Kentucky Department of EDUCATION

Selecting Anchoring Phenomena for Equitable Three-Dimensional Teaching

Facilitator's Guide

Winter 2025

Module Overview

The *Using an Anchoring Phenomenon to Drive Three-Dimensional Teaching and Learning Module* aims to guide educators in implementing authentic learning experiences centered on phenomena that engage students in using all three dimensions of the Kentucky Academic Standards (KAS) for Science to make sense of the world.

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 anchoring phenomena can support coherence and equity in the science classroom.

Goals

The goals of the *Using an Anchoring Phenomenon to Drive Three-Dimensional Teaching and Learning Module* are for participants to:

- **Develop** a working definition and criteria of what is considered phenomena.
- **Experience** how launching an anchoring phenomenon at the beginning of a learning experience can support students in sensemaking.
- **Explain** how utilizing an anchoring phenomenon assists students in growing their science ideas and skills within the context of *Kentucky Academic Standards (KAS) for Science*.
- **Analyze** how a cohesive storyline can be built around an anchoring phenomenon.
- **Identify** and **explore** local phenomena to make connections and bundle disciplinary core ideas.

Module Sessions

This module in its entirety will take approximately 10 hours.

Session A: What is the definition of "phenomena" in the context of science education?
Session B: How does the launch of an anchoring phenomenon engage all students in sensemaking?
Session C: How might utilizing an anchoring phenomenon assist students in growing their science ideas and skills within the context of the *Kentucky Academic Standards for Science?*
Session D: Why is a storyline centered around an anchoring phenomenon crucial for achieving coherence from the students'. perspective?
Session E: How might exploring and identifying local phenomena support both teachers and students?

Materials

KDE developed materials that are part of this module:

- Using an Anchoring Phenomenon to Drive Three-Dimensional Teaching and Learning At a Glance Document
- Using an Anchoring Phenomenon to Drive Three-Dimensional Teaching and Learning Facilitator's Guide
- Using an Anchoring Phenomenon to Drive Three-Dimensional Teaching and Learning Slide Presentation
- Using an Anchoring Phenomenon to Drive Three-Dimensional Teaching and Learning Participant Packet
- Using an Anchoring Phenomenon to Drive Three-Dimensional Teaching and Learning Poster

Materials also needed for this module:

- Using Phenomena in NGSS-Designed Lesson and Units
- Phenomena Sort
- STEM Teaching Tool 28 Qualities of a Good Anchor Phenomenon for a Coherent Sequence of Science Lessons
- Communicating in Scientific Ways Poster
- Mississippi River Delta Map and Reading Passage
- NGSS Storyline Tool #1 - AnchoringPhenomenon - v 2.0
- Kentucky Academic Standards for Science Writers' Vision Statement Page 6
- NSTA Critical Components of Sensemaking
- Appendix E–Disciplinary Core Idea (DCI) Progressions
- Appendix F: Science and Engineering Practices
- Appendix G: Crosscutting Concepts
- Coherence from the Students' Perspective: Why the Vision of the Framework for K-12 Science Requires More than Simply "Combining" Three Dimensions of Science Learning
- BSCS Earth's Changing Surface Unit
    - Common Student Ideas
    - Scope and Sequence
    - Lesson 1

    - Lesson 2
    - Lesson 3
    - Lesson 4
    - Lesson 5
    - Lesson 6
- The Conceptual Story from Different Perspectives Slide Deck
- STEM Teaching Tool #57 How place-based science education strategies can support equity for students, teachers and communities.
- Phone Phenomenon Note Catcher or Slide Deck
- STEM Teaching Tool #41 Prompts for Integrating Crosscutting Concepts

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 in order 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 group 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 norms, 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 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 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) in order to access the links embedded within this module.

Preparation

All sessions have specific materials that are needed for that learning experience and is 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
  - Anchoring Phenomenon 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 time to adjust them to fit the needs of the group as they work together.
  - Parking Lot
    - The Parking Lot can be used by the participant 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 Google document, for example, to post questions and 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

