



# SCIENCE EDUCATORS SESSION 3: How Do I Get There from Here?



Illinois Science Capacity Builders Series

#### CONTEXT, INTRODUCTIONS, and ROLES:



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

Meagan Budke, ISBE

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

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Nate Nugent, High School Science Teacher, Streator, IL

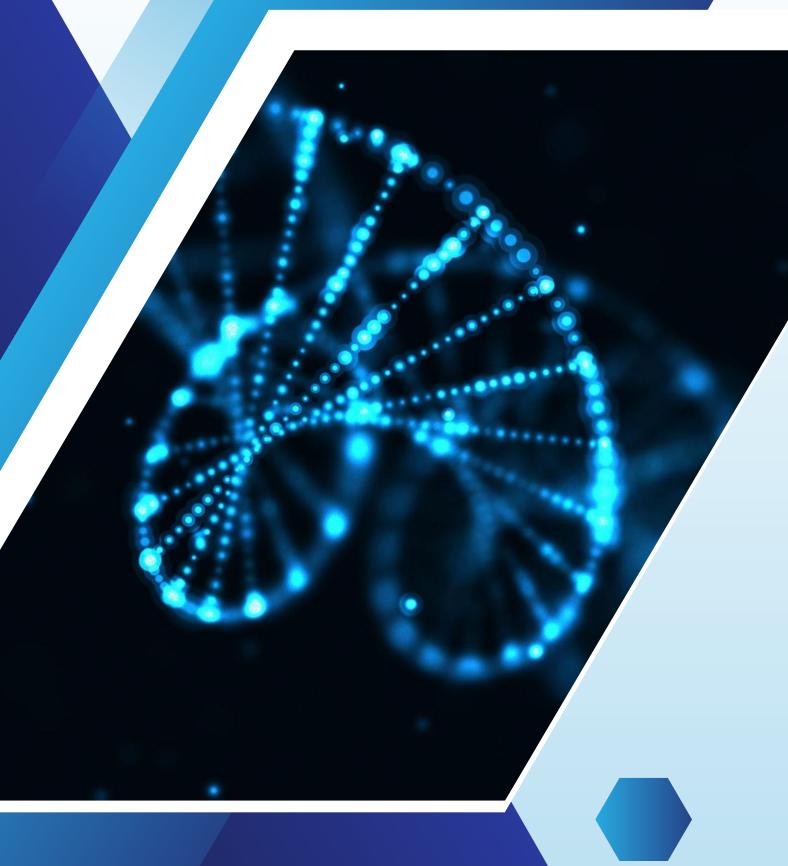
Kristin Rademaker, Professional Learning Specialist, NSTA

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



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:

- Reflected on our current science instruction and identified specific growth areas aligned with the vision from Session 2.
- Explored strategies to engage students in meaningful sensemaking through phenomena and inquiry.
- Discussed ways to scaffold learning that maintain both rigor and curiosity.
- Examined how to use data and standards knowledge to guide next steps and measure progress.
- Developed an actionable plan to implement one or two key shifts toward more authentic, three-dimensional learning.

# 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.

# We heard you....

#### What questions do you have?

How can we make this work in our larger groups?

### What do you want more of in future sessions?

I think the videos helped a lot for me to see what the key features mean.

would love to see videos of ow this works in self contained special education classes. I really liked seeing how other teachers incorporated the phenomenon based lessons. I want to see what materials teachers use for this type of method.

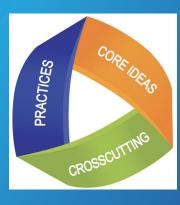
Do teachers still give presentations/notes for students to learn from?

How does a teacher with multiple science classes manage all the different questions and stay sane?

## What do you want less of in future sessions?

I like the structure of breakout rooms and the video are spot on.s

It was hard to participate without a camera/mic. I felt like I wasn't doing my share.



# "Those doing the talking are doing the

# learning"

So how do we support discourse in the classroom that is accessible for all?

We have three tools/strategies we want to share with you today:

- Using Talk Moves
- Using sentence stems
- Using a discussion planning tool

# So why might students not want to engage in productive talk?

In the chat, or unmute:

 What are some reasons why some of your students might not talk in class?

