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Charles A. Dana Center

Productive Science Talk and Planning for Discussions

Recorded session for LDOE

Molly Ewing

– Equity — Access — Excellence –

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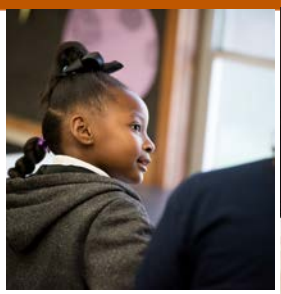
Our Mission

Advancing Public Education at Scale

01 70+-member team works across K–12 and higher education systems

02 Bring equity lens to ensure every student has access to high-quality, relevant mathematics & science education that's central to their postsecondary & career success

03 Nearly 30 years of experience, bringing deep understanding of how to navigate complex education systems



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Stop and Jot

- What is the current state of discourse in your classroom?
- What are some intentional strategies you can implement to better support productive discourse?
- What will it mean for students if you make these changes?

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Purposeful and Productive Discussions

Key Aspects

- **Student engagement**: Students need to learn to work with their own and others' ideas. This learning 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
- **Idea Development:** Make sense of what we are investigating and make progress on important ideas

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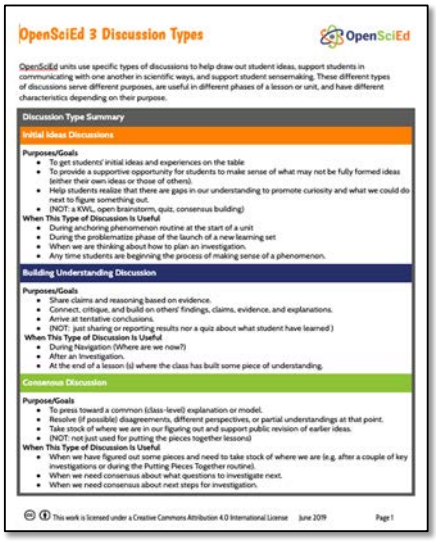
3 Discussion Types

- Share many basic features
- Differ in purpose/goal, which impacts:
  - Skills students need
  - Facilitation strategies teachers use


OpenSciEd 3 Discussion Types

OpenSciEd units use specific types of discussions to help draw out student ideas, support students in communicating with one another in scientific ways, and support student sensemaking. These different types of discussions serve different purposes, are useful in different phases of a lesson or unit, and have different characteristics depending on their purpose.

Discussion Type Summary

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Purposes/Goals
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- When we have figured out some pieces and need to take stock of where we are (e.g. after a couple of key investigations or during the Putting Pieces Together routine).
- When we need consensus about what questions to investigate next.
- When we need consensus about next steps for investigation.

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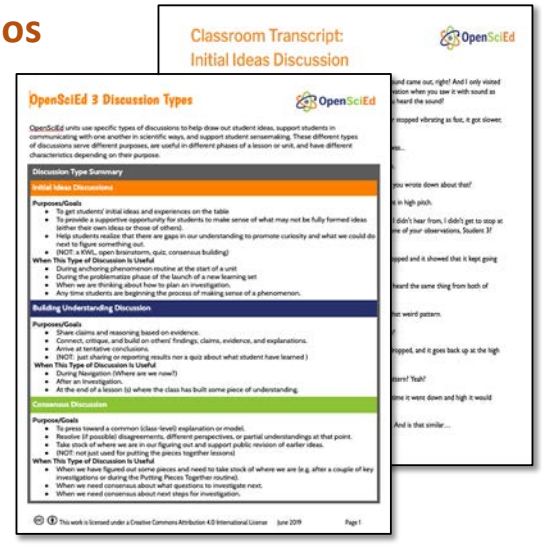
3 Discussion Types — Classroom Videos

For each video we will:

1. Watch the video
2. Reflect individually
3. Discuss in small group

After we watch all 3 clips, we will discuss implications across the 3 types of discussion.


