Kentucky Department of EDUCATION

Science Discourse: Supporting Sensemaking for All Learners

Facilitator's Guide

Winter 2025

Kentucky Department of EDUCATION

Module Overview

This module is intended to provide guidance in the successful implementation of meaningful science discourse for all students, supporting the three-dimensional learning through collaboration called for in the *Kentucky Academic Standards (KAS) for Science*. These materials to be used in professional learning sessions at the district, school or department level.

The duration and scope may be customized to accommodate local needs and conditions. It is recommended that the sequence of the sessions be maintained since each session builds upon one another. Skipping parts may result in less effective learning about how science discourse supports sensemaking for all learners.

Goals

- **Establish** a classroom culture where all learners have access and opportunity to learn through science discourse.
- **Develop** a collaborative understanding of science discourse that supports all learners in sensemaking.
- **Explore** how both teachers and students contribute to science discourse.
- **Examine** why discourse is critical for sensemaking in the science classroom.
- Intentionally **prepare** to facilitate science discourse that supports sensemaking for all learners.

Module Sessions – Completing this module entirely will take approximately 8-10 hours

Session A: How can we establish a classroom culture to ensure all learners have access and opportunity to learn through science discourse?
Session B: What is science discourse and how does it support sensemaking for all students?
Session C: How can both teachers and students contribute to science discourse?
Session D: Why is discourse critical for sensemaking in the science classroom?
Session E: How might we intentionally prepare to facilitate science discourse that supports sensemaking for all learners?

Materials

Kentucky Department of Education (KDE) developed materials available at KYStandards that are part of this module:

- Overview Document
- Facilitator's Guide
- Slide Presentation
- Participant Packet
- Science Discourse Poster
- Viewing Learning from Every Angle Poster

Materials also needed for this module:

- Evidence-Based Instructional Practices: Establishing the Learning Environment and the *Kentucky Academic Standards for Science*
- Communicating in Scientific Ways Poster
- Discussion Diamond Protocol
- How Can I Get My Students to Learn Science by Productively Talking with Each Other?
- OpenSciEd Instructional Materials for 6th grade Weather, Climate and Water Cycling Unit
    - 6.3 Lesson 2 Teacher Edition
    - Weather Data from Seven Hailstorm Sites
- Features of Classroom Culture that Support Sensemaking for All
- Lesson Scenario
- Talk Science Primer
- *Kentucky Academic Standards for Science*
- Lesson Internalization Protocol for Science
- 3 Discussion Types: Building Understanding Discussions (pg. 1 and 3)
- Lesson Rehearsal Protocol (ky.gov)

Intended Audiences

Participants: Module participants are district teams that may include, but are not limited to, district leadership, school administrators, instructional specialists/coaches, intervention specialists, department chairs, special educators and active or pre-service classroom teachers.

Facilitators: Module session facilitators may include, but are not limited to, district leadership, school administrators, instructional specialists/coaches, intervention specialists, department chairs, special educators, classroom teachers and higher education faculty.

Using This Facilitator's Guide

This facilitator's guide provides suggestions for structuring each section of this module, recommended learning experiences to prompt meaningful discourse and guidance on talking points to use with the provided presentation. As you work through the module, there will be learning experiences provided to aid in developing, or reinforcing, participant knowledge. Facilitators may need to revise specific tasks to meet the needs of the participants or to be respectful of the time planned within the work session.

Setup for Success

This module begins with group agreements intentionally embedded to promote an environment of trust between facilitators and participants and among the participants themselves. Throughout the module, participants will be expected to collaborate in a variety of ways. Attending to the group agreements will be critical for participants to actively participate and accept collective responsibility for the successful attainment of the module goals. Facilitators should feel free to adapt these agreements in collaboration with the participants.

Building a Community

Building a community is important for any group that will work together, especially if participants have not worked together before. The concept is the same as building a safe, respectful, productive classroom climate. Incorporating community-building into each session builds trust, shows participants that they are valuable as individuals and engages them in the learning process. It is also useful for creating a professional learning network where participants can be supported in their work. Community-building can be as simple as allowing participants to introduce themselves and their role in the school/district, developing or refining group agreements, allowing for

questions and/or the sharing of answers to reflection questions or individual discovery task items that are included in the module. Again, time allotted for community-building intentionally embedded in this module will allow participants to have a voice and be engaged as active contributors and learners.

Helpful Hint

It is important to realize that while you are the facilitator of these work sessions, you may not have all the answers to the questions asked by participants. And that is okay. When this happens, reflect on this quote from Graham Fletcher, *"Every teachable moment, doesn't need to be a teachable moment, in that moment."* Use these moments to encourage participants to engage in discussion with other participants so that a shared understanding may be developed. If participants ask questions, you are not prepared to answer, offer to seek out answers to those questions and share with the larger group. If the question is pressing and doesn't appear to be addressed in this module, talk to your district team and determine who would be the best person to contact at the KDE. You may also e-mail questions or feedback to KDEScience@education.ky.gov

Planning Ahead

- Determine which stakeholders to invite as participants. In the invitation, describe how the work session will benefit them.
- A few days before the meeting, you may want to remind participants to bring their documents to the meeting.
- Reserve adequate space and equipment. Tables should be set up to support small-group discussion.
- Access to the internet for the facilitator and participants (if needed) to access the links embedded within this module.

Preparation

All sessions have specific materials that are needed for that learning experience and are noted at the beginning of each session. **Ensure participants have a device to access or receive hard copies of the participant packet and session resources.** The facilitator will need to prepare the following items to be used within **ALL** module sessions.

- Computer with access to the module slide presentation
- Technology with projection capability including a speaker system
- Copies of handouts needed for each session

- Charts/Posters for the Room
  - Driving Question Board Poster
  - Agreements Chart
    - Post a copy of these agreements in the room so it can be referred to throughout the sessions. As participants come back for the sessions, revisit these agreements and continue to give participants the opportunity to adjust them to fit the needs of the group as they work together.
  - Parking Lot
    - Participants can use the parking lot to note ideas, questions or issues constructively while the other attendees continue to focus on an activity or lesson. This may be a poster, or you may prefer to have a digital parking lot where participants can access a shared document, for example, to post questions and that you can modify as the participants work through the sections of the module. The purpose of the parking lot is to provide participants with a safe way of asking questions or suggesting ideas. Participants should feel free to add to the parking lot throughout the module.
- Paper
- Poster paper
- Self-Sticking Notes
- Colored markers
- Tape

Preparation for Session A

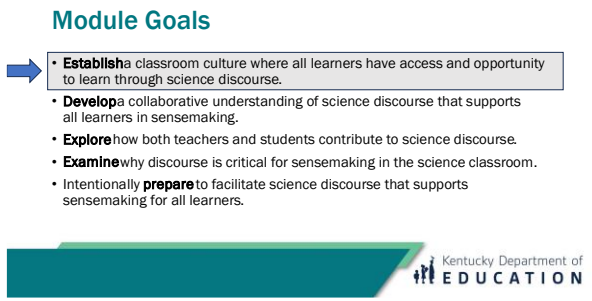
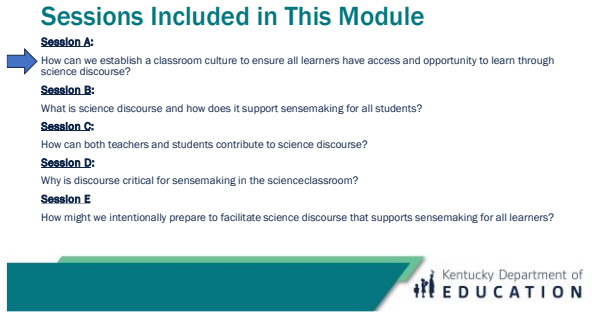
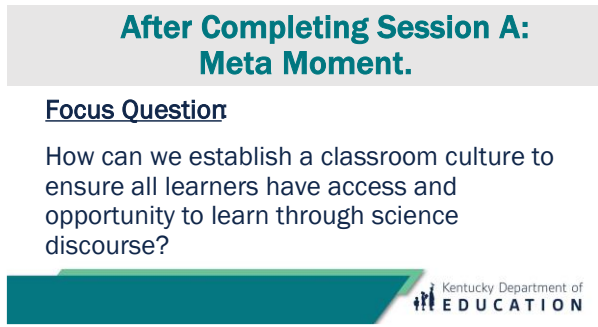
Focus Question: How can we establish a classroom culture to ensure all learners have access and opportunity to learn through science discourse?

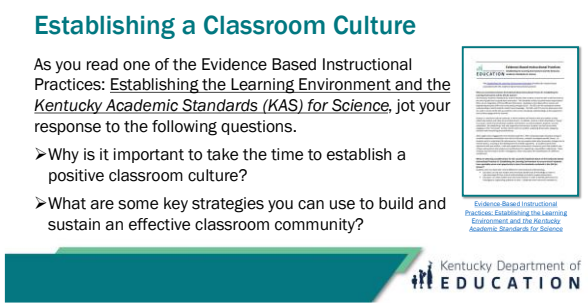
Agenda: 1 hour 30 minutes

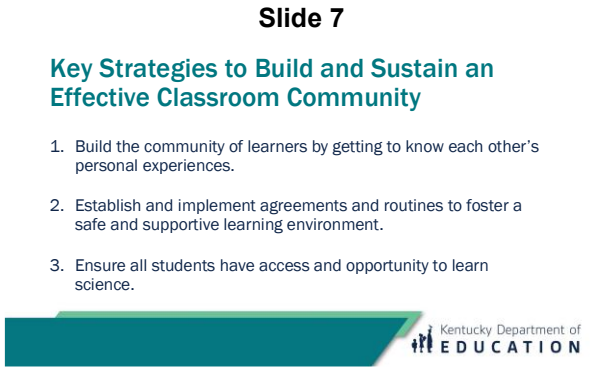
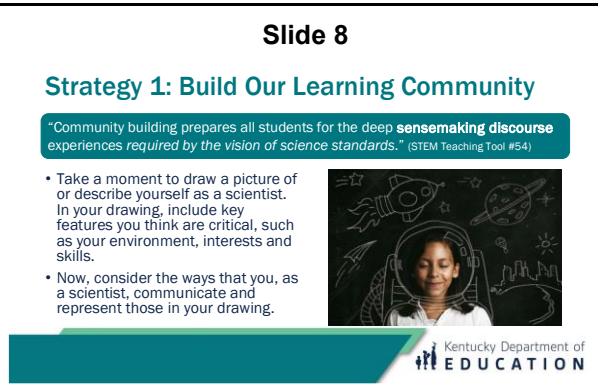
Time	Slides #'s	Outline	Materials Needed
15 minutes	2-5	Introduction • Establishing Goals • Focus Questions • Meta Moment	• Participant Packet (used throughout the session) • Parking Lot Poster
65 minutes	6-17	Establishing the Classroom Culture • Building the Community • Establishing Group Agreements • Access and Opportunity for All	• Evidence-Based Instructional Practices: Establishing the Learning Environment and *the Kentucky Academic Standards for Science* • Paper for Participants Scientist Drawing • Poster Papers for Group Agreements • Communicating in Scientific Ways Poster
10 minutes	18-20	Closing • Shared Understanding • Meta Moment • Reflection	
5 minutes	21	Next Steps - Considerations for Implementation	

Session A: How can we establish a classroom culture to ensure all learners have access and opportunity to learn through science discourse?

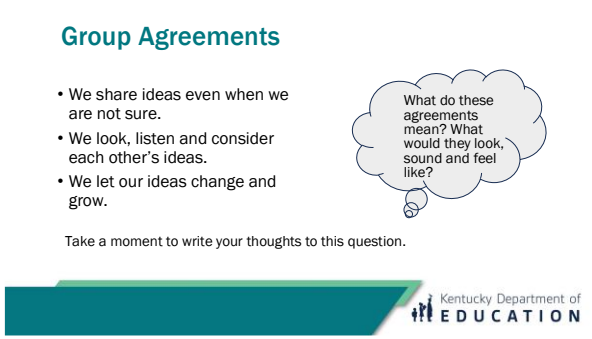
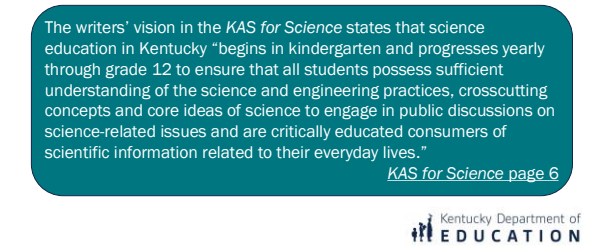
Guidance	Accompanying Slide(s)
Explain: Officially welcome the participants. Introduce yourself (if necessary). This module is intended to build or reinforce your understanding on how science discourse supports student sensemaking for all learners. ***Facilitator Note:*** *Modified from Emily Adah Miller, Patricia Works, Rebecca Nowak, Lia Stelljes, and Erica Baker (2023). [How do we support student sensemaking with equitable discourse? from the Advancing Coherent and Equitable Systems of Science Education (ACESSE) Project. This work is licensed under a Creative Commons Attribution-ShareAlike 4.0 Unported License. Educators and others may use or adapt. If modified, please attribute and re-title. CC BY-SA license details are at https://creativecommons.org/licenses/by-sa/4.0/*	**Slide 1**
Explain: We will now begin session A of this module.	**Slide 2**

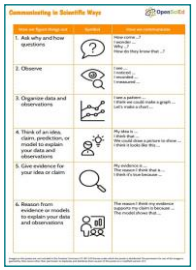
Guidance	Accompanying Slide(s)
Explain: Throughout this module, we will be learning more about “effective science talk”. During these sessions, we will work toward the goals on the screen. Take a moment to read the goals on the screen. For this first session, we will focus on goal one, establishing a classroom culture where all students have access and opportunity to learn through discourse.	**Slide 3** 
Explain: This slide shows the content incorporated within this module. At the end of each session, you should have a deeper understanding of academic discourse in order to answer the focus question aligned to each session. To accompany session A’s goal, we will focus on the following question, “How can we establish a classroom culture to ensure all learners have access and opportunity to learn through science discourse?”	**Slide 4** 
Explain: As we begin session A, our focus question for this section of the module is: How can we establish a classroom culture to ensure all learners have access and opportunity to learn through science discourse? Please take a meta moment to individually respond to the focus question in your participant packet. A meta moment is a brief pause to capture your current thinking. ***Facilitator Note:*** *Check to make sure participants have a copy of the participant packet as a digital file or printed. They will use this throughout the session to record their thoughts to various prompts embedded in the session.*	**Slide 5** 

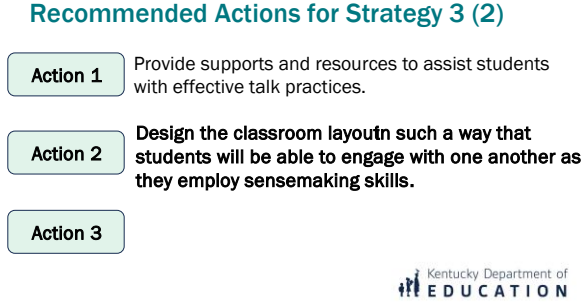
Guidance	Accompanying Slide(s)
Explain: For all students to be a part of academic discourse, one of the most important steps is to establish a positive classroom culture. Teachers are responsible for developing science classroom communities that welcome all students into a safe and supportive science learning opportunity. We are going to read one of the Evidence Based Instructional Practices: Establishing the Learning Environment and the *Kentucky Academic Standards (KAS) for Science*, jot your response to the following questions. ➢ Why is it important to take the time to establish a positive classroom culture? ➢ What are some key strategies you can use to build and sustain an effective classroom community? Please be prepared to share out in small groups. ***Facilitator Note:*** *Allow participants to share their takeaways in small groups, then ask each group to share a key takeaway from their group's conversation.* *Listen Fors:* • *Engage students in exploring phenomena or designing solutions* • *Ensure all students feel comfortable contributing and that differences in how they contribute are respected.* • *Utilize student and community interest.* • *Collaborate with families and community members as students engage in citizen science projects.* • *Recognize student differences and leverage their various perspectives.* • *Improve deeper science talk through discourse.* • *Alter classroom layout to meet the needs of the task.* • *Implement norms/agreements and routines.* • *Use students' questions to drive instruction.* • *Reduce the risk of social injuries associated with learning together* • *Build a respectful classroom community.*	**Slide 6** 