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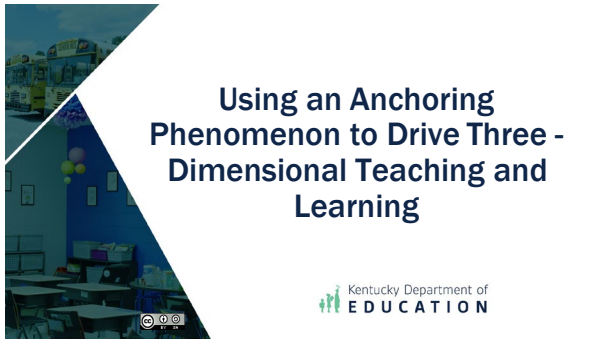
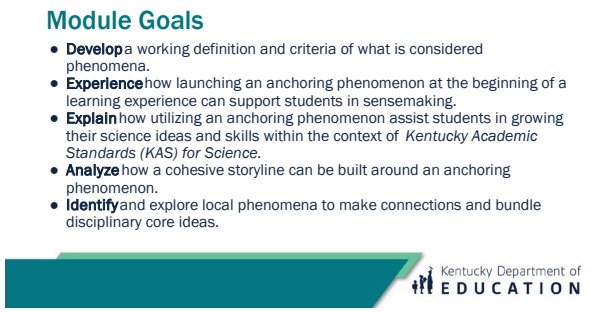
Preparation for Session A

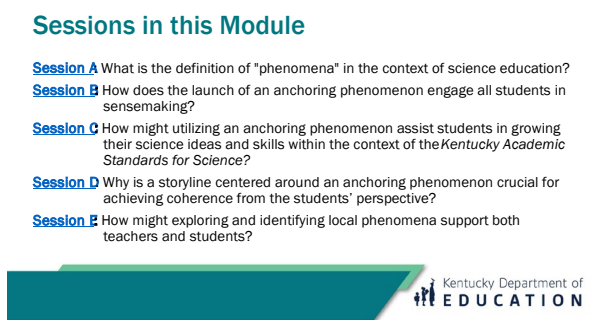
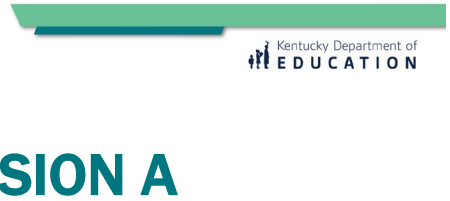
Focus Question: What is the definition of "phenomena" in the context of science education?

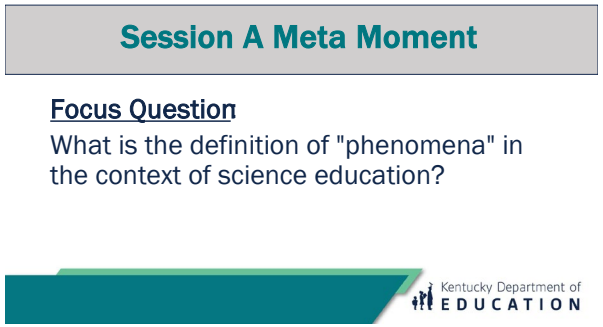
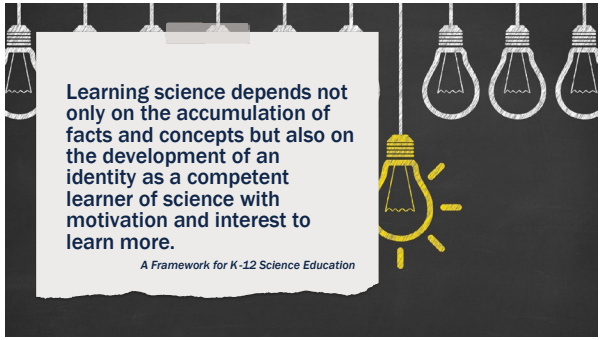
Agenda: 1 hour 30 minutes

