards knowledge to determine next steps and measure progress.
- Develop an actionable plan for trying out one or two key shifts in their own classrooms.

Whether you're just starting your journey or already experimenting with new approaches, this session will help you connect where you are now to where you want your science instruction to be—one lesson at a time.

Register Now

Science Professional Learning in Illinois

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Meeting Evaluation

PLUS

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DELTA

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THANK YOU!