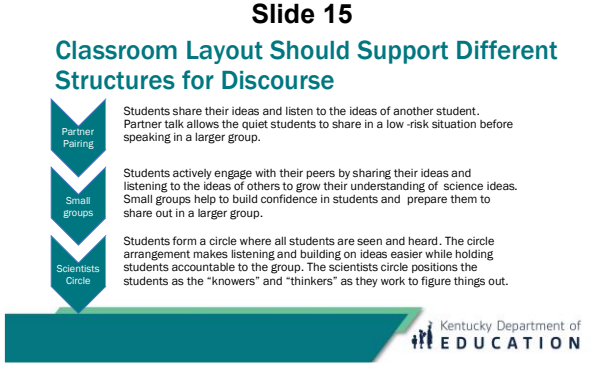
Guidance	Accompanying Slide(s)
Explain: Three key strategies noted in the readings and discussions we wish to focus in on, are: 1) build the community of learners by getting to know each other's personal experiences, 2) establish and implement agreements and routines to foster a safe and supportive learning environment and 3) ensure all students have access and opportunity to learn science. We will take some time as a group to dive deeper into each of these strategies to help us establish a positive learning environment.	**Slide 7** 
Explain: The first strategy we will consider is building our learning community. Community building prepares all students for the deep sensemaking discourse experiences required by the vision of the science standards. "Research shows that when students feel that they belong to their academic community, that they matter to one another, and that they can find emotional, social, and cognitive support for one another, they are able to engage in dialogue and reflection more actively and take ownership and responsibility of their own learning" (Baker, 2009). We will take a few minutes to draw a picture of or describe yourself as a scientist. In your drawing, include key features you think are critical, such as your environment, interests and skills. Now, consider the ways that you, as a scientist, communicate and represent those in your drawing. ***Facilitator Note:*** *Consider posting these in the room and allow participants to share out or complete a gallery walk of these posters to see connections between one another.*	**Slide 8** 

Guidance	Accompanying Slide(s)
Explain: The second strategy revolves around establishing group agreements, commonly referred to as norms. Norms are slightly different from work agreements because they are the general best practices of all productive groups, while working agreements are agreed upon guidelines for how group members will conduct themselves to achieve desired outcomes. (Thinking Collaborative, 2024) Working to develop the group agreements where the needs and styles of participants are honored will assist the group in collectively figuring out science ideas through productive discourse and talk. This requires a culture where all members of the learning community feel like they belong and it is safe to participate, share ideas, disagree and productively struggle together. Our learning space integrates varied cultural and linguistic experiences and ways of knowing. These elements are integral to the community's sensemaking and can be leveraged to enhance everyone's learning. Developing and using agreements can support a safe classroom culture where all participate in collaborative sensemaking. The quote on the screen reminds that, "As part of their practice, scientists rely on norms of thinking and discourse that enable them to pursue the work of the discipline and communicate with other scientists. To successfully engage students in the scientific practices, teachers need to support the development of these agreements and routines in their classrooms." As we work together to build our agreements, we will identify those as our group agreements. Let's take a moment to consider the following agreements for our learning community as we begin working together: • We share ideas even when we are not sure. • We look, listen and consider each other's ideas. • We let our ideas change and grow. Are there any changes to this list are additional agreements you would like the group to consider?	**Slide 9**

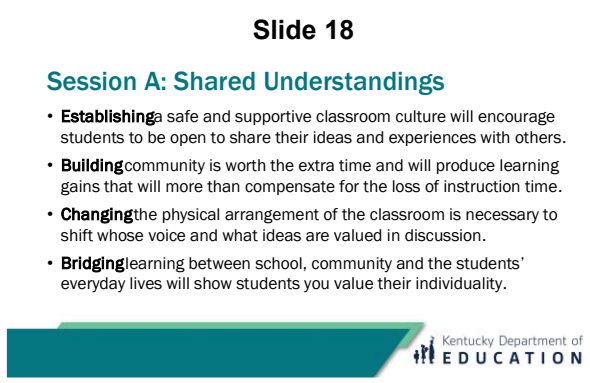
Guidance	Accompanying Slide(s)
Explain: If we have come to a consensus on these agreements for our learning community let's take a moment to reflect on what these agreements mean. What do these agreements mean? What would they look, sound and feel like? Let's consider the first agreement, "We share ideas even we are not sure." If participants are attending to this agreement, what would it look like, sound and feel like? ***Facilitator Note:*** *Use chart paper to create a 3x3 table with the norms in the left column, one per cell. The middle column will be what the norms look, sound and feel like. Capture the thoughts of the participants. Continue this process will all group agreements. After gathering responses for these agreements…* **Explain:** We are working towards a common goal of growing together. This means that we learn collectively, and it is not enough to simply share our ideas without connecting to others' ideas. Establishing agreements around being prepared and focused during discussions is important. We all have a responsibility to our learning community to come prepared and share our thinking clearly so others can understand. Listening carefully and asking questions are also crucial. Encouraging contributions even when unsure and celebrating all ideas, whether correct or incorrect, supports these agreements.	**Slide 10** 
Explain: The third strategy focuses on ensuring all students have access to resources, participation and opportunities to engage meaningfully in the science classroom. Read from the screen: The writers' vision in the KAS for Science states that science education in Kentucky "begins in kindergarten and progresses yearly through grade 12 to ensure that all students possess sufficient understanding of the science and engineering practices, crosscutting concepts and core ideas of science to engage in public discussions on science-related issues and are critically educated consumers of scientific information related to their everyday lives." This quote captures why our work matters. We are helping build a foundation that begins in kindergarten and continues through high school. As we look at the KAS for Science, this vision is the anchor. Our goal is to create learning that supports this kind of progression and empowers all students to participate in meaningful scientific thinking and discussions.	**Slide 11** 

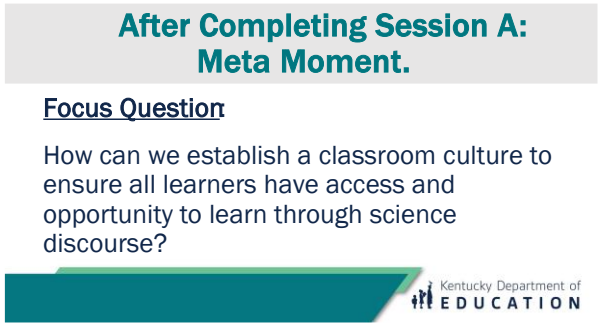
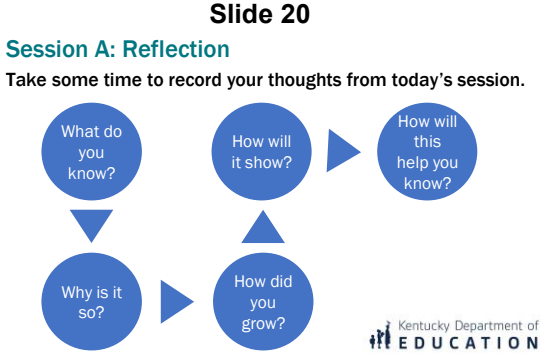
Guidance	Accompanying Slide(s)
Explain: One way to ensure all students have access and opportunity is to provide support and resources to assist students with effective talk practices. When using this in the classroom, teachers should encourage all students to join the conversation and ensure everyone feels welcomed. Engaging students in productive talk involves asking them to communicate in ways they might not be comfortable with or used to at home. This can be particularly challenging for shy students, emerging multilingual students, those with high-frequency learning needs or students new to academic discussions. These students will require scaffolding and support from both teachers and peers to help them formulate arguments and explanations in a way that others can understand.	**Slide 12** Recommended Actions for Strategy 3 Action 1 — Provide supports and resources to assist students with effective talk practices. Action 2 Action 3 Kentucky Department of EDUCATION
Explain: Let's take a moment to look at the Communicating in Scientific Ways (CSW) document. Supporting science discourse in our classrooms involves teaching students how to effectively communicate within a scientific community. This includes understanding how to present scientific arguments and evidence and practicing productive social interactions during science investigations. Teachers can use and model specific questions to help students communicate. These questions encourage listening, considering different perspectives and clearly presenting their own ideas and evidence. Structuring this communication is vital for building a scientific community in the classroom where ideas are shared, challenged and refined. Here are some examples of teacher questions that support science discourse: • Did anyone have a similar/different question to that? • Can anyone add to this idea? • Who has a different way of thinking about this topic? • Who can summarize some of the ideas we've heard today? • What questions do you have for this group about their model/solution? • What do the rest of you think of that idea?	**Slide 13** Supports for Talk Practices  How might this resource, *Communicating in Scientific Ways (CSW)*, help ensure access and opportunity for all learners? Kentucky Department of EDUCATION

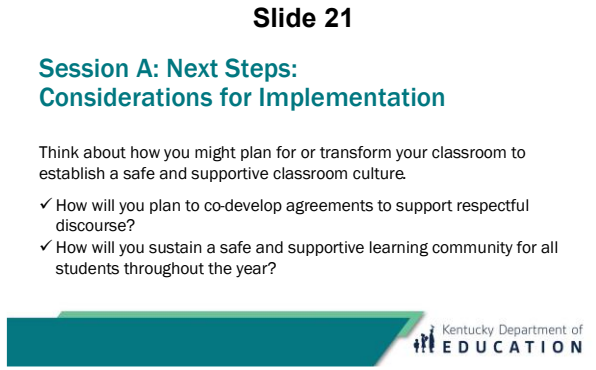
Guidance	Accompanying Slide(s)
By using these sentence stems, students can engage more deeply in scientific discourse, fostering a classroom culture where ideas are collaboratively developed and refined. The questioning strategies we use in the classroom serve as teacher talk moves, encouraging students to share, revise and challenge ideas constructively. While these strategies initially help guide students, a key goal is for students to begin communicating naturally with each other as their thinking evolves. This allows the teacher to step back from being the teller of the science ideas in the discussion and instead become the listener and facilitator. By noting the progression of their thinking and areas of disagreement, teachers can better plan future instruction. How might this resource, CSW help ensure access and opportunity for all learners? ***Facilitator Note:*** *Consider printing a larger poster of this document and/or printing individual copies for each participant to reference and use in their discussions throughout these sessions.*	
Explain: Another way to ensure all students have access and opportunity to learn is to design the classroom layout in such a way that students will be able to engage with one another as they employ sensemaking skills.	**Slide 14** 

Guidance	Accompanying Slide(s)
Explain: There are a variety of classroom layouts that may support different structures for discourse. Partner Pairing: Students share their ideas and listen to the ideas of another student. Partner talk allows quiet students to share in a low-risk situation before speaking in a larger group. Small Group: Students actively engage with their peers by sharing their ideas and listening to the ideas of others to grow their understanding of science ideas. Small groups help to build confidence in students and prepare them to share out in a larger group. Scientists Circle: Students form a circle where all students are seen and heard. The circle arrangement makes listening and building on ideas easier while holding students accountable to the group. The scientists circle positions the students as the “knowers” and “thinkers” as they work to figure things out. Take a moment to read the one pager around using a scientists circle for discourse from OpenSciEd. As you read, note what stands out to you when implementing this classroom layout to support discourse. ***Facilitator Note:*** *Have participants share out whole group using CSW stems #2: Observe and #9: Add on to someone else’s idea. Capture the group thinking in a visual way using an anchor chart, shared document or whiteboard app of your choice. Consider these questions for facilitating the discussion:* • *What did you notice about…* • *Who wants to add on to what _____ is saying?* • *Can others add on to this thought….* • *Were there others that had something similar/different marked?* • *Can you say more about that?* *<u>Listen For:</u>* • *Desks are set up in circles already so I can easily implement science circles.* • *Students will be more likely to share knowing the expectations of these discussions.*	**Slide 15** 

Guidance	Accompanying Slide(s)
• *Students sit in a circle with the teacher outside the circle. Students need their notebooks to pull from.* • *Puts the focus on the students and their ideas.* • *This structure allows students to have more communication of ideas.* • *Teachers are not the sole source of knowledge.* • *Getting up and moving also helps students stay engaged.* • *Set the expectation of **ALL** students participating.* • *It's important to capture ideas and ideas that are agreed upon or ideas that need further clarification.*	
Explain: One final thing to consider when working towards all students having access and opportunity to learn is to recognize and leverage the unique strengths and experiences in the classroom.	**Slide 16** **Recommended Actions for Strategy 3 (3)** **Action 1** Provide supports and resources to assist students with effective talk practices. **Action 2** Design the classroom layout in such a way that students will be able to engage with one another as they employ sensemaking skills. **Action 3** **Recognize and leverage the unique strengths and experiences in the classroom.** Kentucky Department of EDUCATION
Explain: The NGSS framework says, “All science learning can be understood as a cultural accomplishment...What counts as learning and what types of knowledge are seen as important are closely tied to a community’s values and what is useful in that community context.” There are many opportunities to connect learners’ sensemaking with their lived experiences, interests, cultural practices and the like. We are going to read about some ways teachers can begin to incorporate these ideas into their instructional practices. We are going to take a moment to read before we move into small groups to discuss what opportunities you see to recognize and leverage the unique strengths and experiences of your students.	**Slide 17** **Recognize and Leverage Unique Strengths and Experiences** The NGSS framework says, “All science learning can be understood as a cultural accomplishment...What counts as learning and what types of knowledge are seen as important are closely tied to a community’s values and what is useful in that community context” (p. 284, NRC, 2012). Picture adapted from Framework for Thinking about Culture and Identity in Science Learning and Teaching Kentucky Department of EDUCATION

Guidance	Accompanying Slide(s)
In your small groups, be an active listener so that you can build off one another's ideas and offer new thoughts that resonated with you. Utilize the *CSW* stems from OpenSciEd #1: Ask why and how questions, #7: Listening to other's ideas and ask clarifying questions and #9: Add onto someone else's idea. ***Facilitator Note:*** *Allow each group to share out a notice or wondering. Consider the following questions to help navigate the discussion:* • *What did you notice about…* • *Who wants to add on to what _____ is saying?* • *Can others add on to this thought….* • *Were there others that had something similar/different marked?* • *Can you say more about that?* • *What you mean when you say…* • *What wonderings do you have?*	
Explain: Here are some shared understandings from session A. • Establishing a safe and supportive learning classroom culture will encourage students to be open to share their ideas and experiences with others. • Building community is worth the extra time and will produce learning gains that will more than compensate for the loss of instruction time. • Changing the physical arrangement of the classroom is necessary to shift whose voice and what ideas are valued in discussion. • Bridging learning between school, community and the students' everyday lives will show students you value their individuality.	**Slide 18** 

Guidance	Accompanying Slide(s)
Explain: Take a moment to go back and look at your individual initial thoughts recorded at the start of this session. Consider adding to your initial thoughts in a different color. How have your thoughts grown or changed after completing session A?	**Slide 19** 
Explain: Take some time to reflect on this session. Allow time for participants to record their thoughts in the participant packet. What do you know? –Something you have learned from this session. Why is it so? – The why or the evidence that supports what you learned. How did you grow? – Explain how this helped you grow. How will it show? – The actions you are putting into place. How will this help you know? – Identify how those actions will help you know you have grown. ***Facilitator Note:*** *Encourage participants to share how did they grown in this session. If there is time invite a few to share.*	**Slide 20** 

Guidance	Accompanying Slide(s)
Explain: Consider this quote from Socrates, “The secret of change is to focus all of your energy not on fighting the old, but on building the new.” As you begin to focus your energy on building the new, what small step might you take to establish a safe and supportive classroom culture? Record your responses in Session 1: Next Steps – Considerations for Implementation section of your participant packet.	**Slide 21** 

Kentucky Department of EDUCATION

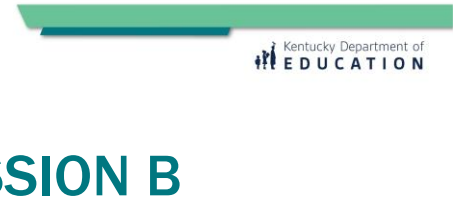
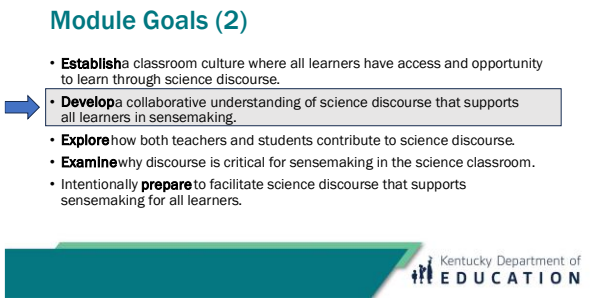
Preparation for Session B

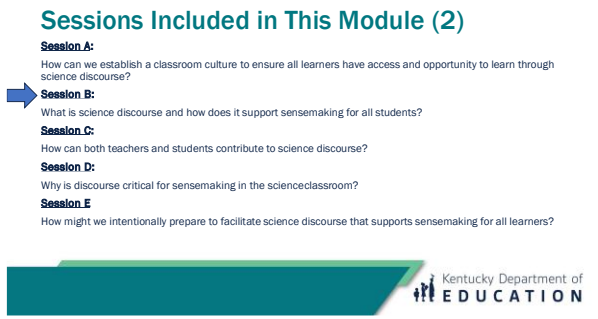
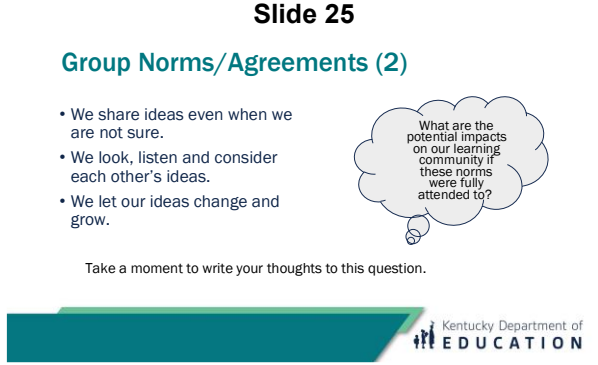
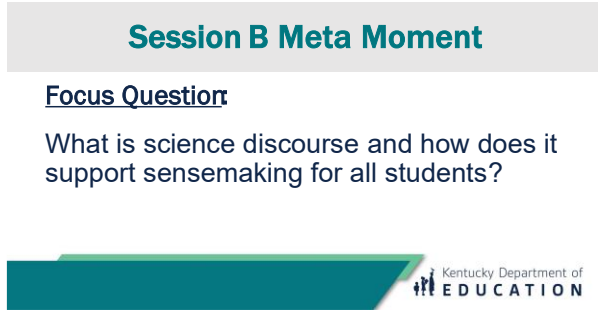
Focus Question: What is science discourse and how does it support sensemaking for all students?