Classroom Transcript:
Initial Ideas Discussion

OpenSciEd 3 Discussion Types

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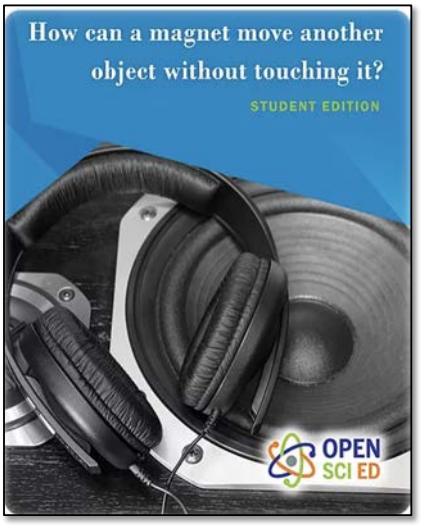
Initial Ideas Discussion: Context

Forces at a Distance — Lesson 1

- Students recalled that anything that produces a sound requires a force.
- They don't know what is causing the force in a speaker.
- They decide to watch a video of a speaker playing in slow motion.
- They watch the video once without sound and once with the sound on and discuss in small group before sharing out.



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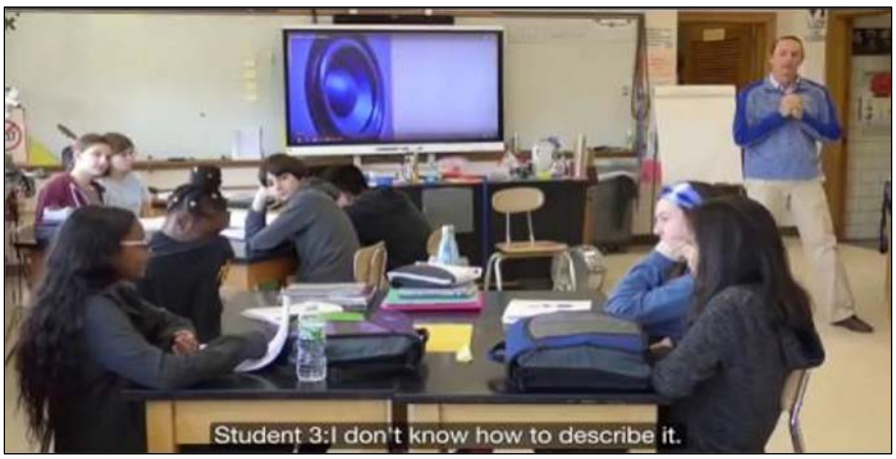
Initial Ideas Discussion — Speaker Observations



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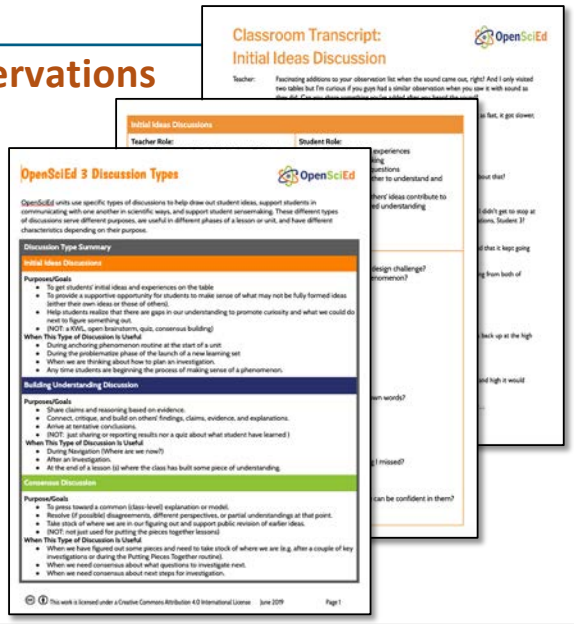
Initial Ideas Discussion — Speaker Observations

Individually reflect:

- What do you notice the students doing?
- What moves is the teacher making to support the goals of this initial ideas discussion?
- How do the moves support both **idea development** and **student engagement**?