# Why is discourse so central to student sensemaking?

Rich student sensemaking requires a classroom culture of public reasoning to build students' science ideas across a unit.

Being able to identify and support productive talk is an important part of building this culture.

#### Productive talk allows students to:

- make their thinking public in an equitable way.
- reason about complex ideas.
- develop arguments and evidence-based explanations.

	oal One: Help individual students share, expand, and clarify their own thinking	Observations
1.	Time to think: Partner talk; writing as think time; wait time	
2.	Say more: "Can you say more?"; "What do you mean by that?"; "Give an example"	
3.	So, are you saying?: "So, let me see if I've got what you're saying. Are you saying?" (always leaving space for the original student to agree or disagree and say more)	
Gc	oal Two: Help students listen carefully to one another	Observations
4.	Who can rephrase or repeat?: "Who can repeat what Javon just said or put it into their own words?" (After a partner talk) "What did your partner say?"	
Gc	oal Three: Help students deepen their reasoning	Observations
5.	Asking for evidence or reasoning: "Why do you think that?" "What's your evidence?" "How did you arrive at that conclusion?"	
6.	Challenge or Counterexample: "Does it always work that way?" "How does that idea square with Sonia's example?" "What if it had been a copper cube instead?	
Gc	oal Four: Help students think with others	Observations
7.	Agree/Disagree and Why?: "Do you agree/disagree? (And why?)" "What do people think about what lan said?" "Does anyone want to respond to that idea?"	
8.	Add On: "Who can add onto the idea that Jamal is building?" "Can anyone take that suggestion and push it a little further?"	
9.	Explaining What Someone Else Means: "Who can explain what Aisha means when she says that?" "Why do you think he said that?"	

#### Goals for Productive Talk

To support productive talk, there are four conditions that need to be in place. These can be expressed as goals or challenges.

- Goal 1: Help individual students share, expand, and clarify their own thinking.
- Goal 2: Help students listen carefully to one another.
- Goal 3: Help students deepen their reasoning.
- Goal 4: Help students think with others.

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Oti	ner Observations:	

### **Productive Talk Moves**

### Individually:

Read through the Goals and Talk Moves Handout.

#### Be ready to share:

- Which Goal is most in place in your own classroom?
- Which Goal is least in place in your own classroom?

#### **Productive Talk Goals and Moves**



Goal One: Help individual students share, expand, and clarify their own thinking	Observations
<ol> <li>Time to think: Partner talk; writing as think time; wait time</li> </ol>	
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Other Observations:	
	Adapted from TERC (2012), Talk Science in the Inquiry Project

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#### Sentence Stems

- Offering a set of sentences stems can help students focus their talk.
  - Perhaps introducing one or two stems that would be particularly useful during or discussions today.
    - Ask students to try to use those specific stems in conversation as we talk about science today.

#### Science Talk Sentence Starters

#### My Responsibilities

- I agree that I will...
- Explain my ideas
- Listen to others and show that I am listening.
- Ask questions when I am confused or can't hear.
- Connect my ideas to others' (explain, add to, respectfully disagree)
- Participate because all ideas lead to learning (speak loud and clear)

#### When scientists share their own ideas, they may say:

- I observed...
- I noticed...
- My data show...
- I think...because...
- I wonder...

#### Respond to other ideas

- Can you explain to me...?
- Why do you think...?
- What evidence do you have...?
- Are you saying...?
- I agree with...because....
- I respectfully disagree with...because....

# Making Student Thinking Visible Through Talk Moves & DQB Routines

#### How Visible Posters Support Productive Discussions

- Give students shared reference points that keep discussions focused and coherent.
- Help students build on and connect to each other's ideas using common classroom tools.
- Make thinking visible so students can justify, revise, and clarify their reasoning.
- Promote a safe, collaborative culture where all students can participate meaningfully.

#### **Top Five Posters to Keep Visible**

Wall space is limited, and OpenSciEd generates a lot of student thinking. With each lesson, new artifacts emerge. So how do you decide which ones deserve a spot on your walls? This guide highlights the key posters your class will return to throughout the unit, so you can make sure they're visible, accessible, and useful for sensemaking.