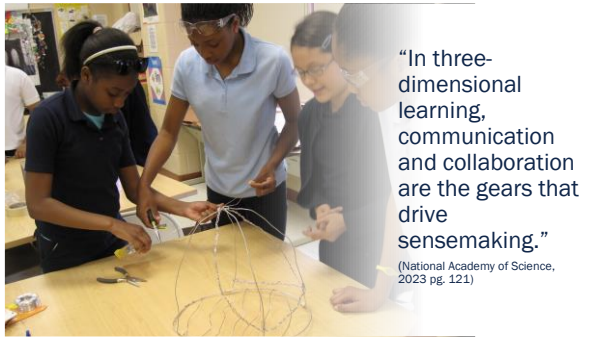
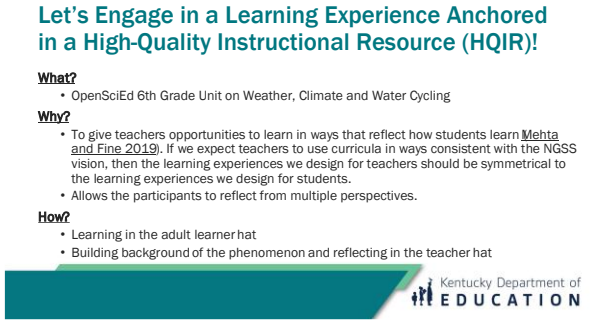
Agenda: 2 hours

Time	Slides #'s	Outline	Materials Needed
10 minutes	22-26	Introduction • Establishing Goals • Focus Questions • Group Agreements • Meta Moment	• Participant Packet (used throughout the session) • Agreement Poster • Parking Lot Poster • Communicating in Scientific Ways Poster
1 hour 35 minutes	27-49	Developing a Collaborative Understanding • Adult Learning Experience • Initial Ideas about Discourse • Building Understanding Around Discourse	• Viewing Learning from Every Angle Poster • Weather Data from Eight Hailstorm Sites • Discussion Diamond Protocol • How Can I Get My Students to Learn Science by Productively Talking with Each Other?
10 min	50-53	Closing • Shared Definition and Understanding • Meta Moment • Reflection	
5 minutes	54	Next Steps - Considerations for Implementation	

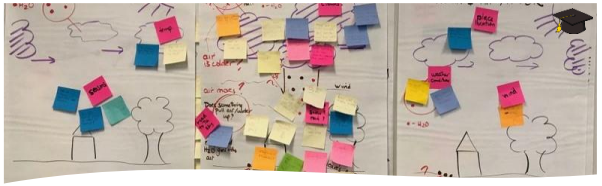
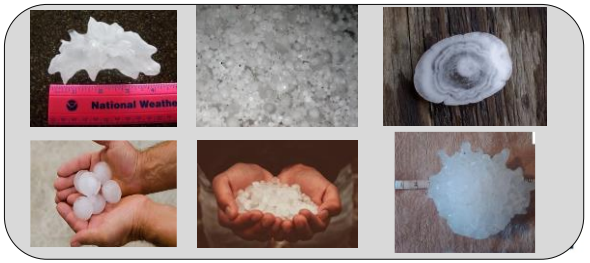
Session B: What is science discourse and how does it support student sensemaking?

Guidance	Accompanying Slide(s)
Explain: We will now begin session B.	**Slide 22** 
Explain: In session A, our goal was to work through how to establish a learning environment where all students have access and opportunity to learn through discourse. In this session, we are going to focus on developing a collaborative understanding of science discourse that supports all learners in sensemaking.	**Slide 23** 

Guidance	Accompanying Slide(s)
Explain: As you can see our focus questions are closely aligned to our goals throughout our sessions. Our focus question for this session will be, "What is science discourse and how does it support student sensemaking for all students?"	**Slide 24** 
Explain: During the previous session, we came to a consensus that these agreements are important for our community. We identified what participants would look, sound and feel like while honoring these agreements. Now, let's take a moment to reflect on the potential impacts on our learning community if these agreements were fully attended to? ***Facilitator Note:*** *You will add the potential impacts for each agreement to the right column on your agreements chart made during session A.*	**Slide 25** 
Explain: Let's take a meta moment and jot down our initial ideas around today's focus question in your participant packet, what is science discourse and how does it support sensemaking for all students? ***Facilitator Note:*** *Check to see that participants have their participant packet for this module. If not, provide one for them.*	**Slide 26** 

Guidance	Accompanying Slide(s)
Explain: Pause and reflect on this powerful quote from the National Academy of Science. “In three-dimensional learning, communication and collaboration are the gears that drive sensemaking. Would anyone like to share what this quote means to you? ***Facilitator Note:*** *Allow time for participants to share out in whole group.*	**Slide 27** 
Explain: At this time, we are going to engage in a learning experience symmetrical to the classroom experience anchored in a high-quality instructional resource (HQIR). We will be using a 6th grade unit on Weather, Climate and Water Cycling from the open educational resource, OpenSciEd. It is important to provide opportunities to learn in ways that reflect how students learn (Mehta and Fine 2019). If we expect you as educators to use curricula in ways consistent with the NGSS vision, then the learning experiences designed for teachers should be symmetrical to the learning experiences we design for students. In addition, it allows the participants to reflect from multiple perspectives. You will experience learning in the adult learner hat while building background of the phenomenon and reflecting in the teacher hat. ***Facilitator Note:*** *Refrain from sharing the teacher’s guide to this lesson prior to engaging as an adult learner. Participants will have the opportunity to examine this later.*	**Slide 28** 

Guidance	Accompanying Slide(s)
Explain: As already shared, you will be experiencing the learning from both a teacher and an adult learner perspective. When in "teacher hat," we will grow our understanding of the phenomenon, analyze the *Kentucky Academic Standards(KAS) for Science.* Most importantly, we will reflect on our teaching and consider new shifts in our teaching practice. As we shift our focus from the "teacher hat" to the "adult learner hat," it is very important we do not speak as one of our students but rather be engaged in the learning for ourselves. This will provide a safe space for all participants to engage in the phenomenon, ask questions and deepen their own understanding of science. Participants will also engage in discourse contributing to the community's understanding as we make sense of the phenomenon together. In the "adult learner hat" it is very important that the participant stays in the learner hat. Staying in the "adult learner hat" will honor the investigative process for the adult learning community as it is very likely that the adults in the room have varying backgrounds and past opportunities to make sense of the science content they are learning. As we navigate between these two hats the corresponding symbol can be found in the upper right-hand corner of the slide. ***Facilitator Note:*** *Refrain from encouraging participants to engage in the learning experience as one of their students. Participants should engage as an adult learner rather than pretending to be a 6th grade student. A poster is provided to call attention to these two hats we will be using in our learning together. It may be helpful to have this posted in the room as a reminder for participants. Provide a space for participants to ask clarifying questions regarding these two hats.*	**Slide 29** **Viewing Learning from Different Angles** **Teacher Hat** **We will…** • **grow** our understanding of phenomena. • **analyze** *Kentucky Academic Standards for Science.* • **reflect** on our teaching and consider new shifts in our teaching practice. **Adult Learner Hat** **We will…** • **build** and **deepen** our own science content knowledge. • **contribute** to the community's understanding as we make sense of the phenomenon. **Viewing Learning From Every Angle Poster**
Explain: To build the background of the phenomenon and answer the driving question, "Why does a lot of hail, rain or snow fall at some times and not others?" You will need some information regarding what has happened prior to engaging as an adult learner. The phenomenon was launched by exploring a series of videos of hailstorms from different locations across the country at different times of the year. From the videos, the observations on the screen were made.	**Slide 30** **Building the Background** Weather, Climate & Water Cycling Why does a lot of hail, rain, or snow fall at some times and not others? OpenSciEd **Observations** ✓ Pieces of ice of different sizes (some very large) falling out of the sky. ✓ These pieces of ice were sometimes accompanied by rain and wind gusts. ✓ All happened on days when the temperature of the air outside remained above freezing for the entire day. Kentucky Department of EDUCATION

Guidance	Accompanying Slide(s)
Explain: Next, models were developed to explain what causes this to occur and questions were developed for a driving question board (DQB) about the mechanisms that cause different kinds of precipitation events. Then, investigations were brainstormed that could help them collect data and figure out answers to their questions. The picture on the screen provides a visual of what that could look like. ***Facilitator Note:*** *For more information regarding driving question boards, please refer to the Professional Learning Module, Improving Student Engagement Using a Driving Question Board.*	**Slide 31**  **Next Steps** • Students develop a model to try to explain what causes this to occur. • Students then develop questions for our Driving Question Board (DQB) about the mechanisms that cause different kinds of precipitation events. • Students brainstorm investigations to do and sources of data that could help them figure out answers to their questions. Kentucky Department of EDUCATION
Explain: Lesson 2 addresses one of the questions on the driving question board, which is what the conditions are like on days when it hails. Photos of hailstorms were provided to make observations and identify patterns. Look at the photos of hailstones. What do you think the students would have noticed or wondered when observing these photos? ***Facilitator Note:*** *Capture these notices and wonderings on a t-chart. Notices on the left and wonderings on the right. An example of this can be found below.*	**Slide 32** **Beginning of Lesson 2** Examine photos of hailstones, make observations and identify patterns 

Guidance	Accompanying Slide(s)

Hailstone Photos: Notice and Wonder Chart

1.
2.
3.
4.
5.
6.

Notice	Wonder
• Some are bigger than others • Different shapes and sizes • The hailstones look different • Some look they are starting to melt • Some have different layers • Some are bumpy and some smooth and some are rough • Different mass	• Are they from different locations • Why does one of rings? • Why are the shapes different? • How heavy are they on average? • Would it hurt to get hit by one? • What time of year did they fall? • Do bigger hail stones come from stronger storms/ • Do they always form during thunderstorms? • Can you predict when a hailstorm will occur?

Explain:
Here are a few notices and wonders about the hailstones. Just like what you mentioned, students noticed…

- Different sizes (small/pea – big/baseball)
- Different shapes (most round with some flat)
- Some smooth and some spiky
- See "layers" or "rings "

These notices lead them to wonder…

- How do they get so big?
- What are the "rings"?
- If they are so big, how do they stay up there?
- Why spikes?

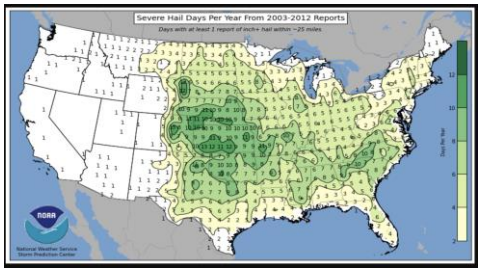
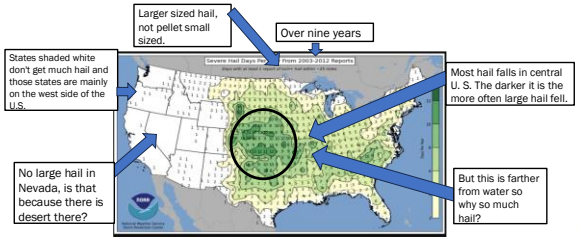
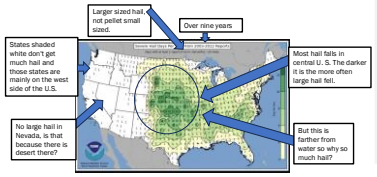
Slide 33

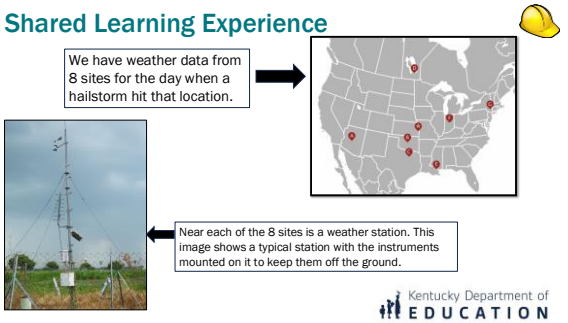
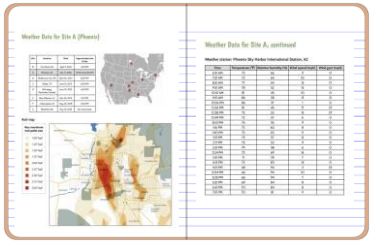
Beginning of Lesson 2 (2)

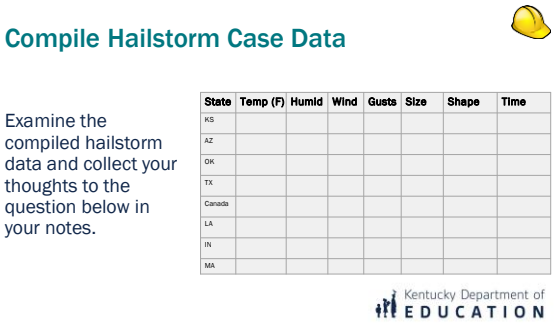
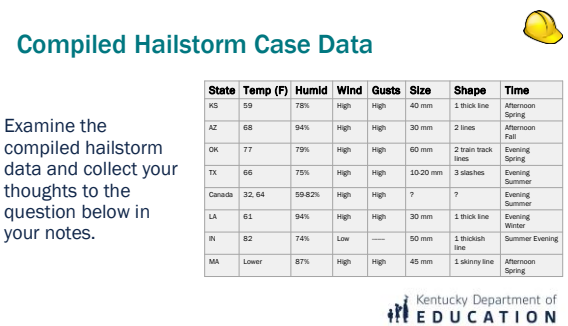
• Examine photos of hailstones and make observations

Notice	Wonder
• Different sizes (small – big) (pea – baseball) • Different shapes (most round with some flat) • Some smooth and some spiky • See "layers" or "rings"	• How do they get so big? • What are the "rings"? • If they are so big, how do they stay up there? • Why spikes?