Use the transcript and pages 1 and 2 of the Discussion Types Handout



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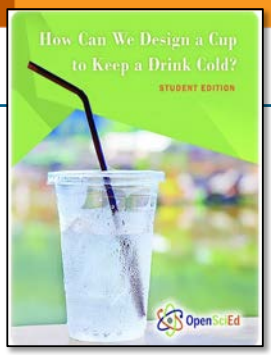
Building Understandings Discussion: Context

Thermal Energy — Lesson 8

- Students have just conducted an investigation to test what kinds of materials best block the radiation energy from a heat lamp.
- Groups tested wrapped and unwrapped (control) cups.
- This clip shows the end of class where students start to share their findings.



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Building Understandings Discussion — Cup Testing

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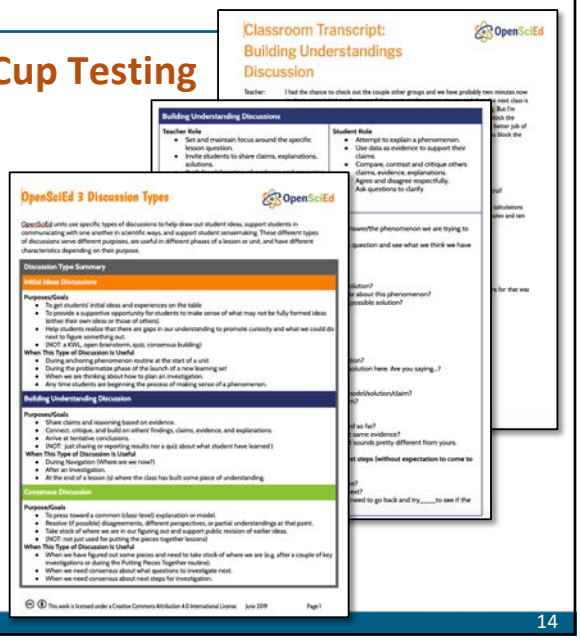
Building Understandings Discussion — Cup Testing

Individually reflect:

- What do you notice the students doing?
- What moves is the teacher making to support the goals of this building understandings discussion?
- How do the moves support both **idea development** and **participant engagement**?

Use the transcript and pages 1 and 3 of the Discussion Types Handout.



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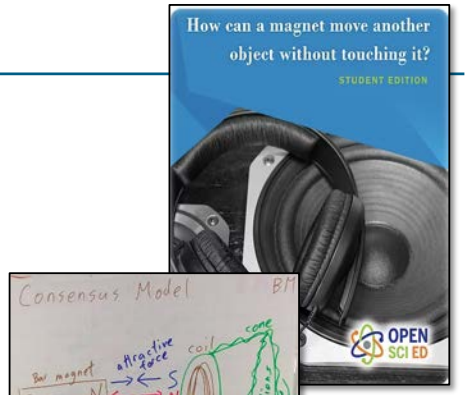
Consensus Discussion: Context

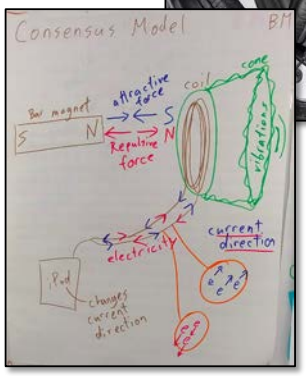
Forces at a Distance — Lesson 5

- The class is revising their initial model to answer the question:

  How do the magnet and the wire work together to move the speaker?

- Prior to this discussion they have created a "gotta-have-it checklist," individually revised their models, shared with the class, and revised again.





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Consensus Discussion — Speaker Model Revision

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Consensus Discussion — Speaker Model Revision

Individually reflect:

- What do you notice the students doing?
- What moves is the teacher making to support the goals of this consensus discussion?
- How do the moves support both **idea development** and **participant engagement**?