Driving Question Board (DQB)

Central to class discussions and investigations, the DQB tracks which questions have been answered and which remain. It is regularly revisited and should be available for students to access at any time.

- Class Consensus Models or Big Ideas
  Students begin with an initial model to show what they know and where they have questions. As understanding grows, the class updates the model to reflect shared ideas—making it a living record of sensemaking across the
- Ideas for Investigation

  This list captures student suggestions for how to explore their questions.

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Referencing it builds ownership and reinforces that students help drive how the class figures things out.

- Related Phenomena
  These connect classroom science to students' real-world experiences and highlight how the same ideas apply across different situations—supporting relevance and transfer.
- Classroom Agreements/Norms

  Displayed norms promote a safe, collaborative environment where students can share, question, and revise ideas. Revisited often, they help build and sustain classroom culture.





# Guidelines for Watching Videos of Teaching\*

 These are real classrooms, which means there are also students who did not give consent.

#### Ground rules:

- Teaching and the classrooms we will see are complex. There is much we
  don't know about the students and teacher and their history together.
- Presume expertise on the part of the teacher.
- Assume what the kids are saying makes sense to them.
- Focus on how the classroom talk (teacher and students) is serving the learning goals of the lesson and the science and engineering practices involved.

<sup>\*</sup>Adapted from: Classroom Discussions: Seeing Math Discourse in Action, Grades K–6. A Multimedia Professional Learning Resource and the Next Generation Science Exemplar Program (NGSX)

#### 6th Grade Science Classroom

A class is constructing a driving question board about the movement of Mt. Everest, which is the anchoring phenomenon for the Rock Cycling & Plate Tectonics unit.

#### What to Notice in the Video

- How does the teacher use talk moves to help students clarify or expand their thinking?
- Where do you see students building on each other's ideas instead of only responding to the teacher?
- How does the classroom environment (posters, norms, DQB setup) support students in participating and sharing their thinking?



# Making Student Thinking Visible Through Talk Moves & Driving Question Board (DQB) Routines

### Talk Moves Summary

- Say More: Helps students clarify and deepen their ideas.
- Revoice/Rephrase: Ensures shared understanding and supports idea-building.
- Ask for Evidence: Pushes students to justify reasoning with data.
- Crosstalk: Promotes student-to-student discussion and collaborative sensemaking.

#### 6th Grade Science Classroom

A class is constructing a driving question board about the movement of Mt. Everest, which is the anchoring phenomenon for the Rock Cycling & Plate Tectonics unit.

### **Small Group Discussion**

- How does the teacher use talk moves to help students clarify or expand their thinking?
- Where do you see students building on each other's ideas instead of only responding to the teacher?
- How does the classroom environment (posters, norms, DQB setup) support students in participating and sharing their thinking?



# Purposeful and Productive Discussions

1. **Student engagement:** There is a need to work with their own and others' ideas. This requires that students:

Go public with their ideas

Listen carefully to the thinking of others

Dig deeper into their own reasoning

Connect with the ideas of others

2. Idea Development: Make sense of what we are investigating and make progress on important ideas

What we observed and read about how solid objects respond to forces applied to them

Establish that elastic limits and breaking points depend on the material, shape, and thickness

Slide A

# Navigation

In our last set of investigations, we found that many things that appear to be rigid actually **deform** (bend, distort, or change shape) when a contact force is applied to them.



Dr. Mostafa Tazrv, Assistant Professor, Department of Civil Env. Engineering, South Dakota State University



#### Turn and Talk

In our last lesson we wondered if applying any amount of force to any solid object would cause it to bend.

 What were some of your ideas for how we could investigate if any amount of force would cause any solid object to start bending or change shape?