Kentucky Department of EDUCATION

Guidance	Accompanying Slide(s)
Explain: Utilize the "WIS" strategy to analyze the hail frequency map data for patterns showing the frequency of occurrences of hail in the United States. The WIS strategy stands for "What I see." Without making any interpretations, what do you think the students would see from the data included on this map?	**Slide 34** Hail Frequency Map Analyze the hail frequency map data for patterns and questions. 
Explain: On the screen, you see what the students saw in this data.	**Slide 35** Hail Frequency Map (2) Analyze the hail frequency map data for patterns and questions. 
Explain: From the information gathered from the map, students noticed… • Not very many big hail days on the west coast. • Some places get lots of hail. • More hail days in the middle of the country. and wondered… • Why more hail in the middle? • What is it like in the middle where there is more hail? • What was it like outside in those days? • Does CA get small hail? Are there any additional notice and wondering you had that are not captured here?	**Slide 36** Hail Frequency Map Analyze the hail frequency map data for patterns and questions.  **Notice** • Not very many big hail days on the west coast. • Some places get lots of hail • More hail days in the middle of the country. **Wonder** • Why more hail in the middle? • What is it like in the middle where there is more hail? • What was it like outside on those days? • Does CA get small hail? Kentucky Department of EDUCATION

Guidance	Accompanying Slide(s)
Explain: Staying in the adult learner hat is one way to honor the figuring out process for our adult learning community. It is likely that we have varying backgrounds, past experiences and opportunities to make sense of this science. As we shift to the adult learner hat, teacher thoughts or wonderings may linger. While these thoughts are important, we want to honor staying in the adult learner hat too. Please feel free to capture these teacher thoughts on a post it notes or on the parking lot.	**Slide 37** Adult Learner Hat Kentucky Department of EDUCATION
Explain: We have weather data from eight sites where hail hit, shown in the map on the right. Three of these storms were present in the videos during the phenomenon launch. Please direct your attention to the photograph of the weather station on the left of the slide. Near each of the eight sites is a weather station that measures weather conditions. What do you think is meant by "weather" and "weather conditions"? *Listen for: Temperature*, *Humidity, Wind Speed, Precipitation, Wind Gusts* All these conditions together make up our weather in a particular place at any given point in time. So, when we talk about weather conditions, we mean what the air is like at a given time in terms of things like the temperature, how windy it might be, how humid it is and other factors.	**Slide 38** Shared Learning Experience 
Explain: We will divide into small groups to analyze hailstorm data at 1 of the 8 sites. During this time, you will be utilizing the Weather Data for Sites. Your group will be assigned one of the sites to analyze. Group 1 will analyze site A and so forth. Each site consists of 3-4 pieces of data. As you are making your observations, consider marking up the data. Feel free to draw arrows to things you noticed. Be sure to capture your observations using the "WIS" What I See strategy. To help make sense of the data, consider putting a mark next to the time the hail event started and use that to help determine the weather conditions around that time of day. Be open to discussion with your group to understand more about your site. As you discuss, be	**Slide 39** Analyze Your Case File with a Partner 

Guidance	Accompanying Slide(s)
intentional with your discussions by considering the following Communicating in Scientific Ways stems, CSW#2: Observe, CSW#3: Organize Data and Observations and CSW#8: Agree or Disagree with others' ideas. Before we move into groups, what questions might you have? ***Facilitator Note:*** *Participants will need around 8-10 minutes to collect their case data. Consider walking around to check on small groups to address any questions or concerns they have with the task. You may need to remind participants to remain in the adult learner hat. If they have thoughts or questions in their teacher's hat, capture those on a post it and place it on parking lot. This will honor their thoughts while encouraging them to stay in adult learner hat.*	
Explain: Now that you have had some time to look at your case, we will share our site data with the whole group to identify patterns in our hailstorm cases. Please bring your chairs, notebooks, data and pencils to gather in a scientists circle. Record the data observations for each site on chart paper or a spreadsheet. ***Facilitator Note:*** *If time allows, have 2 small groups share their findings and identify patterns across those 2 sites before moving into whole group sharing with all 8 sites.*	**Slide 40** 
Facilitator Note: *This slide is optional and can be used if someone is working through this module independently. This will allow the participant to have the completed hailstorm case data for all 8 sites.*	**Slide 41** 

Guidance	Accompanying Slide(s)

Explain:
We are building our understanding of what the conditions are like when it hails. Let's continue building our understanding together. What patterns did you notice in the compiled data? Please feel free to share with the group. As we engage in this discussion, I will invite you to use CSW #4: Think of an idea, claim, prediction or model to explain your data and observations. As you discuss, be intentional with your discussions by considering the following CSW stems #7: Listen to others' ideas and ask clarifying questions, # 9: Add onto someone else's idea and #11: Consider if new ideas make sense.

Facilitator Note:
Suggested prompts if participants struggle with identifying patterns:

- *What was one pattern you noticed in the location, scale, timing and weather conditions that lead to the formation of hail?*
- *What does the pattern of data lead you to conclude about the timing of hailstorms?*
- *What patterns do you observe in the data about the weather conditions around the time of a hailstorm?*
- *What other patterns do you observe in the data about the weather conditions?*

<u>Listen For:</u>
Location and scale

- *Hailstorms happen more often in the Midwest.*
- *Hailstorms appear to happen in "lines."*
- *Hailstorms impact relatively small areas (20-60 square miles).*
- *Hailstorms are relatively short (10-30 minutes).*

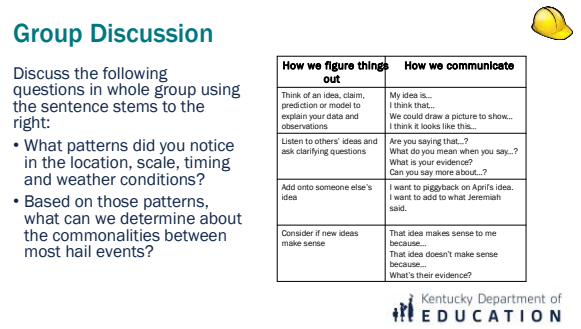
Timing

- *Hail is less common in the winter months.*
- *Hail happens later in the day.*

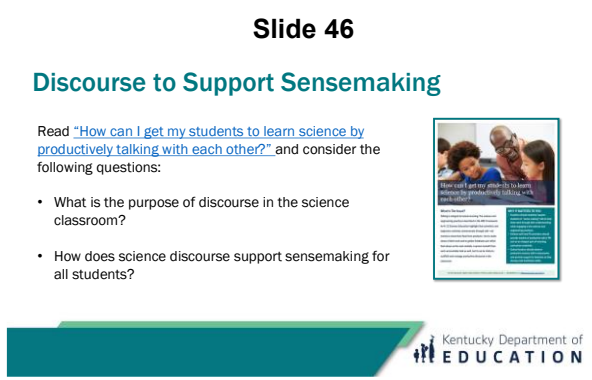
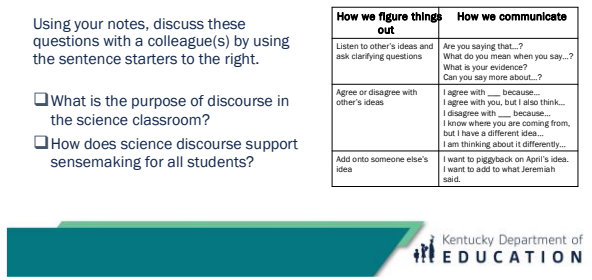
Weather conditions

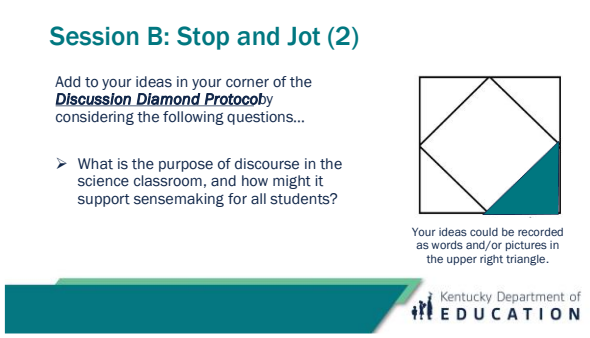
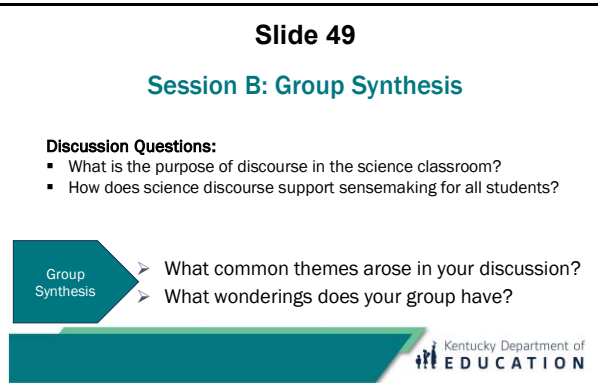
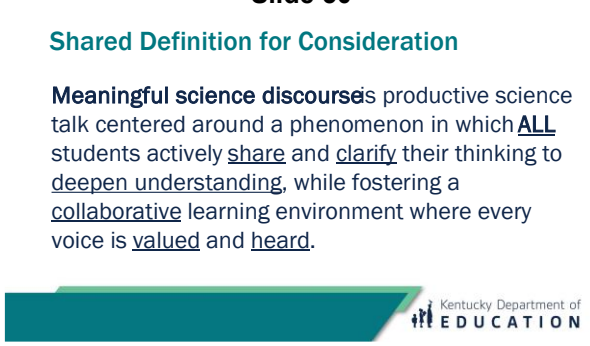
- *The temperature is relatively warm (above 50°F) on days when it hails.*
- *Humidity is relatively high when it hails.*
- *The humidity often goes up and the temperature often goes down and there are often changes in the wind around the time of a hailstorm. (General trends like the one listed are easily identified, though they are difficult ones to find in the data due to the relatively brief nature of the hailstorm vs. where weather stations are located and how often they are sampling the weather conditions.)*

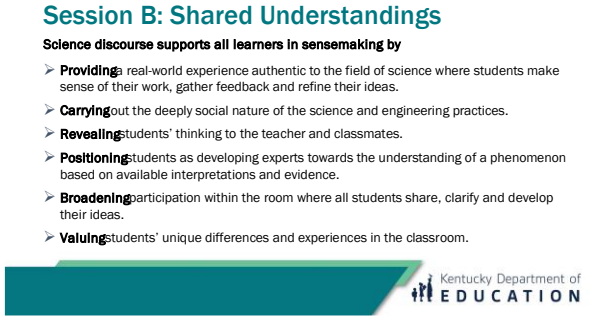
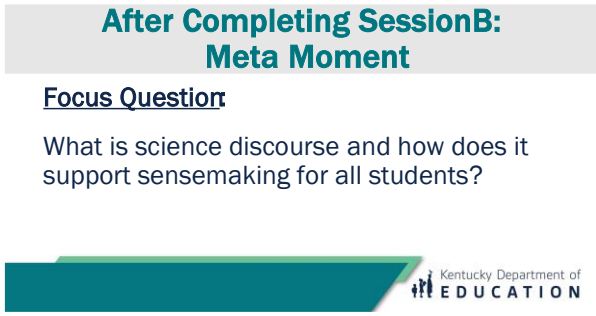
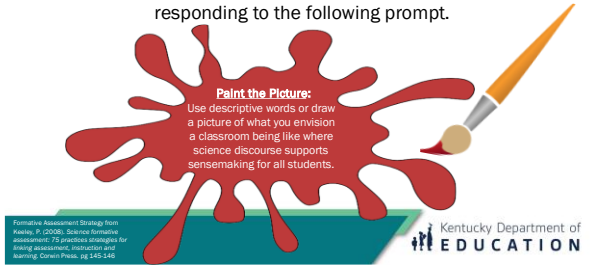
Slide 42

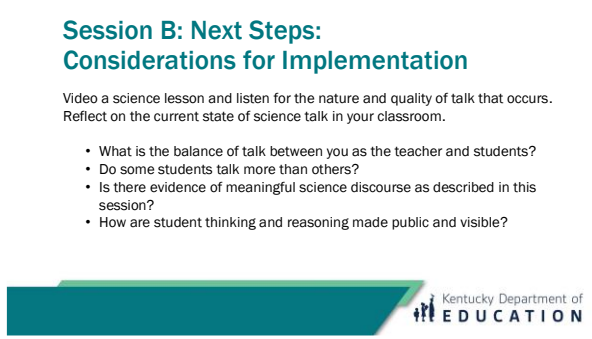


Guidance	Accompanying Slide(s)
Explain: Now that you have had the opportunity to discuss with your peers and share your thinking as you let your ideas change and grow, take some individual time to capture what we figured out from our analysis and discussion of the hailstorm data in your participant packet. Feel free to use words and/or pictures. ***Facilitator Note:*** *Allow participants to share if they feel comfortable.*	**Slide 43** **What We Figured Out…** We have been investigating the question, "What are the conditions like on days when it hails?" Take some individual time to capture what we figured out from our analysis and discussion of the hailstorm data. Use words and/or pictures. Kentucky Department of EDUCATION
Explain: Now we will reflect on the adult learning experience as a teacher. Take a few moments to jot your thinking down and we will take some time to share with the whole group. Let's consider the first question, how did the discussion support your sensemaking around hailstorm conditions? How did the discussion encourage participation from all in the learning community? ***Facilitator Note:*** *Check the parking lot or ask the participants if they have any questions they would like to discuss in the teacher hat*.	**Slide 44** **Reflect on the Adult Learning Experience** Record your responses to the questions below in your notes. • How did the discussion support your sensemaking around hailstorm conditions? • How did the discussion encourage participation from all in the learning community? Kentucky Department of EDUCATION
Explain: In the top right-hand corner of your discussion diamond protocol found in your participant packet, record your initial ideas and understanding answering the following question. Feel free to use words and/or pictures. • What does science discourse look like when all students' voices are valued and heard? How can we know if we are making progress toward achieving this? • How might science discourse support student sensemaking for all students? ***Facilitator Note:*** *The discussion diamond protocol is designed for a group of four coming to a consensus. If you are working through the module independently, you may want to adapt the protocol. You can write*	**Slide 45** **Session B: Stop and Jot (1)** Following the Discussion Diamond Protocol, independently reflect and record your initial ideas and understanding answering these questions: • What does science discourse look like when all students' voices are valued and heard? How can we know if we are making progress toward achieving this? • How might science discourse support sensemaking for all students? Your ideas could be recorded as words and/or pictures in the upper right triangle. Kentucky Department of EDUCATION

Guidance	Accompanying Slide(s)
your ideas from each learning experience on each corner then pull all your ideas together in the middle in the form of a summary of your learning.	
Explain: Read the "How can I get my students to learn science by productively talking with each other". As you read, respond to the following questions in your participant packet: • What is the purpose of discourse in the science classroom? • How does science discourse support sensemaking for all students? ***Facilitator Note:*** *Adapted from Bell, P. & Bang, M. (2015). Overview: How can I get my students to learn science by productively talking with each other?. STEM Teaching Tools Initiative, Institute for Science + Math Education. Seattle, WA: University of Washington. Retrieved from https://stemteachingtools.org/brief/6*	**Slide 46** 
Explain: Using your notes, discuss the following questions in your small groups. • What is the purpose of discourse in the science classroom? • How does science discourse support sensemaking for all students? Remember to be an active listener so that you can build off one another's' ideas and offer new thoughts that resonate with you. Utilize the CSW stems, #7: Listening to other's ideas and ask clarifying questions, #8: Agree or disagree with other ideas and #9: Add onto someone else's idea.	**Slide 47** 

Guidance	Accompanying Slide(s)
Explain: Take a moment to record your key takeaways from your small group discussion in the bottom right-hand corner of the diamond protocol.	**Slide 48** 
Explain: What common themes arose in your discussion and what wondering does your group have? Who would like to share out? As you share, please use CSW stems: #7: Listening to other's ideas and ask clarifying questions, #8: Agree or disagree with other ideas and #9: Add onto someone else's idea.	**Slide 49** 
Explain: After considering these questions, we can begin to develop a shared definition of science discourse one that reflects how all students actively engage in making sense of phenomena through talk, reasoning and collaboration. **Meaningful science discourse** is productive science talk centered around a phenomenon in which **ALL** students actively share and clarify their thinking to deepen understanding, while fostering a collaborative learning environment where every voice is valued and heard. Is there anything that needs to be added or revised?	**Slide 50** 