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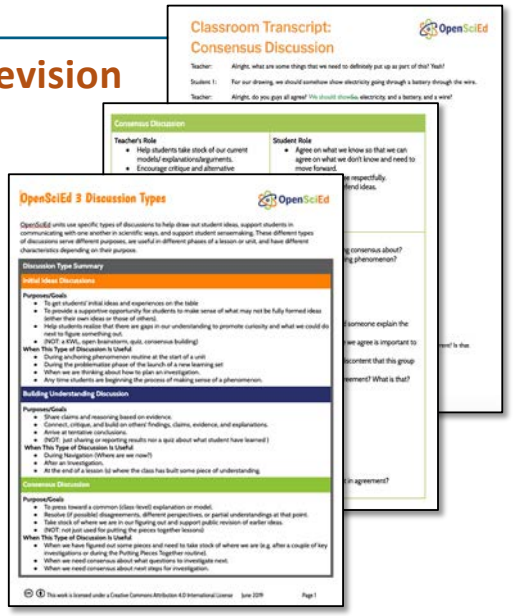

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Revisiting Key Aspects of Purposeful and Productive Discussions

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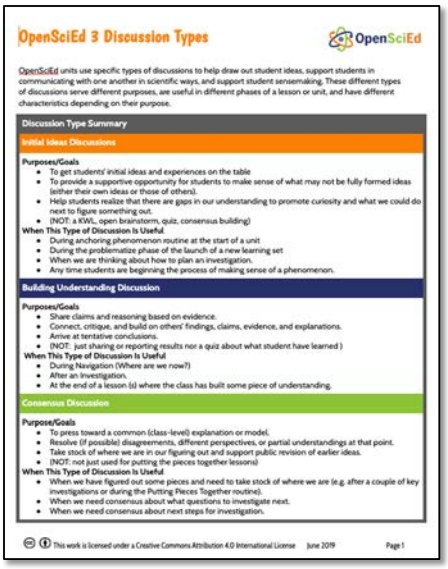
Reflecting on the 3 Discussion Types

- How is understanding the differences between the 3 discussion types helpful in supporting idea development and student engagement?
- What are the implications for us as teachers?



OpenSciEd 3 Discussion Types

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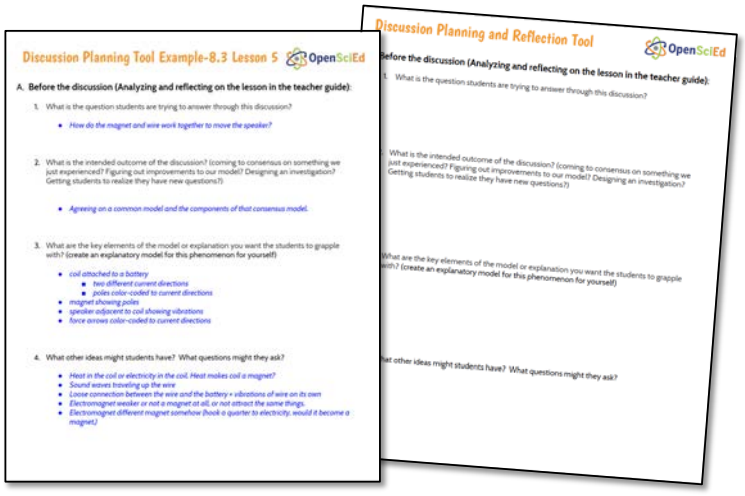
Planning Purposeful and Productive Discussions