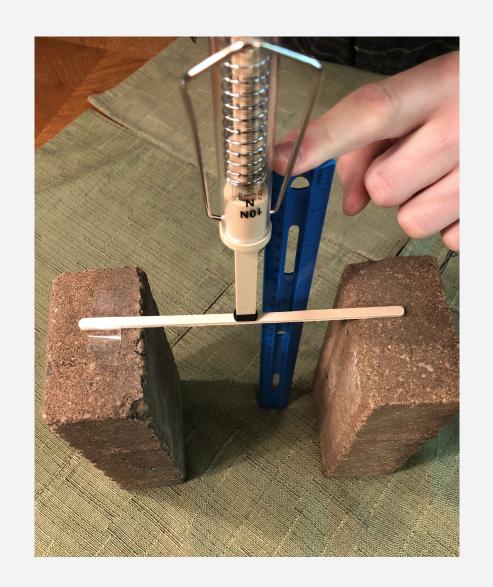
### Material Deformation Lab



- Add your handouts to your notebook.
- Record the investigation question that is shown below.

### Investigation question

How much do you have to push on any object to get it to deform (temporarily vs. permanently)?



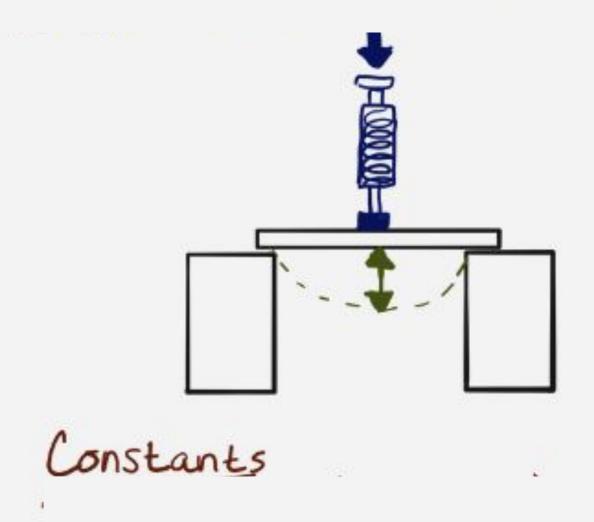
#### Lesson 4 Materials Deformation Lab - Anchor Chart

#### **Word Wall**

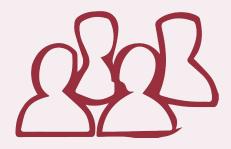
Independent variable: this is the variable to change each time you test.

Dependent variable: the variable to observe the effects caused by a change in the independent variable.