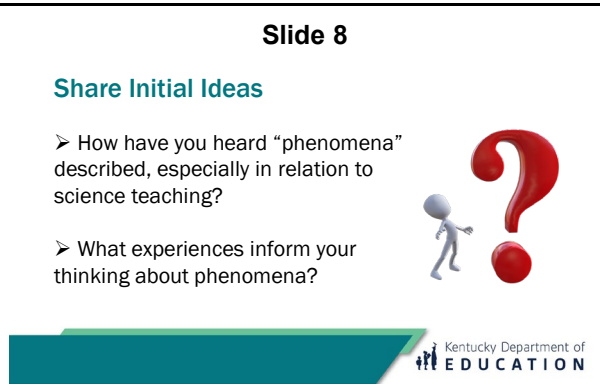
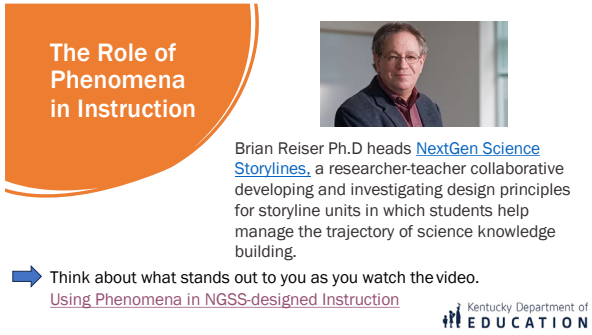
Time	Slides #'s	Outline	Materials Needed
20 minutes	1-8	Introduction • Establishing goals • Establishing agreements • Sessions in this module • Focus question • Initial Ideas, experiences, and questions	• Agreements Poster • Parking Lot Poster • Participant Packet
45 minutes	9-21	Deepening understanding of phenomena-based instruction • The role of phenomena in instruction • Making the case for phenomena-based instruction • Working definition of phenomena • Sorting phenomena descriptors • Qualities of a good anchor phenomenon for a coherent sequence of science lessons	• Using Phenomena in NGSS-Designed Lesson and Units • Phenomena Sort • STEM Teaching Tool 28 Qualities of a Good Anchor Phenomenon for a Coherent Sequence of Science Lessons
15 minutes	22-25	Shared understanding and reflection	
15 minutes	26-27	Next steps - considerations for implementation	

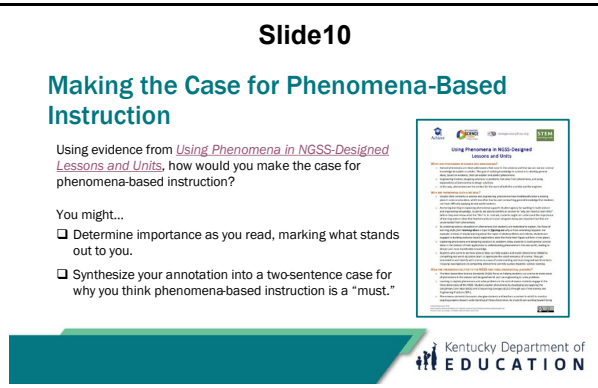
Session A: What is the definition of “phenomena” in the context of science education?

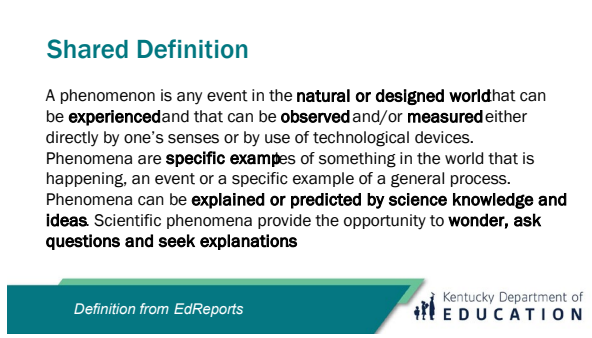
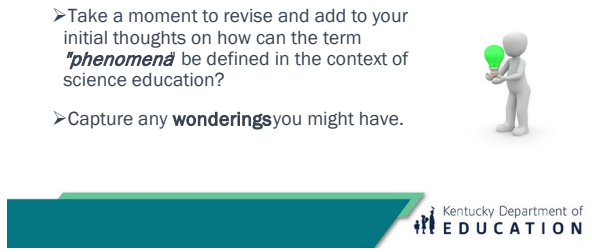
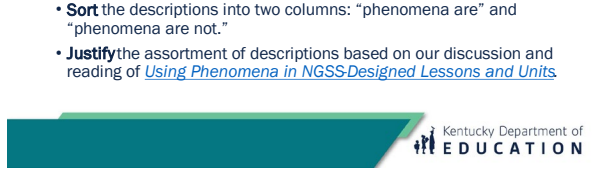
Guidance	Accompanying Slide(s)
Officially welcome the participants. Introduce yourself (if necessary). Provide an opportunity for participants to introduce themselves and engage in a community building activity that is suitable for the needs of the group. **Explain:** This module is intended to build or reinforce your understanding on using an anchoring phenomenon to drive three-dimensional teaching and learning. ***Facilitator Note:*** *The first 4 slides within this module will be used to begin each session. Slide 4 contains bookmarks directly to the session needed.*	**Slide 1** 
Explain: Throughout this module, the goals are for participants to: ● **Develop** a working definition and criteria of what is considered phenomena. ● **Experience** how launching an anchoring phenomenon at the beginning of a learning experience can support students in sensemaking. ● **Explain** how utilizing an anchoring phenomenon assists students in growing their science ideas and skills within the context of Kentucky Academic Standards (KAS) for Science. ● **Analyze** how a cohesive storyline can be built around an anchoring phenomenon. ● **Identify** and explore local phenomena to make connections and bundle disciplinary core ideas.	**Slide 2** 