Discussion Planning Tool Example-8.3 Lesson 5 OpenSciEd

A. Before the discussion (Analyzing and reflecting on the lesson in the teacher guide):

1. What is the question students are trying to answer through this discussion?
   - *How do the magnet and wire work together to move the speaker?*
2. What is the intended outcome of the discussion? (coming to consensus on something we just experienced? Figuring out improvements to our model? Designing an investigation? Getting students to realize they have new questions?)
   - *Agreeing on a common model and the components of that consensus model.*
3. What are the key elements of the model or explanation you want the students to grapple with? (create an explanatory model for this phenomenon for yourself)
   - *coil attached to a battery*
     - *two different current directions*
     - *poles color-coded to current directions*
   - *magnet showing poles*
   - *speaker adjacent to coil showing vibrations*
   - *force arrows color-coded to current directions*
4. What other ideas might students have? What questions might they ask?
   - *Heat in the coil or electricity in the coil. Heat makes coil a magnet?*
   - *Sound waves traveling up the wire*
   - *Loose connection between the wire and the battery + vibrations of wire on its own*
   - *Electromagnet weaker or not a magnet at all, or not attract the same things.*
   - *Electromagnet different magnet somehow (hook a quarter to electricity, would it become a magnet)*

Discussion Planning and Reflection Tool OpenSciEd

Before the discussion (Analyzing and reflecting on the lesson in the teacher guide):

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What is the intended outcome of the discussion? (coming to consensus on something we just experienced? Figuring out improvements to our model? Designing an investigation? Getting students to realize they have new questions?)

What are the key elements of the model or explanation you want the students to grapple with? (create an explanatory model for this phenomenon for yourself)

What other ideas might students have? What questions might they ask?

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Planning Purposeful and Productive Discussions

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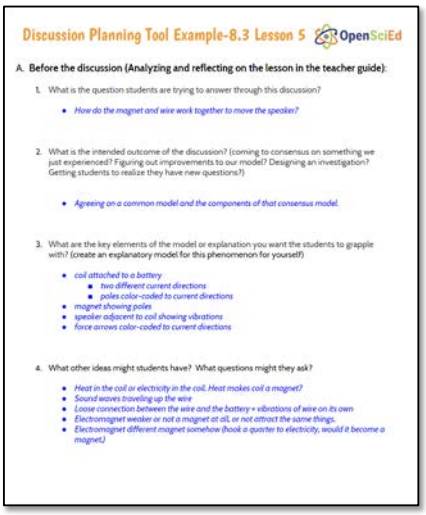
Planning Purposeful and Productive Discussions

Part 1: From the video and completed tool

- How is the teacher considering both the science ideas in the curriculum and the science ideas of his students in his planning?
- What strategies or talk moves does he plan to use to help move those ideas forward?

Part 2: Look at the Consensus Discussion Transcript

- Where do you see evidence of his planning (ideas, talk moves, etc.) in the transcript of the Consensus Discussion?



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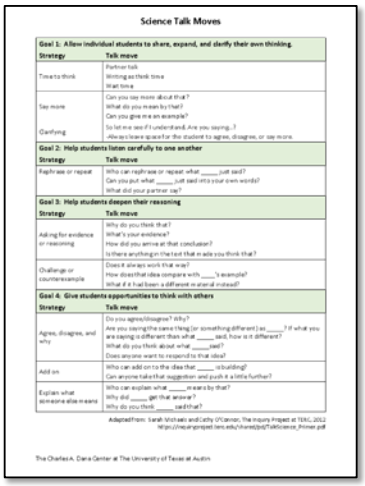
Planning Purposeful and Productive Discussions

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.



Science Talk Moves

Goal 1: Allow individual students to share, expand, and clarify their own thinking.	
Strategy	**Talk move**
Time to think	Partner talk Writing as think time Wait time
Say more	Can you say more about that? What do you mean by that? Can you give me an example?
Clarifying	So let me see if I understand. Are you saying...? Always leave space for the student to agree, disagree, or say more.
Goal 2: Help students listen carefully to one another	
Strategy	**Talk move**
Rephrase or repeat	Who can rephrase or repeat what ____ just said? Can you put what ____ just said into your own words? What did your partner say?
Goal 3: Help students deepen their reasoning	
Strategy	**Talk move**
Asking for evidence or reasoning	Why do you think that? What's your evidence? How did you arrive at that conclusion? Is there anything in the text that made you think that?
Challenge or counterexample	Does it always work that way? How does that idea compare with ____'s example? What if it had been a different material instead?
Goal 4: Give students opportunities to think with others	
Strategy	**Talk move**
Agree, disagree, and why	Do you agree/disagree? Why? Are you saying the same thing (or something different) as ____? If what you are saying is different than what ____ said, how is it different? What do you think about what ____ said? Does anyone want to respond to that idea?
Add on	Who can add on to the idea that ____ is building? Can anyone take that suggestion and push it a little further?
Explain what someone else means	Who can explain what ____ means by that? Why did ____ get that answer? Why do you think ____ said that?