# Material Deformation Lab

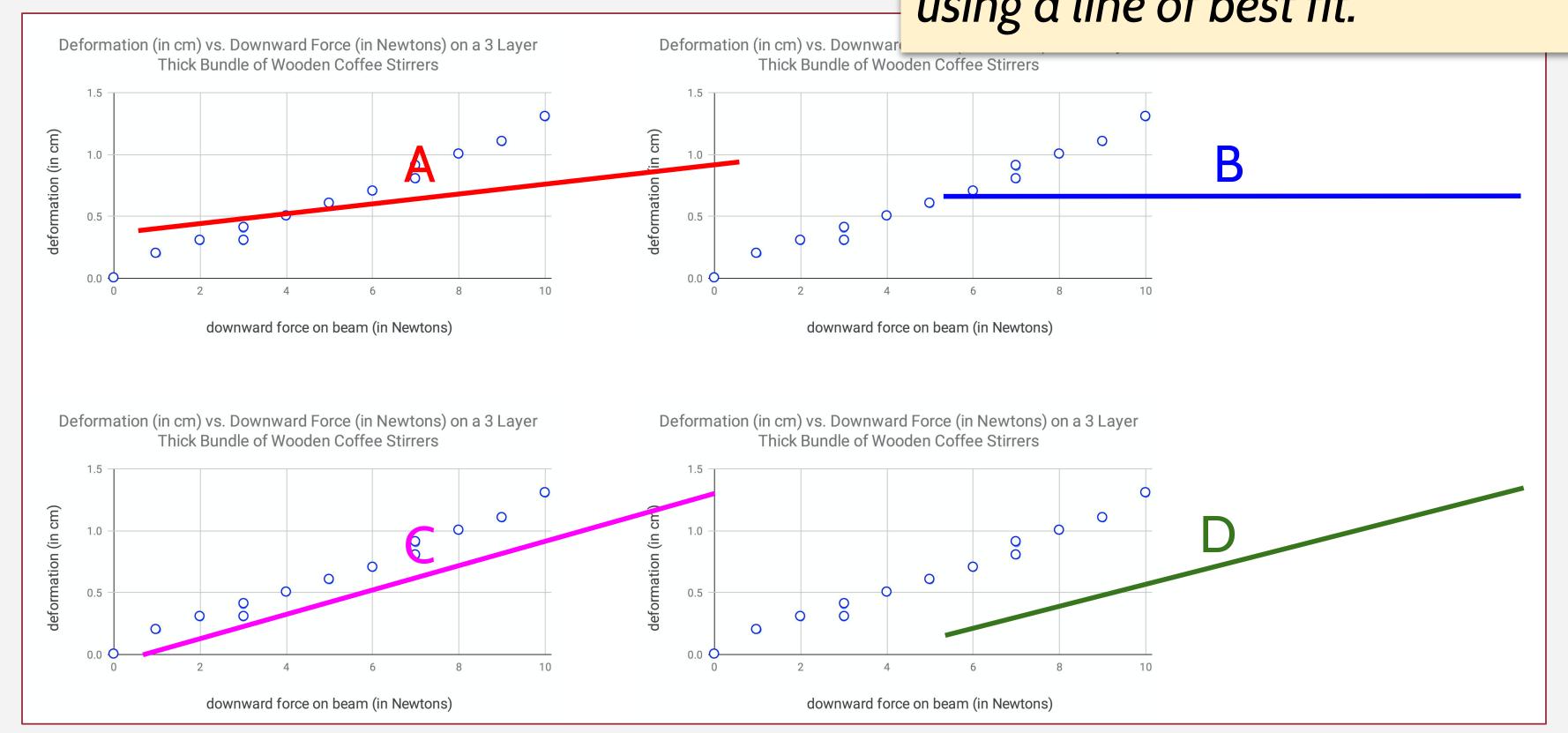


# With Your Group

- Collect and record data on your handout
- Graph your data after you have finished recording it

# Comparing Mathematical Models

Students get into jigsaw groups to graph and compare their data, using a line of best fit.



# Lesson 4 Consensus Discussion

How do we make sense of evidence through discussions?



# Update Class Progress Tracker



#### As a Class

Meet in a Scientists Circle and develop a record of the sources of evidence and what you all have figured out in relation to the lesson question:

How much do you have to push on any object to get it to deform (temporarily or permanently)? We're going to watch a classroom video of this consensus discussion.

Progress Tracker					
Question	Source of evidence				
What we figured out					

#### Classroom Video of Consensus Discussion

As you watch, consider the following questions:

- What do you notice about what the teacher is doing to support students to go public with their ideas?(Talk moves)
- What kinds of ideas are students comfortable sharing?

#### **Talk Moves Summary**

- Say More: Helps students clarify and deepen their ideas.
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# Video of Consensus Discussion



- What do you notice about what the teacher is doing to support students to go public with their ideas? (Talk Moves)
- What kinds of ideas are students comfortable sharing?

### Classroom Video Debrief





With your small group, review the completed planning tool for this discussion and discuss the following:

- How does it seem like this teacher used this tool to plan for the discussion we just saw?
- How does this planning tool ensure student engagement during the discussion?

# Unit and Lesson \_\_8.1 Lesson 4\_\_\_\_\_ Context What type of discussion is this? What tasks will students on



What tasks will students complete prior to the discussion that connect to the discussion? What might they bring to the discussion?

- Planned and carried out the deformation investigation, graphed results
- slow-motion videos of collisions
- laser light reflected off a mirror on a piece of glass
- concrete beam load video
- force vs. deformation lab results (wood and Styrofoam)
- compression test results from engineers

#### Goals

What is the purpose of this discussion?

Summarize the main ideas about how solid objects respond to forces applied to them and how their elastic limits and breaking points are affected by the material they are made of, their shape, and thickness.

As a result of this discussion, what do we hope students will figure out? (Students will figure out \_\_\_\_\_\_.)