Guidance	Accompanying Slide(s)
Explain: Science discourse supports all learners in sensemaking by: ➢ Providing a real-world experience authentic to the field of science where students make sense of their work, gather feedback and refine their ideas. ➢ Carrying out the deeply social nature of the science and engineering practices. ➢ Revealing students' thinking to the teacher and classmates. ➢ Positioning students as developing experts towards the understanding of a phenomenon based on available interpretations and evidence. ➢ Broadening participation within the room where all students share, clarify and develop their ideas. ➢ Valuing student unique differences and experiences in the classroom.	**Slide 51** 
Explain: Let's take a meta moment and jot down our initial ideas around today's focus question in your participant packet, what is science discourse and how does it support student sensemaking for all students? Consider adding on to your initial thoughts in a different color. How have your thoughts grown or changed after completing session B?	**Slide 52** 
Explain: Take some time to record your thoughts from today's session by responding to the following prompt at the end of your participant packet called, Paint the Picture. Use descriptive words or draw a picture of what you envision a classroom being like where science discourse supports sensemaking for all students. ***Facilitator Note:*** *Invite everyone to choose a word they used or a word that would describe their drawing you made and share it out with the whole group. You might consider a word cloud with these descriptor words.*	**Slide 53** 

Guidance	Accompanying Slide(s)
Explain: “The first step toward change is awareness. The second step is acceptance.” This quote by Nathaniel Branden helps us to see the importance of taking inventory of the nature and quality of talk occurring in our classroom. Video a science lesson and listen for the nature and quality of talk that occurs. Reflect on the current state of science talk in your classroom. • What is the balance of talk between you as the teacher and students? • Do some students talk more than others? • Is there evidence of meaningful science discourse as described in this session? • How are student thinking and reasoning made public and visible?	**Slide 54** 

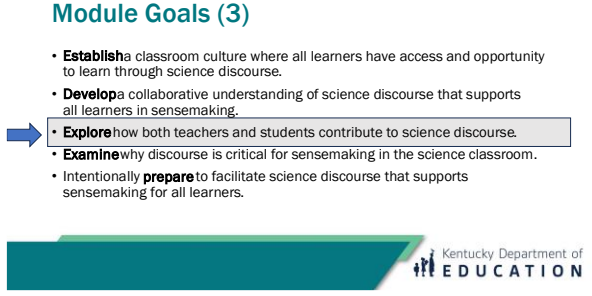
Preparation for Session C

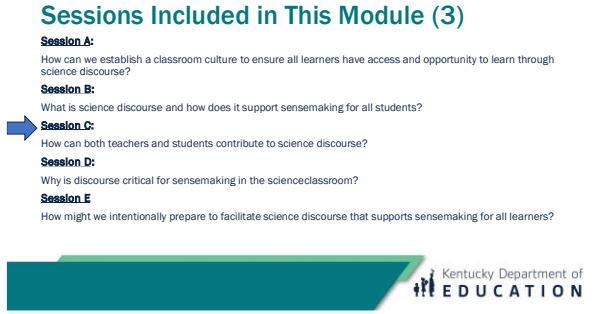
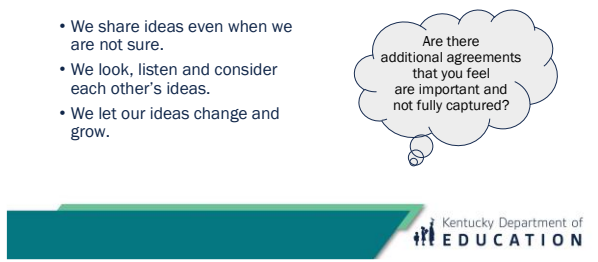
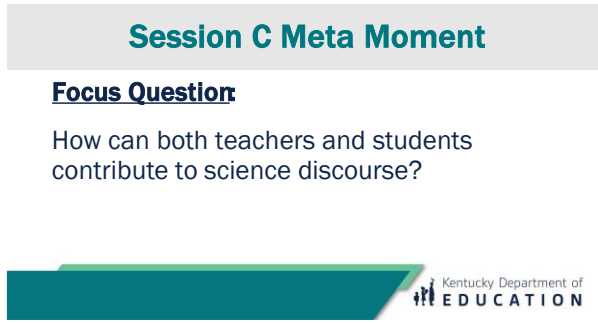
Focus Question: How can both teachers and students contribute to science discourse?

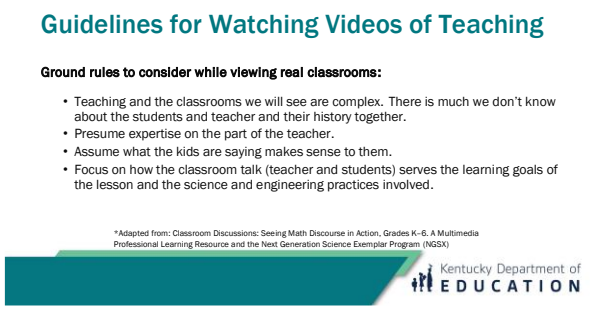
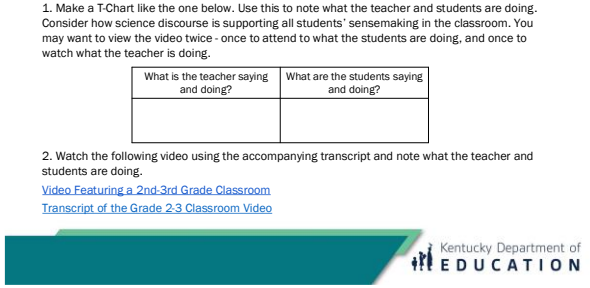
Agenda: 2 hours

Time	Slides #'s	Outline	Materials Needed
10 minutes	55-59	Introduction • Establishing Goals • Focus Questions • Group Agreements • Meta Moment	• Participant Packet (used throughout the session) • Agreements Poster • Parking Lot Poster • Communicating in Scientific Ways Poster
1 hour 30 minutes	60-71	Video Analysis • Teacher VS Student • Features of Classroom Culture • Vignette • Diamond Protocol to Capture Thinking	• Video Featuring a 2nd-3rd Grade Classroom • Transcript of the Grade 2-3 Classroom Video • Features of Classroom Culture that Support Sensemaking for All • Video Featuring a Primary Classroom • Transcript of the Primary Classroom Video • Video Featuring an Intermediate Classroom • Transcript of the Intermediate Classroom Video • Video Featuring a Middle School Classroom • Transcript of the Middle School Classroom Video • Video Featuring a High School Classroom • Transcript of the High School Classroom Video
10 minutes	72-73	Closing • Meta Moment and Reflection	
10 minutes	74	Next Steps - Considerations for Implementation	• Self-evaluation: Engaging in Classroom Discourse

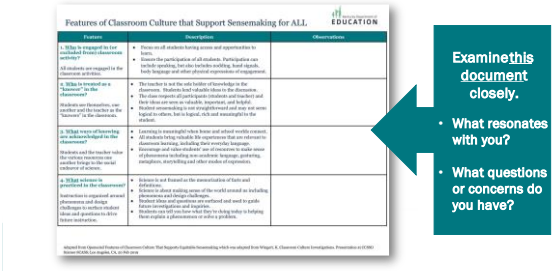
Session C: How can both teachers and students contribute to science discourse?

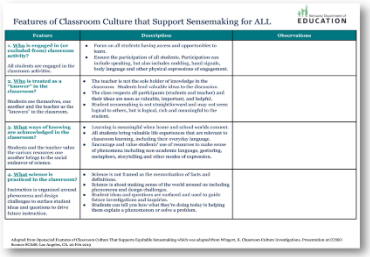
Guidance	Accompanying Slide(s)
Explain: We will now begin session C.	**Slide 55**
Explain: As you can see, we have worked towards the first two goals and during this session we will explore how both teachers and students contribute to science discourse. We will be engaging in some video analysis to see how both teachers and students are contributing to science discourse.	**Slide 56** 

Guidance	Accompanying Slide(s)
Explain: This goal aligns to our focus question, “How can both teachers and students contribute to science discourse?”.	**Slide 57** 
Explain: Reflecting on our agreements we have built together, are there any additional agreements that you feel are important to add and have not fully been captured? Thank you for the ideas you have shared on the potential impacts on our learning community if these agreements are fully attended to. *Bring in some of the participants’ thoughts regarding the impacts shared during session B.* Let’s continue as we work today to honor these thoughts and contributions from one another that will impact all of us.	**Slide 58** 
Explain: Let’s take a meta moment and jot down our initial ideas around today’s focus question in your participant packet, “How can both teachers and students contribute to science discourse?”	**Slide 59** 

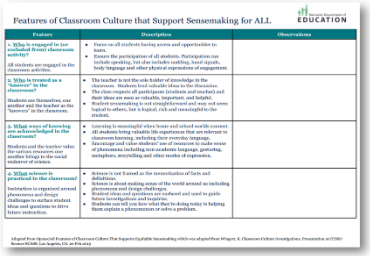
Guidance	Accompanying Slide(s)
Explain: As we prepare for video analysis it is important to follow a few ground rules to support our work today. Teaching and the classrooms we will see are complex. There is much we don't know about the students, the teacher and their history together. These teachers are giving us a gift by opening their classroom. Let's presume expertise on the part of the teacher acknowledging that there may be missed opportunities or alternative moves that could continue opening the space for student sensemaking in other ways. Assume what the kids are saying makes sense to them. In these few minutes, we do not get to see what happened before or after to continue supporting students in their sensemaking. Lastly, focus on how the classroom talk (teacher and students) serves the learning goals of the lesson and the science and engineering practices involved.	**Slide 60** 
Explain: A T-chart can be found in our participant packet. As we watch this video, note what the teacher and students are doing. Consider how science discourse is supporting all students' sensemaking in the classroom. You will also need the transcript. Feel free to make notes, highlight, or underline evidence as we go or during that independent time after the video. These markings will help support your thoughts as we share out in the whole group. ***Facilitator Note:*** *Watch video.* **Explain:** Let's take a moment to continue collecting our thoughts and mark the transcript where we see evidence of what the teacher and students are saying and doing. As we come back into the conversation, we will use the timestamps in the transcript to call out the place we are referring to so others can navigate to that spot as well and continue adding on to the conversation. Who would like to begin sharing a timestamp and describe what the teacher is saying and doing? ***Facilitator Note:*** *As participants are sharing, encourage them to note the specific timestamp so that others can follow.* *<u>Listen Fors:</u>*	**Slide 61** 

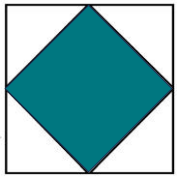
Guidance	Accompanying Slide(s)
What is the teacher saying and doing? • *1:34 Teacher uses specific prompts and questions such as tell me more.* • *00:41 Teacher acknowledges a claim and invites discourse, which prompts students to think and begin speaking.* • *5:46 Teacher guides the conversation.* • *7:44-8:29 Teacher is talking less but providing prompts.* • *3:28-5:55 At one point the students noticed that one of the drawings they created matched another claim and the teacher led that into another discussion about agreeing or explaining why it fit better with the other claim.* • *1:17 Teacher asked, "What claim did you hear?"* • *5:36 Teacher asked the student to share their idea again.* • *5:55 Teacher pushes students' ideas to further support their claim.* • *1:27-1:34 Teacher says, "Mm-hmm" and asks, "Can you tell me more?" The teacher doesn't confirm or deny what the students are thinking.* ***What are the students saying and doing?*** • *9:11 Student 9 began talking about why he agreed with what another student said - then he asked that student to repeat what he said for clarification.* • *7:31 Student 6 is sharing their claim.* • *1:45 and 9:25 Students add on or agree to what another student said.* • *1:17-1:45 Student 1 explained what they heard and adding on to their thoughts as the teacher probed at 1:34, "Can you tell me more?"* • *9:24 Students asked other students to repeat their idea for clarification.* • *1:36 Students felt comfortable adjusting their understanding of the models based on new evidence.* • *5:55 and 7:28-8:30 Students gave nonverbal cues as they actively listened to one another. Students were willing to share with one another even when different from their peers. Through their thinking it was challenged, and they allowed their science ideas to grow and change.* • *5:36 – 5:55 Brought in their own experiences and background into the classroom. Students then lead an evidence-based discussion.* • *7:29 Teacher shares several notices of students in the class where they have gained in confidence in sharing their thinking, engaging in discussion where they agree and disagree comfortable, challenge each other's thinking, ask questions, clarify one another's thinking, thank one another for their contribution in their learning community*	

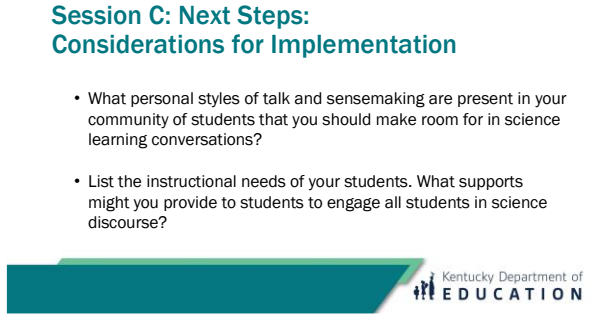
Guidance	Accompanying Slide(s)
Explain: This document from OpenSciEd describes four features of classroom culture that support sensemaking for all. Take a moment to examine this document closely. As you read, what resonates with you? What questions or concerns do you have? ***Facilitator Note:*** *Open the floor up for discussion. As participants share, you may want to add in the information below.* *<u>Feature 1:</u> Who is engaged in (or excluded from) classroom activity? Participation from all ensures everyone has a chance to share their ideas. Providing multiple arrangements (e.g., pairs, small group, whole group) and modalities (e.g., talking, drawing, gesturing) for students to express their ideas can support all students.* *<u>Feature 2:</u> Who is treated as a "knower" in the classroom? Central to a classroom culture that supports all students in sensemaking is the need for students to see themselves, one another and the teacher as the "knowers" in the classroom.* *<u>Feature 3:</u> What ways of knowing are acknowledged in the classroom? We cannot consider and build on all ideas if students and the teacher do not value the various resources that each person brings. Making space for students to use their everyday and native languages for their sensemaking as well as other ways to communicate (e.g., gestures, drawing, storytelling) signals that students' ideas and experiences are valued.* *<u>Feature 4:</u> What science is practiced in the classroom? If we want to establish a classroom culture where we consider all ideas, students need opportunities to observe, wonder and explain complex phenomena or design solutions.*	**Slide 62** **Features of Classroom Culture that Support Sensemaking for ALL** 
Explain: We are going to think about the video through a different lens, the features of classroom culture that support sensemaking for all. Point out specific examples of features of classroom culture that support sensemaking for all. As you discuss, don't forget to use your CSW stems, #2: Observe, #5: Give evidence for your idea or claim and #11: Consider if new ideas make sense. Be sure to cite specific lines/timestamps from the transcript as evidence. Would anyone like to share?	**Slide 63** **Features of Classroom Culture that Support Sensemaking for All (2)**

Guidance	Accompanying Slide(s)
Explain: We will now watch a video with accompanying transcript of the grade level you most identify with. You will complete a T-chart identifying the actions and talk of both the teacher and students just like you did with the first video. ***Facilitator Note:*** *Group participants in small groups by grade level. Allow them to watch the video in their groups and complete the T-chart as they watch. Allow time for groups to discuss their evidence of what the teacher and students are doing.* *Primary participants should only watch an excerpt of the primary video (1:40-6:34). They do not need to answer the questions at the end of this primary video.* *If you have more than one group for each grade, consider allowing the same grade level groups to join and share their findings.* *You may decide to ask participants to complete this first watch on their own, then come together to discuss the following slide on the features of classroom culture that supports sensemaking for all learners.*	**Slide 64** **A Look Inside the Classroom: Videos (2)** 1. Make a T-Chart like the one below. Use this to note what the teacher and students are doing. Consider how science discourse is supporting all students' sensemaking in the classroom. You may want to view the video twice - once to attend to what the students are doing and once to watch what the teacher is doing. What is the teacher saying and doing? | What are the students saying and doing? 2. Choose one additional video with accompanying transcript highlighting the grade band you identify with and continue to collect your thoughts in the T-chart. Option 1: Video Featuring a Primary Classroom; Transcript of the Primary Classroom Video Option 2: Video Featuring an Intermediate Classroom; Transcript of the Intermediate Classroom Video Option 3: Video Featuring a Middle School Classroom; Transcript of the Middle School Classroom Video Option 4: Video Featuring a High School Classroom; Transcript of the High School Classroom Video
Explain: Now consider specific examples of the features of classroom culture that support sensemaking, just like you did with the last video. You can do these one of two ways. You can watch the video again independently and return to your small group for discussion or one person can oversee sharing screen while you all watch together. While discussing your examples of the four features, be sure to cite specific lines/timestamps from the transcript as evidence in your discussion. ***Facilitator Note:*** *Allow grade level groups to discuss their findings.* *Optional: Let each group share out key takeaways as they come back whole group.*	**Slide 65** **Features of Classroom Culture that Support Sensemaking for All (3)**  Features of Classroom Culture that Support Sensemaking for ALL Small Group: Cite specific examples of features of classroom culture that support sensemaking for all. Note specific lines or timestamps as evidence. Whole Group: Share out key ideas from your small group. Kentucky Department of EDUCATION