Adapted from: Sarah Michaels and Cathy O'Connor, The Inquiry Project at TERC, 2012
http://inquiryproject.terc.edu/shared/pd/TalkScience_Primer.pdf

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Reflection

- How does planning and conducting different discussion types support access for all students?
- What might happen if we do NOT plan for different types of discussions?

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References, page 1 of 3

Slides 7, 8, 11, 14, 17, 19: OpenSciEd. (2019 June). "OpenSciEd: 3 Discussion Types." Available at https://www.openscied.org/wp-content/uploads/2019/07/Handout-3-Discussion-Types-OpenSciEd-1.pdf | Adapted by OpenSciEd from Michaels, S. and Moon, J. (2016) NGSX. *Discussion as a Form of Productive Talk.*

Slides 9, 10, 11: OpenSciEd. (2019 June). Unit 8.3: Forces at a Distance: How Can a Magnet Move Another Object Without Touching It? Lesson 1. Classroom Transcript: Initial Ideas Discussion. | Course content URL: https://www.openscied.org/instructional-materials/8-3-forces-at-a-distance | Video URL: https://www.youtube.com/watch?v=X54sW1mdfVo

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Slides 12, 13: OpenSciEd. (2019 June). Unit 6.2: Thermal Energy: How Can We Design a Cup to Keep a Drink Cold? Lesson 8. Student Edition. Course content URL: https://www.openscied.org/instructional-materials/6-2-thermal-energy | Video URL: https://www.youtube.com/watch?v=LiiUMtCZsoo

Slide 14: OpenSciEd. (2019 June).Thermal Energy: How Can We Design a Cup to Keep a Drink Cold? Lesson 8. Classroom Transcript: Building Understandings Discussion.

Slides 15, 16: OpenSciEd. (2019 June). Unit 8.3: Forces at a Distance: How Can a Magnet Move Another Object Without Touching It? Student Edition. Lesson 5. Course content URL: https://www.openscied.org/instructional-materials/8-3-forces-at-a-distance | Video URL: https://www.youtube.com/watch?v=qUkTj4kc3IY

Slide 17: OpenSciEd. (2019 June). Unit 8.3: Forces at a Distance: How Can a Magnet Move Another Object Without Touching It? Lesson 5. Classroom Transcript: Consensus Discussion.

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Slides 20, 22: OpenSciEd. (2019 June). "Discussion Planning and Reflection Tool." | https://www.openscied.org/wp-content/uploads/2019/07/Day-3.2-Unit-8.2-Discussion-Planning-Tool-.pdf and Discussion Planning Tool Example-8.3, Lesson 5.

Slide 21: Discussion Planning Video and Interview. Video URL: https://www.youtube.com/watch?v=p3SSQYS8c4E

Slide 23: Science Talk Moves. Adapted from Sarah Michaels and Cathy O'Connor. (2012). *Talk Science Primer.* The Inquiry Project at TERC. Cambridge, MA: TERC. | https://inquiryproject.terc.edu/shared/pd/TalkScience_Primer.pdf

See also: TERC. (2012). "The Inquiry Project: Seeing the world through a scientist's eyes." Available at https://inquiryproject.terc.edu/prof_dev/Goals_and_Moves.cfm.html

Some of these TERC resources in turn cited as adapted from: Chapin, S. O'Connor, C., & Anderson, N. (2009). *Classroom Discussions: Using Math Talk to Help Students Learn, Grades 1-6.* Sausalito, CA: Math Solutions Publication.

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Direct questions or feedback to STEM@la.gov.