Students will figure out:

☐ Initial ideas

Consensus

☐ Building understanding

- All solid objects deform elastically when smaller amounts of force are applied to them; they will spring back to their original shape when this force is removed.
- How much a solid object deforms for a given amount of force applied to it is dependent on the type of material it is made of, its shape, and its thickness.
- Different objects have a different elastic limit and breaking point.

#### What is it ok to leave unresolved during the discussion?

- Effects of mass and speed on collisions, forces between particles that make up solid matter.

# Tools and strategies we have explored

# **Galk** Moves

- Visible Classroom Resources
- Discussion Planning Tool
- Sentence Stems

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- I observed...
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- I think...because...
- I wonder...

#### Respond to other ideas

Can you explain to me ...?

**OpenSciEd** 

Why do you think ...?

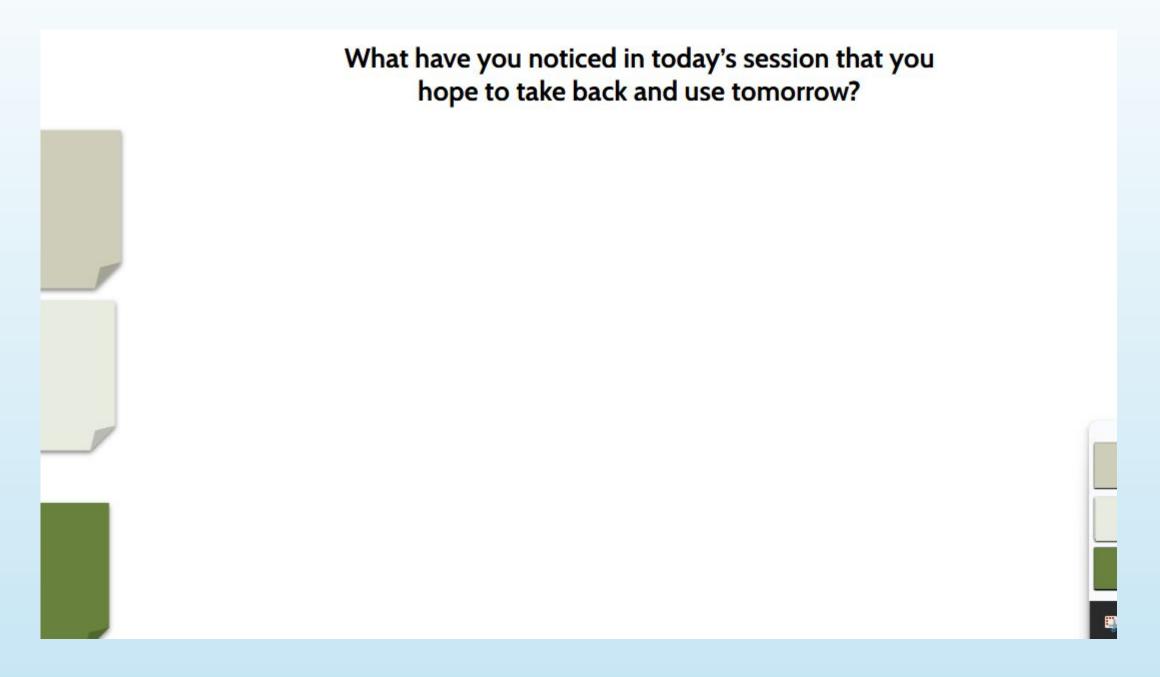
ive...?

th...because....