Guidance	Accompanying Slide(s)
Explain: Take a moment to locate your discussion diamond protocol from your participant packet from session B. Add to your ideas to the bottom left triangle of the *Discussion Diamond Protocol* by considering the following questions… • What are the roles of the teacher and students while engaging in science discourse? • How does the teacher create a classroom culture where science discourse supports all students' sensemaking in the classroom?	**Slide 66** **Session C: Stop and Jot (1)** Add to your ideas in your corner of the ***Discussion Diamond Protocol*** by considering the following questions… · What are the roles of the teacher and students while engaging in science discourse? · How does the teacher create a classroom culture where science discourse supports all students' sensemaking in the classroom? Your ideas could be recorded in the bottom left triangle. Kentucky Department of EDUCATION
Explain: We are now going to read through the lesson scenario and think about how science discourse is supporting sensemaking for all students in the classroom. Take a moment to read and mark what the teacher was saying and doing and what were the students saying and doing? Refer to your t-chart from the previous notes and add ideas from this vignette. ***Facilitator Note:*** *WIDA-Doing-and-Talking-Science.pdf Pgs. 25-26* MacDonald, R., Cook, H. G., & Miller, E. C. (2014). *Doing and Talking Science: A Teacher's Guide to Meaning-Making with English Learners* (pp. 25–26). Wisconsin Center for Education Research, Board of Regents of the University of Wisconsin System. Retrieved from https://stem4els.wceruw.org/resources/WIDA-Doing-and-Talking-Science.pdf#page=25-26	**Slide 67** **A Look Inside the Classroom: Vignette** Read through the lesson scenario and think about how science discourse is supporting sensemaking for all students in the classroom. ➢ What was the teacher saying and doing and what were the students saying and doing? ➢ Refer to your t-chart from the previous slide and add ideas from this vignette. WIDA-Doing-and-Talking-Science.pdf Kentucky Department of EDUCATION

Guidance	Accompanying Slide(s)
Explain: Let's engage in a whole group discussion around the features of classroom culture that support sensemaking for all students. As you are sharing, reference the feature you see evidence of and where your example is located using specific lines or timestamps from the transcript.	**Slide 68** **Features of Classroom Culture that Support Sensemaking for All (4)**  Features of Classroom Culture that Support Sensemaking for ALL Small Group: Cite specific examples of features of classroom culture that support sensemaking for all. Note specific lines or timestamps as evidence. Whole Group: Share out key ideas from your small group. Kentucky Department of EDUCATION
Explain: Add to your ideas in your corner of the ***Discussion Diamond Protocol*** by considering the following questions… • What are the roles of the teacher and students while engaging in science discourse? • How does the teacher create a classroom culture where science discourse supports all students' sensemaking in the classroom? • How did this teacher use multiple modalities for communication to attend to the needs of all learners? • Record your ideas in the upper left triangle.	**Slide 69** **Session C: Stop and Jot (2)** Add to your ideas in your corner of the ***Discussion Diamond Protocol*** by considering the following questions… · What are the roles of the teacher and students while engaging in science discourse? · How does the teacher create a classroom culture where science discourse supports all students' sensemaking in the classroom? · How did this teacher use multiple modalities for communication to attend to the needs of all learners? Your ideas could be recorded in the upper left triangle. Kentucky Department of EDUCATION
Explain: Allow participants to share their thinking with a shoulder partner. Encourage them to use the following CSW stems: #4: Think of an idea, claim, prediction, or model to explain your data and observations, #11: Consider if new ideas make sense, and #13: Let your ideas change and grow.	**Slide 70** **Session C: Pause and Discuss** **Discuss each focus question with a colleague(s) using the sentence stems to the right.** • What are the roles of the teacher and students while engaging in science discourse? • How does the teacher create a classroom culture where science discourse supports all students' sensemaking in the classroom? • How did this teacher use multiple modalities for communication to attend to the needs of all learners? How we figure things out / How we communicate Think of an idea, claim, prediction or model to explain your data and observations — My idea is… / I think that… / We could draw a picture to show… / I think it looks like this… Consider if new ideas make sense — That idea makes sense to me because… / That idea doesn't make sense because… / What's their evidence? Let your ideas change and grow — I think I'm changing my idea. / I have something to add to my idea. Kentucky Department of EDUCATION

Guidance	Accompanying Slide(s)
Explain: We will now take some time to synthesize our thoughts from all 4 corner triangles into the center diamond. ***Facilitator Note:*** *If time allows, have a few participants share out their synthesis.*	**Slide 71** **Session C: Synthesis** Synthesize your shared ideas from all the triangles on your discussion diamond and record your synthesis in the center diamond.  Kentucky Department of EDUCATION
Explain: Meta moment to go back to our initial ideas as we began our session today. With a different colored pen please take a moment to show how your ideas have grown and changed.	**Slide 72** **After Completing Session C: Meta Moment** **Focus Question:** How can both teachers and students contribute to science discourse? Kentucky Department of EDUCATION
Explain: Take some time to record your thoughts from today's session by completing the SWOT analysis, one of the oldest and most widely adopted strategy tools worldwide. S- What are your strengths (things you do well) when it comes to meaningful science discourse? W- What are your weaknesses (where you need to improve) when it comes to meaningful science discourse? O- What opportunities (goals) do you see possible?	**Slide 73** **Session C: Reflection** **Take some time to record your thoughts from today's session by completing the SWOT analysis.** S What are your **strengths** (things you do well) when it comes meaningful science discourse? W What are your **weaknesses** (where you need to improve) when it comes to meaningful science discourse? O What **opportunities** (goals) do you see possible? T What **threats** (obstacles) do you face and how might you overcome them? Kentucky Department of EDUCATION

Guidance	Accompanying Slide(s)
T- What threats (obstacles) do you face and how might you overcome them? ***Facilitator Note:*** *This is a private reflection and will not be shared out with the group. If you want to share one of these, have participants share out their opportunity (goals) they see possible.*	
Explain: George Evans said, "Every student can learn, just not on the same day or in the same way." Knowing that all students are unique, consider the different styles of talk and sensemaking in your classroom and how you may support those differences. • What personal styles of talk and sensemaking are present in your community of students that you should make room for in science learning conversations. • List the instructional needs of your students. What supports might you provide to students to engage all students in academic discourse? **Facilitator Note:** One supportive document that can be provided to students is the Self-evaluation: Engaging in Classroom Discourse document from OpenSciEd. Provide a copy of this resource and time for educators to share how they might use this in their implementation plan.	**Slide 74** 

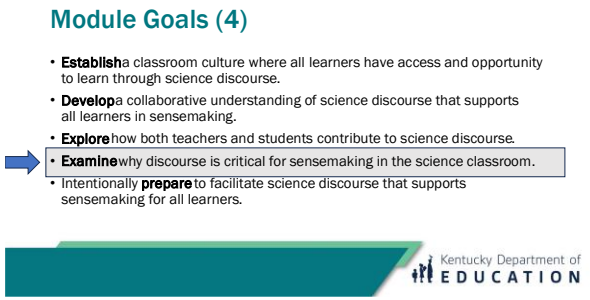
Preparation for Session D

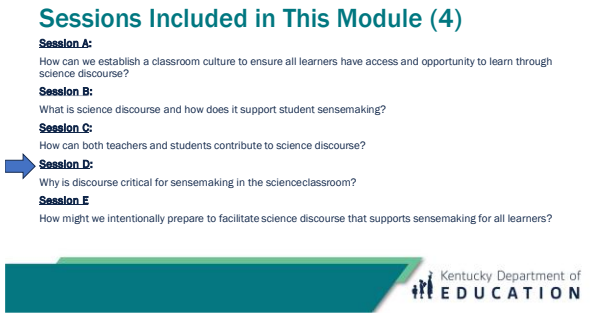
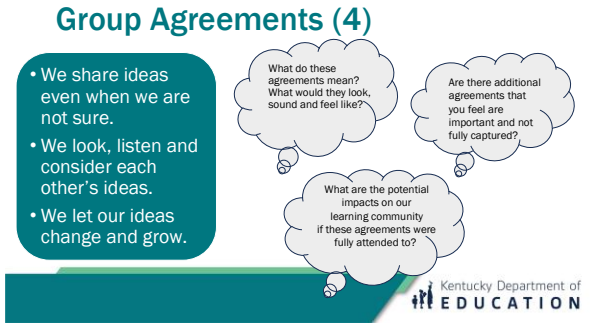
Focus Question: Why is discourse critical for sensemaking in the science classroom.

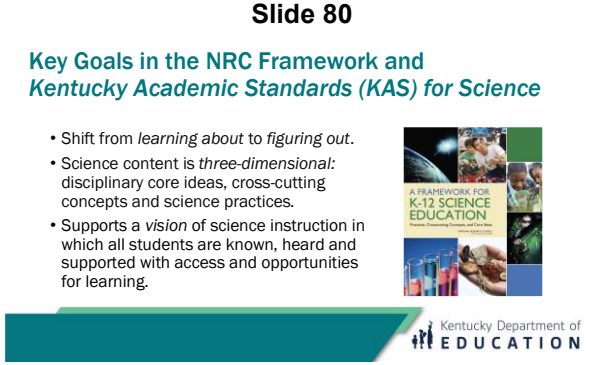
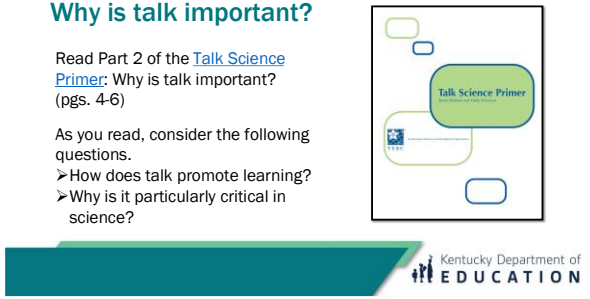
Agenda: 1 hour 30 minutes

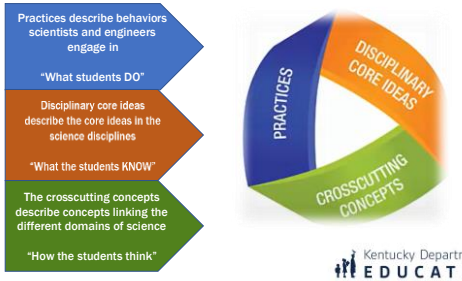
Time	Slides #'s	Outline	Materials Needed
10 minutes	75-79	Introduction • Establishing Goals • Focus Questions • Group Agreements • Meta Moment	• Participant Packet (used throughout the session) • Agreement Poster • Parking Lot Poster • Communicating in Scientific Ways Poster
65 minutes	80-91	Development of Science Ideas and Skills • Why is talk critical? • *KAS for Science* • Lesson Internalization	• Talk Science Primer: Why is talk important? (pgs. 4-6) • *Kentucky Academic Standards (KAS) for Science* • OpenSciEd 6th Grade Unit on Weather, Climate and Water Cycling Lesson 2
10 minutes	92-94	Closing • Shared Understanding • Meta Moment • Reflection	
5 minutes	95	Next Steps - Considerations for Implementation	• Lesson Internalization Protocol

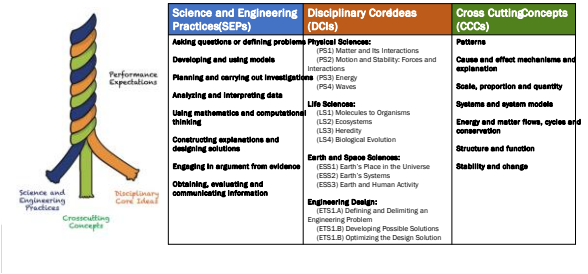
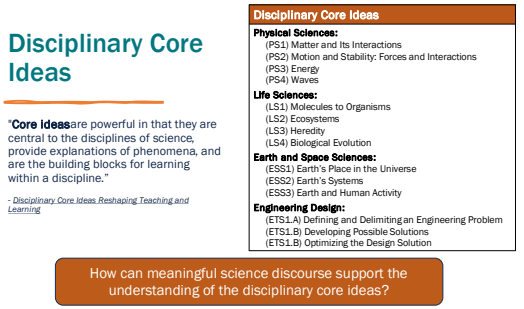
Session D: Why is discourse critical for sensemaking in the science classroom.

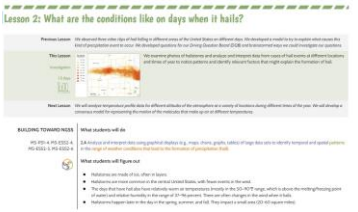
Guidance	Accompanying Slide(s)
Explain: We will now begin session D.	**Slide 75** SESSION D
Explain: Our goal for today is to examine why discourse is critical for sensemaking in the science classroom.	**Slide 76** 

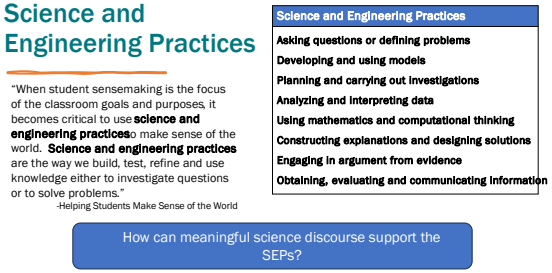
Guidance	Accompanying Slide(s)
Explain: This leads us to our focus question for the day: *Why is discourse critical for sensemaking in the science classroom?*	**Slide 77** 
Explain: As you can see on the screen, the questions in the thought bubbles on the right capture the questions we have worked on through each session to build out our agreements that we are using in our community. As we reflect on how this has impacted our learning community, let us keep in mind how we might carry this over into the classroom with our students.	**Slide 78** 
Explain: As we navigate to the participant packet, let's take a meta moment to write our initial thoughts around our focus question on the screen.	**Slide 79**

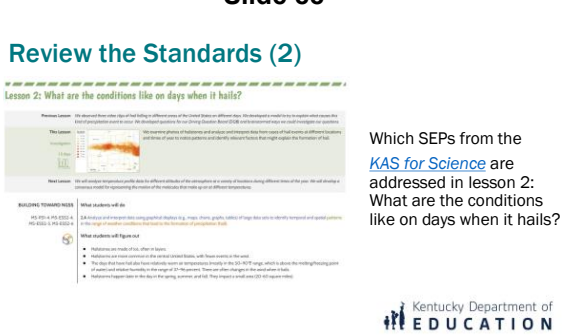
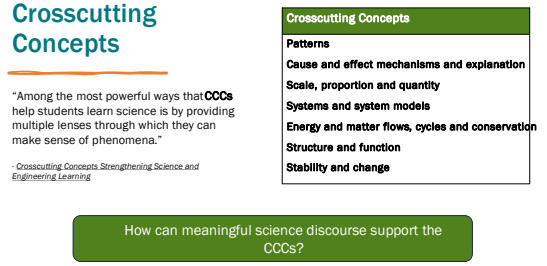
Guidance	Accompanying Slide(s)
Explain: A strong research-based resource for science educators is a book called *A Framework for K-12 Science Education*. This resource supports teachers in understanding the shifts called for in our standards, shifts from students learning about science to figuring it out. It also highlights that science content is three-dimensional: including disciplinary core ideas, cross-cutting concepts and science practices. In addition, it supports a vision of science instruction in which all students are known, heard and supported with access and opportunities for learning.	**Slide 80** 
Explain: Locate the Talk Science Primer and turn to page 4 using the green page numbers at the bottom. We are going to read this section. As you read, consider the following questions. • How does talk promote learning? • Why is it particularly critical in science? We will move back into small groups and take time to share evidence from the passage that supports how talk promotes learning and why it is particularly critical in science. Choose a person from your group who will come back prepared to share out the group's key takeaways. Does any have any questions before moving into small groups? ***Facilitator Note:*** *Small groups can be formed by grade level or can be mixed, whatever you think is best and will meet the needs of the participants.*	**Slide 81** 