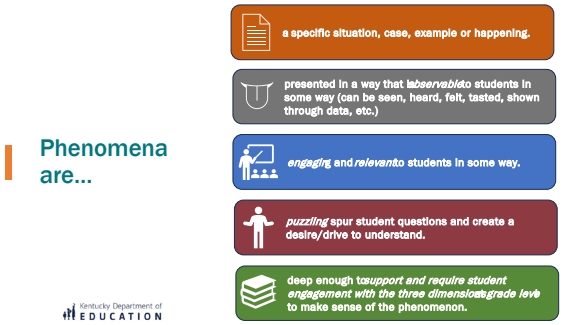
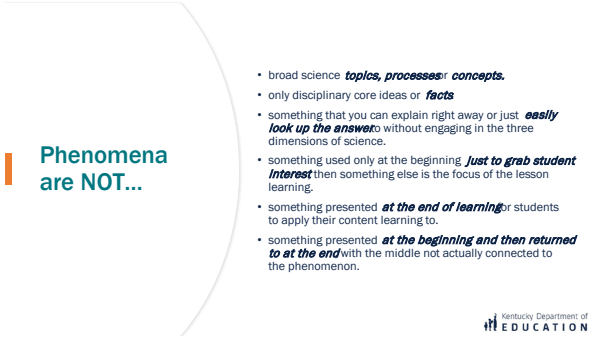
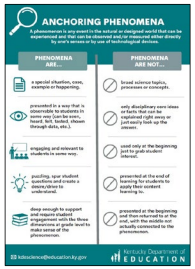
Guidance	Accompanying Slide(s)
Explain: Group agreements help create a safe space where participants feel comfortable sharing ideas and experiences. This slide offers a starting point to consider which agreements best support our collaboration. Take a moment to review and reflect: How might these impact our community? Would anyone like to suggest edits, revisions or additions? ***Facilitator Note:*** *Take a moment to discuss and revise. If a change is proposed, confirm with the rest of the group whether they want to make the change. If there is a consensus, note the changes to the slide or poster of where the agreements will be placed in the space in a different color than the original text.*	**Slide 3** 
Explain: This slide shows the content incorporated within this module. At the end of each session, participants should have a deeper understanding of phenomena in order to answer the focus question aligned to the session. ***Facilitator Note:*** *Allow participants time to read each of the focus questions outlined for the sessions in this module.* *Each session is bookmarked to the start of the session by clicking on the session needed.*	**Slide 4** 
Explain: We will now begin Session A. ***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** 