Discussion Planning Tool

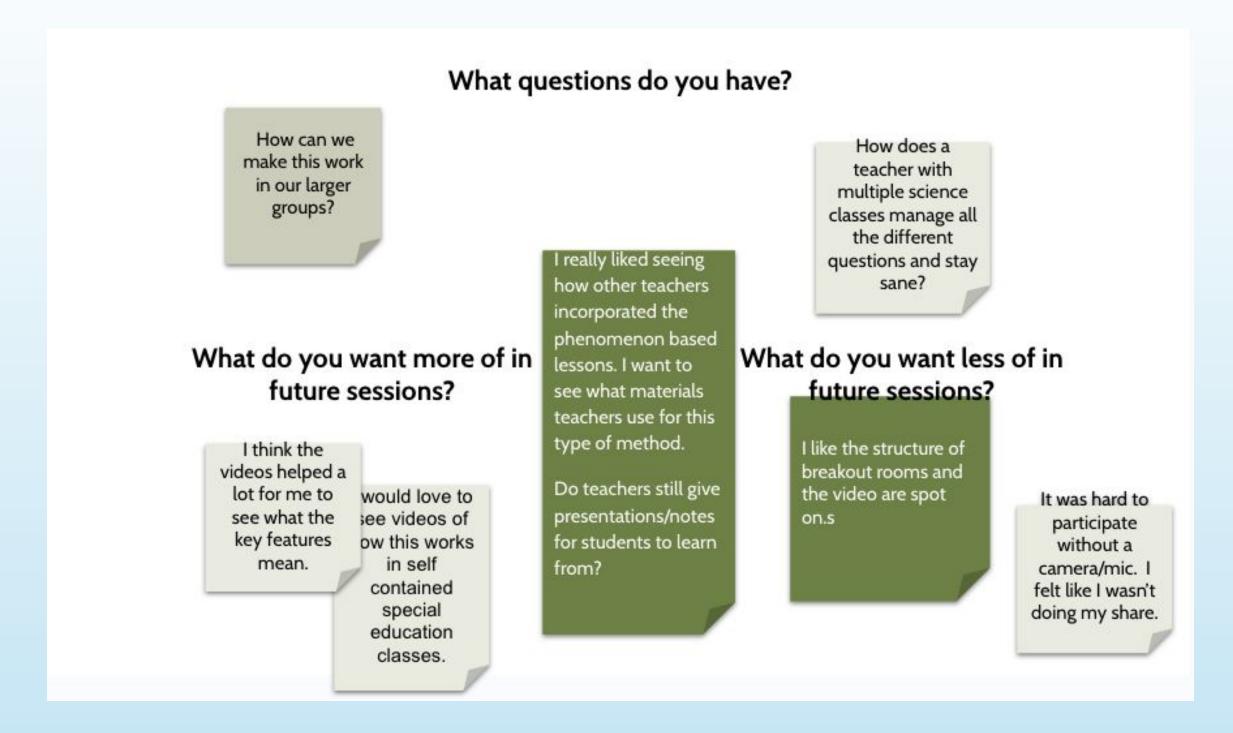
Unit and Lesson Context						
Goals						
What is the purpose of this discussion?						
As a result of this discussion, what do we hope	students will figure out? (Students will figure out)					
What is it ok to leave unresolved during the dis	ccussion?					

# What have you noticed in today's session that you hope to take back and use tomorrow?



Individually: Add something you noticed today that you can take back to your classroom and use tomorrow.

#### How did we do at answering your questions from last time?



Individually: Drag a checkmark onto the questions you feel we addressed during this session.



What questions do you have?

What do you want more of in future sessions?

What do you want less of in future sessions?

**Individually**: What do you want to explore further in future sessions? What do you need more of? Less of? Share your thoughts on our shared slides (slide 3), linked in the chat.

# Next Steps

 Follow up email from Anji Garza, includes slides, agenda, and video recording

• Encourage your teachers to attend the educator sessions each month.

Join us for the next session!

 Complete the Science Survey and share with teachers.



# Science Professional

# Learning in Illinois

# SURVEY CLICK HERE







# UPCOMING HAPPENINGS AT ISTA!

Together, we're shaping the future of science education in Illinois—stay in the loop with the latest news, events, and educator highlights from across the state.

### WE PROVIDE LEARNING OPPORTUNITIES



#### SCIENCE IN THE SOUTH CONFERENCE

Friday, March 6th 2026 John A Logan College Carterville, IL



#### ANNUAL CONFERENCE 2026

Monday, October 5, 2026 Northern Illinois University Conference Center, Naperville, IL



#### WANT TO PRESENT OR HOST AN EXHIBIT?

Be sure to check our website in January or reach out to abigail.trefilek@ilscience.org to be notified when proposals are open!

#### **Stay in Touch with ISTA!**











# Meeting Evaluation







# THANK YOU!