Guidance	Accompanying Slide(s)
Explain: As we have mentioned several times, it is important to notice and leverage the differences of our students in the classroom and the resources they bring. How do we notice and leverage student resources? “By attending closely to what students actually say and do in science, teachers can expand the relationships that are possible among themselves, their students and science. In this way, they can begin to create more … opportunities to learn in science for … [all] students.” (Brown, 2017)	**Slide 82** **How Do We Notice and Leverage Student Resources?** “By attending closely to what **students actually say and do** in science, teachers can expand the relationships that are possible among themselves, their students, and science. In this way, they can begin to create more… opportunities to learn in science for… [all] students.” (p. 33) -Bang, Brown, Calabrese Barton, Rosebery & Warren (2017) Kentucky Department of EDUCATION
Explain: Understanding science and how it works goes beyond knowing discrete pieces of information. To meet the vision of scientifically literate students, the integration of the three dimensions of science, as outlined in the Framework for K-12 Science Education, must be maintained. These dimensions are: • Science and Engineering Practices (SEPs) refers to what the students do and describes the way in which scientists and engineers engage in their work. They engage in wonder, design, modeling, argumentation, communication and engineering thinking. • Disciplinary Core Ideas (DCIs) refer to what the students know. Core ideas found in the *Kentucky Academic Standards for Science* are foundational understandings so that students may later acquire additional information on their own. The core ideas are organized by discipline: physical science, life science and earth/space science. • Crosscutting Concepts (CCCs) are conceptual tools that are used as lenses for understanding the natural/designed world. They provide ways of thinking and reasoning about phenomena across disciplines, uniting core ideas throughout the fields of science and engineering. While specific crosscutting concepts may be identified in each performance expectation, explicit instruction and engagement in all crosscutting concepts are expected.	**Slide 83** **Three-Dimensional Standards**  Kentucky Department of EDUCATION

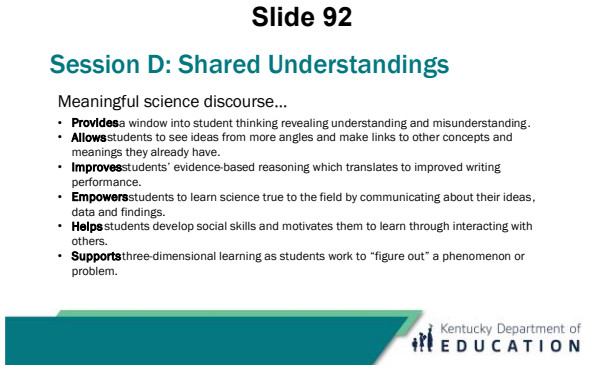
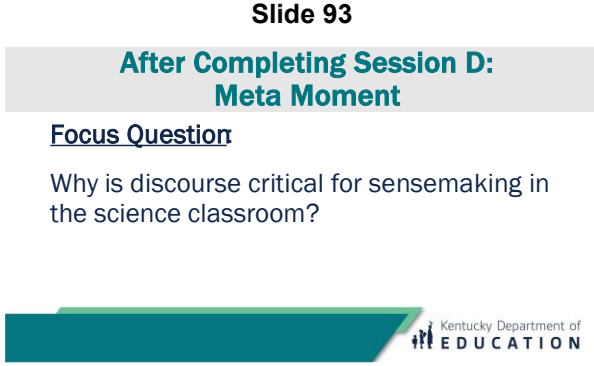
Guidance	Accompanying Slide(s)
Explain: Think of the three components of three-dimensional learning as three intertwining strands of a rope. While the rope can be separated into its three different strands, the strength of the rope is determined by the strands working together; separating the strands weakens the rope so that it is no longer effective for our intended use. In the past, we may have separated out the knowledge and skills students need in the study of science. Knowing and doing cannot be separated if our goal is the kind of usable, conceptual understanding students need to think, act and learn like scientists. Three-dimensional learning (SEPs, DCIs and CCCs) is therefore a non-negotiable for science lessons and units.	**Slide 84** 
Explain: We will take a closer look at the disciplinary core ideas. "Core ideas are powerful in that they are central to the disciplines of science, provide explanations of phenomena, and are the building blocks for learning within a discipline." "Because of the easy access of information, or facts, an important role of science education is to prepare students with sufficient core knowledge so that they can acquire additional information on their own. Therefore, a small set of core ideas that meet these criteria were developed. These core ideas, or elements of them, appear across science domains. How might meaningful science discourse support the understanding of the DCIs? ***Facilitator Note:*** *If participants are struggling with making the connections between the DCIs and discourse, encourage them to use the Talk Science Primer they just read for support.* *<u>Listen for:</u>* • *Through discussion students reveal current thinking of science ideas.* • *If students talk about the content they are studying, teachers can see more clearly what they do not understand and what they do understand.* • *Students themselves may realize what they do not and do understand.* • *Students are willing to try out ideas before they are fully formed, so that others can hear them and think with them.* • *Students take one another seriously as thinkers and evaluate the content of others'*	**Slide 85** 

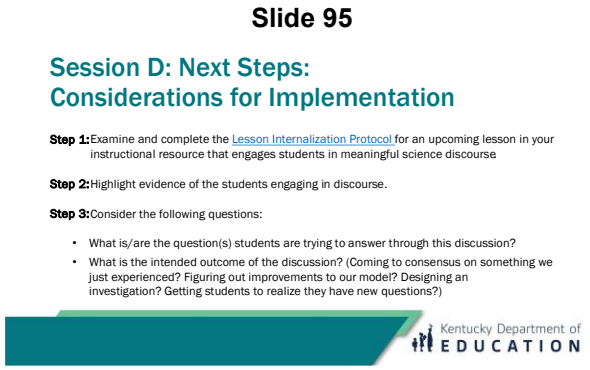
Guidance	Accompanying Slide(s)
contributions, challenging ideas, not people. They gain confidence in expressing their ideas. • *Students can work through naïve concepts.* • *Students' ideas can grow or change.* • *Capture science ideas visually (add or change them in a different color as students build their understanding).*	
Explain: We engaged as an adult learner during session B. We are going to utilize that same lesson to complete a lesson internalization of how the lesson aligns to the *KAS for Science* and how the writers of this lesson intentionally planned for discussion to help students make sense of the phenomenon. Let's first consider, "Which standard(s) or part(s) of standards from the *KAS for Science* are addressed in this lesson?". Consider the DCIs within the lesson. What are the fundamental scientific ideas students will engage in? ***Facilitator Note:*** *Participants will need to register and login at https://openscied.org/. Once they have a free account and have logged in, they will be able to access the link provided to the Unit 6.3 Teacher Edition. Lesson 2 aligns with Performance Expectation (PE) 6-ESS2-5: Collect data to provide evidence for how the motions and complex interactions of air masses result in changes in weather conditions.* *DCIs addressed in this lesson:* • *ESS2.C Roles of Water in Earth's Surface Processes: The complex patterns of the changes and the movement of water in the atmosphere, determined by winds, landforms and ocean temperatures and currents, are major determinants of local weather patterns.* • *ESS2.D Weather and Climate: Because these patterns are so complex, weather can only be predicted probabilistically.*	**Slide 86** v **Review the Standards (1)** Navigate to OpenSciEd Lesson 2 Teacher Edition of Unit 6.3 Weather, Climate and Water Cycling on page 59.  Which standard(s) or part(s) of standards from the *KAS for Science* are addressed in this lesson? Consider the DCIs within the lesson. What are the fundamental scientific ideas students will engage? Kentucky Department of EDUCATION

Guidance	Accompanying Slide(s)
Explain: Key to the vision expressed in the Framework is that students learn the DCIs in the context of SEPs. Students are expected to be able to use their understanding of the DCIs to investigate the natural world through the practice of science inquiry and solve meaningful problems through the practices of engineering design. "When student sensemaking is the focus of the classroom goals and purposes, it becomes critical to use science and engineering practices to make sense of the world. Science and engineering practices are the way we build, test, refine and use knowledge either to investigate questions or to solve problems." How might meaningful science discourse support the SEPs? **Facilitator Note:** <u>Listen For:</u> • Involving students actively in "communication" about their thinking and investigations, while encouraging them to use evidence to support their claims, conjectures, predictions and explanations. • When teachers "open up the conversation" and engage students actively in reasoning with evidence and building and critiquing academic arguments, students make dramatic learning gains. • This requires dedicated and disciplined approaches to the explication and sharing of evidence and agreed-upon ways of challenging or critiquing evidence in the effort to advance knowledge and understanding. • Discussion may cause us to ask more questions or define problems. • Discussion gives us an avenue to communicate information with others.	**Slide 87** 

Guidance	Accompanying Slide(s)
Explain: Let's go back to lesson two to identify the SEPs from the *KAS for Science* that are addressed in Lesson 2. How did your experiences with discourse support you in those SEPs? ***Facilitator Note*** *While a specific practice may be identified in each performance expectation, students should engage in all practices to help them understand how scientific knowledge develops and the links between science and engineering.* *Listen For:* • *Using models* • *Analyzing and Interpreting Data* • *Constructing Explanations* • *Asking questions*	**Slide 88** 
Explain: The framework identifies seven CCCs that bridge disciplinary boundaries, uniting core ideas throughout the fields of science and engineering. Their purpose is to help students deepen their understanding of the DCIs and develop a coherent and scientifically based view of the world. "Among the most powerful ways that CCCs help students learn science is by providing multiple lenses through which they can make sense of phenomena." How might meaningful science discourse support the CCCs? ***Facilitator Note:*** *Listen For:* • *Student talk helps them begin to see ideas from more angles and make links to other concepts and meanings they already have.* • *Allows the discussion to be focused on a specific purpose such as identifying patterns or identifying the cause-and-effect relationship.*	**Slide 89** 

Guidance	Accompanying Slide(s)
Explain: Going back a third time to look closer at this lesson, which CCCs from the *KAS for Science* are addressed in this lesson? How were you able to use these CCCs in your discussion as you were working to make sense of hailstorms? ***Facilitator Note:*** *Listen For:* • *Patterns*	**Slide 90** **Review the Standards (3)** Which CCCs from the *KAS for Science* are addressed in lesson 2: What are the conditions like on days when it hails? Kentucky Department of EDUCATION
Explain: I want us to consider the three-dimensionality of this lesson. Let's begin with the focus question for this lesson. What was the overall phenomenon? What were we trying to figure out? How did all three dimensions work together to help you make sense of the phenomenon? ***Facilitator Note:*** *What was the overall phenomenon?* • *Variety of storms taking place.* *What was the lesson level phenomenon?* • *Hailstorms* *What was the lesson focus question?* • *What are the conditions like on days when it hails?* *What are the students supposed to figure out from this lesson?* • *Hailstones are made of ice, often in layers.* • *Hailstorms are more common in the central United States, with fewer events in the west.* • *The days that have hail also have relatively warm air temperatures (mostly in the 50–90°F range, which is above the melting/freezing point of water) and relative humidity in the range of 37–96 percent. There are often changes in the wind when it hails.* • *Hailstorms happen later in the day in the spring, summer and fall. They impact a small area (20-60 square miles).* *How did all three dimensions work together to help you make sense of the phenomenon?*	**Slide 91** **What are students learning?** Write down the following for Lesson 2: • The question • Phenomenon/problem/activity • What we figured out Discuss: How do all three dimensions come together to help students figure out the phenomenon or solve the problem? Kentucky Department of EDUCATION

Guidance	Accompanying Slide(s)
Explain: Meaning science discourse… • Provides a window into student thinking and reveals understanding and misunderstanding. • Allows students to see ideas from more angles and make links to other concepts and meanings they already have. • Improves students' evidence-based reasoning which translates to improved writing performance. • Empowers students to learn science true to the field by communicating about their ideas, data and findings. • Helps students develop social skills and motivates them to learn through interacting with others. • Supports three-dimensional learning as students work to "figure out" a phenomenon or problem.	**Slide 92** 
Explain: Let's take a meta moment to respond to our focus question at the top of our participants packet in a different color to see how our individual ideas have grown and changed.	**Slide 93** 

Guidance	Accompanying Slide(s)
Explain: For our final reflection record your thoughts from this workshop found at the end of your participant packet. • If you had to choose a most important point (MIP) what would it be and why? • Who would you consider to be your most valuable player (s) (MVPs) in this process and why? ***Facilitator Note:*** *If time allows, have participants share their MIP of the learning from today with the whole group.*	**Slide 94**
Explain: To continue thinking about intentionally planning for discourse in your classroom, examine and complete the Lesson Internalization Protocol for an upcoming lesson in your instructional resource that engages students in meaningful discourse. Go through your teacher guide and highlight evidence of the students engaging in discourse. Consider the following questions: 1. What is/are the question(s) students are trying to answer through this discussion? 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?) ***Facilitator Note:*** *You may ask participants to bring this with them to the next session. This would be a great exercise to complete during common planning time. Participants will be using this lesson to rehearse and prepare to engage students in deep discussion.*	**Slide 95** 

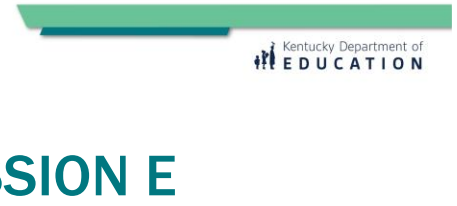
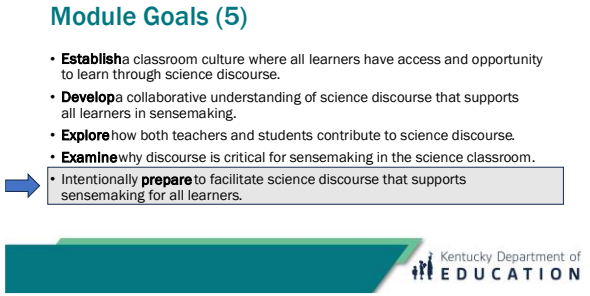
Preparation for Session E

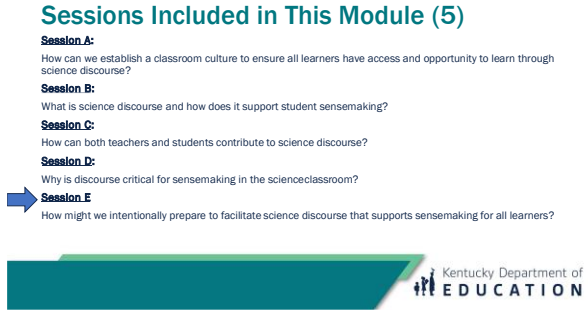
Focus Question: How might we intentionally prepare to facilitate science discourse that supports sensemaking for all learners?

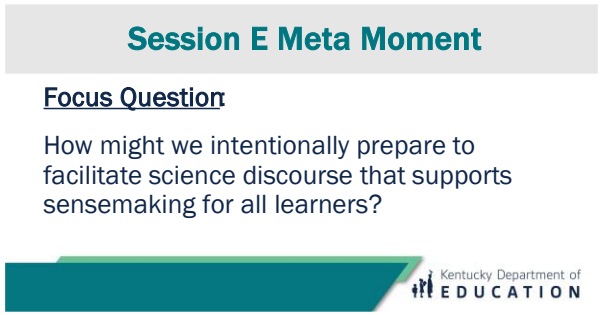
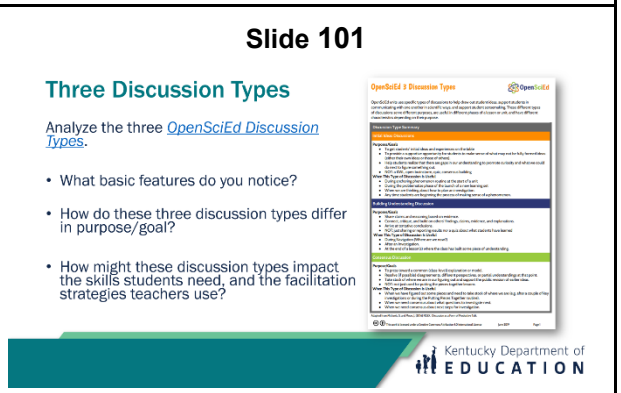
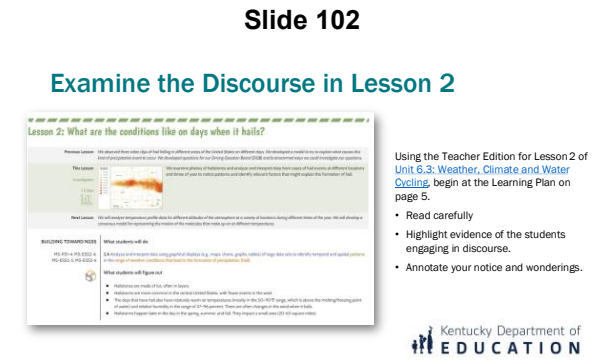
Agenda: 1 hour 30 minutes

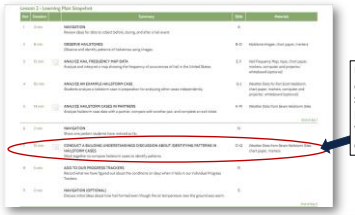
Time	Slides #'s	Outline	Materials Needed
10 minutes	96-100	Introduction • Establishing Goals • Focus Questions • Group Agreements • Meta Moment	• Participant Packet (used throughout the session) • Agreement Poster • Parking Lot Poster • Communicating in Scientific Ways Poster
1 hour 10 minutes	101-110	Lesson Internalization • 3 Discussion Types • Lesson Rehearsal	• OpenSciEd 6th Grade Unit on Weather, Climate and Water Cycling Lesson 2 • *OpenSciEd Discussion Types* • Lesson Rehearsal Protocol (ky.gov) • Session B Meta Moment Focus Question Answer
10 minutes	111-113	Closing • Meta Moment • Next Steps - Considerations for Implementation • Reflection	• Chart Paper
	114	Feedback and Certificate of Completion	• Kentucky Department of Education Professional Learning Module Feedback and Certification

Session E: How might we intentionally prepare to facilitate science discourse that supports sensemaking for all learners?

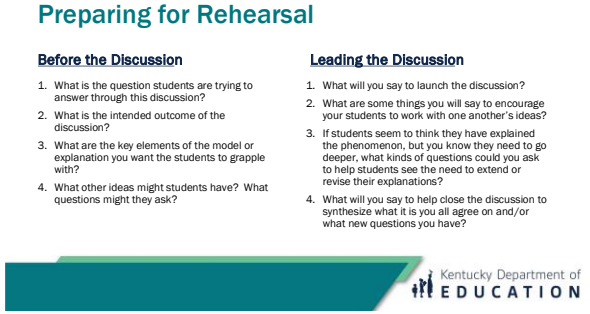
Guidance	Accompanying Slide(s)
Explain: We will now begin session E.	**Slide 96** 
Explain: We are beginning the final session where our goal is to intentionally plan for meaningful science discourse.	**Slide 97** 

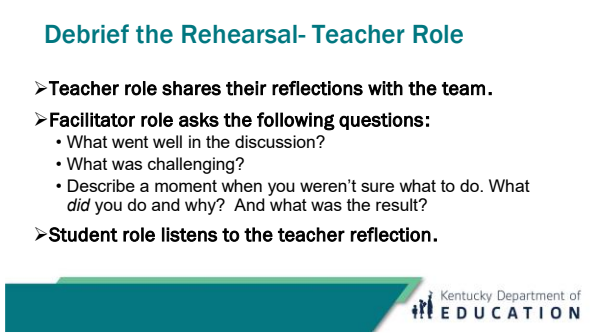
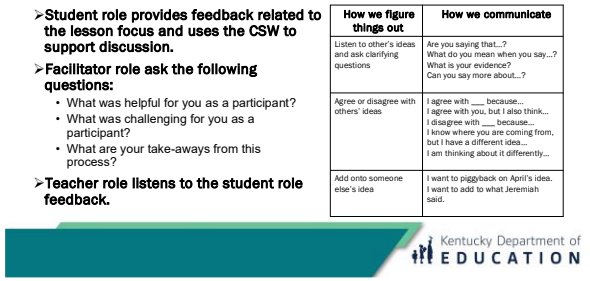
Guidance	Accompanying Slide(s)
Explain: To align with this goal, our focus question is, “How might we intentionally prepare to facilitate science discourse that supports sensemaking for all learners?	**Slide 98** 
Explain: The development and ongoing use of classroom agreements can support a safe classroom culture where all students participate in collaborative sensemaking. In circling back to the agreements, think about how you have been doing in attending to the agreements in this learning community. Place a plus sign next to where you think we are doing well as a learning community. Place a dot near where you think we could improve/continue to work. Take a moment and think about what actions you can take to ensure that you are improving with the agreement that you need to work on. ***Facilitator Note:*** *The agreements should be posted in the room. Allow participants to use a marker or a sticker to identify the area of strength and area of improvement.*	**Slide 99**

Guidance	Accompanying Slide(s)
Explain: Find your participant packet and let's take a meta moment to write our initial thoughts around our focus question on the screen.	**Slide 100** 
Explain: OpenSciEd breaks discussion into three different types: Initial Ideas Discussion, Building Understanding Discussion and Consensus Discussion. Let's look at page 1 of this document to get a brief overview of these discussion types and their purpose. • What basic features do you notice? • How do these three discussion types differ in purpose/goal? • How might these discussion types impact the skills students need, and the facilitation strategies teachers use?	**Slide 101** 
Explain: We will continue examining lesson 2 from session D but now looking for examples of discourse. Read through the lesson with a focus on the discourse moves of the teachers and students. Highlight, underline or note evidence of the students engaging in the building understanding discussion. What do you notice and wonder about the support for discourse in this lesson? We will break into small groups to read and discuss. When we return to whole group, please identify a spokesperson for your group to share some of	**Slide 102** 

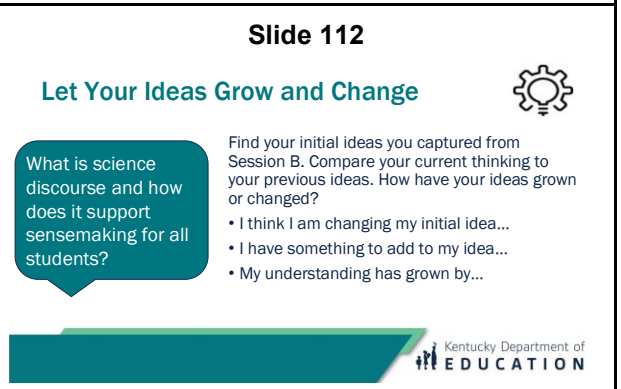
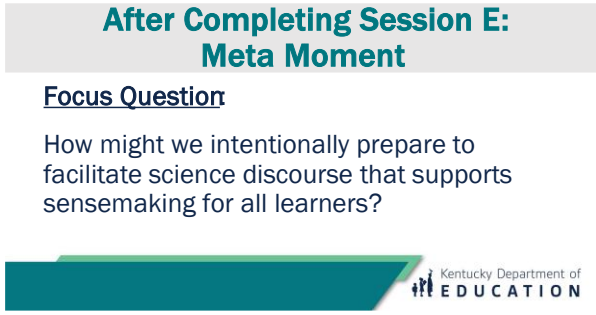
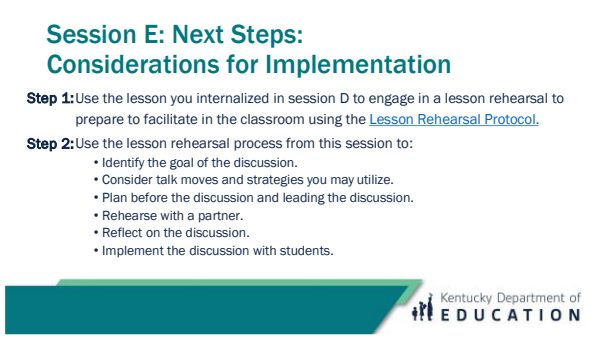
Guidance	Accompanying Slide(s)
your group's thinking. Try to connect to specific notations from the lesson. ***Facilitator Note:*** *Allow participants to spend time in their small groups to identify evidence and discuss. Once all the groups are finished, allow each group to share with the whole group.*	
Explain: "Lesson rehearsal is a core process of intellectual preparation that provides an opportunity for educators to practice instructional strategies and routines from key lessons within the HQIR and to receive feedback to support effective classroom implementation." ***Facilitator Note:*** *Lesson rehearsal may be facilitated by an administrator, coach, lead teacher or other instructional staff member and the time to work through the protocol may vary based on stage of implementation and the focus of the rehearsal. In early implementation, for example, lesson rehearsal may require its own PLC meeting; in ongoing implementation, more targeted rehearsal could be combined with lesson internalization.* *To further support implement, educators can observe a model of an embedded instructional practice or procedure whenever available (e.g., video from an external PL provider; demonstration by a PL provider, instructional coach or lead educator)*	**Slide 103** **Lesson Rehearsal Protocol** "Lesson rehearsal is a core process of intellectual preparation that provides an opportunity for educators to practice instructional strategies and routines from key lessons within the HQIR and to receive feedback to support effective classroom implementation." Lesson Rehearsal Protocol (ky.gov) Kentucky Department of EDUCATION
Explain: As revealed through the lesson, part 7 is where the building understanding discussion about identifying patterns in hailstorm data. We will plan and rehearse this discussion in small groups. ***Facilitator Note:*** *The lesson internalization can help educators identify a portion of an upcoming lesson that could be challenging to implement. The educators must determine which key aspect of practice they will investigate and refine together (this could include recurring lesson elements within the HQIR). The focus is typically decided collaboratively with PLC members, an instructional coach and/or school administrator based on student performance and goals for classroom instruction.*	**Slide 104** **Plan and Rehearse a Building Understanding Discussion**  Using the Teacher Edition for Lesson 2 of 6.3, begin at the Learning Plan Snapshot on page 2. Notice the building understanding discussion. We will plan and rehearse this discussion type. Kentucky Department of EDUCATION

Guidance	Accompanying Slide(s)
Explain: The first step in conducting a lesson rehearsal is to set clear expectations for the discussion and assign roles for the discussion. Working with a small group of four or more, you will plan a Building Understandings Discussion for the investigation we just completed. The goal of this discussion is: to help students make sense of weather conditions that lead to the formation of hail. Have groups determine who will be in the role of "facilitator," "teacher" and "student(s). Assigning roles ensures that everyone can practice specific instructional moves and experience the discussion from multiple perspectives. ***Facilitator Note:*** ***Set clear expectations: 3-5 Minutes.*** • *Remind participants of the lesson rehearsal focus and what effective execution of the instructional moves should look like, including what the teacher should say or do and expected student actions.* • *Provide time for educators to review and ask clarifying questions about the lesson.* • *Review norms for the practice and feedback portions.*	**Slide 105** **Set clear expectations for the discussion** Working with a small group, you will plan a **Building Understandings Discussion** for the investigation we just completed. **The goal ofthis discussion is:** to help students make sense of weather conditions that lead to the formation of hail. Kentucky Department of EDUCATION
Explain The following is the building understanding discussion support document that identifies the teacher and student role within this discourse. Questions are categorized to provide additional prompts teachers and students can use during key opportunities within the unit. The unit material provides specific teacher and student prompts and ideas to look and listen for. These questions engage students in collaborative sensemaking by sharing evidence-based claims, critically building on others' ideas and arriving at tentative conclusions, rather than simply reporting results or recalling learned information.	**Slide 106** **Talk Moves and Strategies** The following is the building understanding discussion support document that identifies the teacher and student role within this discourse. Questions are categorized to provide additional prompts teachers and students can use during key opportunities within the unit. 3 Discussion Types: Building Understanding Discussions (pg. 3) Kentucky Department of EDUCATION

Guidance	Accompanying Slide(s)
Explain: These are some specific aspects you need to consider before the discussion and while leading the discussion.	**Slide 107** 
Explain: In this part of the rehearsal, the teacher will actively practice the instructional moves for this lesson segment, while everyone else participates as students and the facilitator ensures the process stays on track and norms are followed. ***Facilitator Note:*** *Read the expectations from the slide.* ***Engage in lesson rehearsal: 10-15 minutes.*** • *The designated "teacher" practices specific instructional moves for the identified portion of the lesson while the other educators participate as "students."* • *The facilitator keeps track of time and monitors norms.*	**Slide 108**

Guidance	Accompanying Slide(s)
Explain: During the debrief of the lesson rehearsal, begin by having the "teacher" share their immediate reflections with the team while the "students" listen to the reflections from the "teacher". ***Facilitator Note:*** ***Debrief the lesson rehearsal: 5-10 minutes to complete debrief starting on slide 109-111.*** *During this debrief, the facilitator may use probing questions to reveal more information about the teacher's thinking. Consider using one or more of the following to probe the teacher's thinking:* • *Tell us more about that.* • *What do you mean when you say…?* • *So, you are saying [paraphrase the teacher's response]. Is that correct?*	**Slide 109** 
Explain: Continue the debrief by opening team discussion for participants to provide feedback related to the lesson focus while the teacher role listens to the feedback. During discussion, be intentional by using the CSW stems, #7: Listen to other's ideas and ask clarifying questions, #8: Agree or disagree with others' ideas and #9: Add onto someone else's idea.	**Slide 110** 

Guidance	Accompanying Slide(s)
Explain: Continue the debrief by opening team discussion for participants to provide feedback related to the lesson focus while the teacher role listens to the feedback. During discussion, be intentional by using the CSW stems, #7: Listen to other's ideas and ask clarifying questions, #8: Agree or disagree with others' ideas and #9: Add onto someone else's idea. ***Facilitator Note:*** *During this debrief, the facilitator may use probing questions to reveal more information about the teacher's thinking. Consider using one or more of the following to probe the teacher's thinking:* • *Tell us more about that.* • *What do you mean when you say…?* • *So, you are saying [paraphrase the teacher's response]. Is that correct?*	**Slide 110** **Final Debrief Take Aways** All roles: • Identify and record key takeaways and determine next steps. • Decide what student data to collect to determine potential impacts of the session. Kentucky Department of EDUCATION
Explain: The final step to the debrief is for all roles to identify and record key takeaways and determine next steps. The participants then decide what student data to collect to determine potential impacts of the session.	**Slide 111** **Final Debrief Take Aways** All roles: • Identify and record key takeaways and determine next steps. • Decide what student data to collect to determine potential impacts of the session. Kentucky Department of EDUCATION

Guidance	Accompanying Slide(s)
Explain: Now that participants have had the opportunity to engage in a symmetrical like classroom experience as an adult learner, to see into a couple of classrooms where meaning science discourse was happening, to examine the connections between discourse and its intentionality to align with the three-dimensional standards and practice these moves as a teacher and/or student, how have your ideas grown or changed since your initial thinking of what science discourse is and how it supports sensemaking for all students? Use the stems from CSW #13: Let your ideas change and grow.	**Slide 112** 
Explain: Let's take a meta moment to respond to our focus question at the top of our participants packet in a different color to see how our individual ideas have grown and changed.	**Slide 113** 
Explain: Alexander Graham Bell once said, "Before anything else, preparation is the key to success." Discourse in our classroom is no different. For discourse to be successful, we need to intentionally plan for it. With your learning community, examine an upcoming lesson in your instructional resource you plan to teach. Step 1: Use the lesson you internalized in session D to engage in a lesson rehearsal to prepare to facilitate in the classroom using the Lesson Rehearsal Protocol. Step 2: Use the lesson rehearsal process from this session to: • Identify the goal of the discussion.	**Slide 114** 

Guidance	Accompanying Slide(s)
• Consider talk moves and strategies you may utilize. • Plan before the discussion and leading the discussion. • Rehearse with a partner. • Reflect on the discussion. • Implement the discussion with students. ***Facilitator Note:*** *Here are some suggestions for follow-up:* *• Consider inviting a coach or administrator to observe the lesson and provide targeted feedback.* *• Collect data from the lesson and collaboratively analyze to determine impact.*	
Explain: As a final reflection for session E, if you were to share a recipe for meaningful science discourse, what would your recipe be? • What would you name your dish? • From whose kitchen would it come from? • Who would it serve? • What would the ingredients be? Develop your recipe in small groups and post it on chart paper.	**Slide 115** **Session E: Recipe Reflection** **Take some time to record your thoughts from today's session.** Recipe for Science Discourse. • Name of the dish: _____. • From the kitchen of: _____. • Serves: _____. • Ingredients: _____. Develop your recipe in small groups and post on chart paper. Kentucky Department of EDUCATION
Explain: Thank you for completing this module provided by the Kentucky Department of Education. Please use the Kentucky Department of Education Professional Learning Module Feedback and Certification to obtain your certificate of completion.	**Slide 116** **Certificate of Completion** Thank you for completing this module provided by the Kentucky Department of Education. Please use the link below to obtain your certificate of completion. Kentucky Department of Education Professional Learning Module Feedback and Certification *Educators can use the PLBB to find learning sessions, and it is the local school district who determines if they are acceptable for credit based on their district policies. See 704 KAR 3:035 for more details.* Kentucky Department of EDUCATION