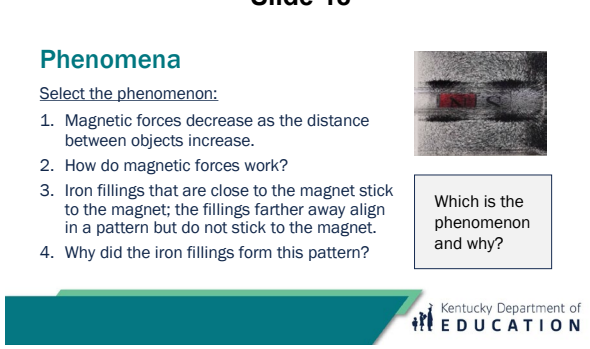
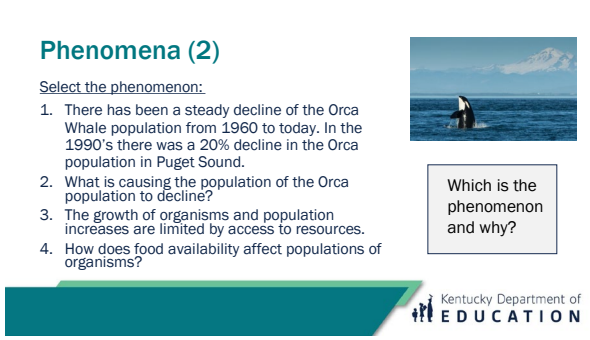
Guidance	Accompanying Slide(s)
Explain: As we begin session A, our focus question for this section of the module is: What is the definition of "phenomena" in the context of science education? Take a “meta moment” to consider your current thinking of this question on the screen. A meta moment is a brief opportunity for you to stop and think about your thoughts in the moment. ***Facilitator Note:*** *Provide time for participants to record their initial thoughts to answer the focus question in their participant packet.*	**Slide 6** 
Explain: The *Framework for K-12 Science Education* outlines a broad set of expectations for students in science and engineering in grades K-12. It informed the development of the *Kentucky Academic Standards (KAS) for Science* for K-12 science education and continues to guide revisions to curriculum, instruction, assessment, and professional development for educators. The overarching goal is to ensure that students appreciate science, possess knowledge of science and engineering, and have the skills to enter careers of their choice. The *Framework for K-12 Science Education* outlines three dimensions that, when used together, support students’ deep understanding of the sciences, how science knowledge is acquired and understood and how the sciences are all connected through concepts that have a common application across the disciplines. On the slide you will see a powerful quote from, “A Framework for K-12 Science Education.” that says, “Learning science depends not only on the accumulation of facts and concepts but also on the development of an identity as a competent learner of science with motivation and interest to learn more.” ***Facilitator Note:*** A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas | The National Academies Press	**Slide 7** 

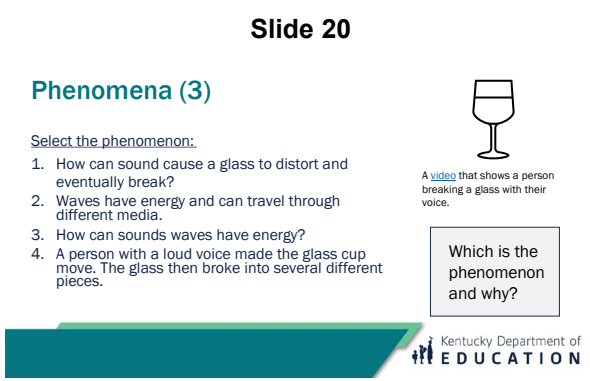
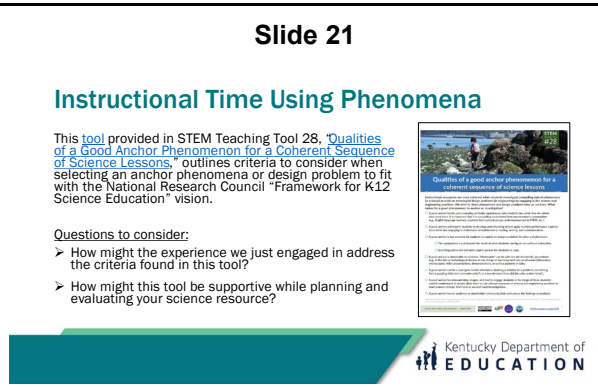
Guidance	Accompanying Slide(s)
Explain: Gather the participants' thoughts around these 2 questions: • How have you heard "phenomena" described, especially in relation to science teaching? • What experiences inform your thinking about phenomena? ***Facilitator Note:*** *You may wish to have participants jot their responses to these two questions on a sticky note and have them post their sticky note on a piece of chart paper. Read the responses aloud or ask for volunteers to share out their responses. Ask participants what patterns they heard across the responses.*	**Slide 8** 
Explain: Let's consider the role of phenomena in instruction. Watch a short video of Brian Reiser describing the role of phenomena in instruction. Brian Reiser Ph.D., heads NextGen Science Storylines, a researcher-teacher collaborative developing and investigating design principles for storyline units in which students help manage the trajectory of science knowledge building. The video references the Next Generation Science Standards (NGSS). Kentucky's Academic Standards *(KAS)* for Science are aligned with these national standards and incorporate three dimensions that together form each standard. These dimensions work in unison to help students develop a cohesive understanding of science over time. ***Facilitator Note:*** *Ask participants to record what stands out to them as they watch the video. Provide time for participants to share their ideas. Here are some ideas to listen for. Ensure that these are revealed through the share out and if not, consider summarizing the video with the following ideas.* *Using phenomena in instruction…* *Helps students connect their science learning to real-world events, moving beyond abstract concepts.*	**Slide 9** 

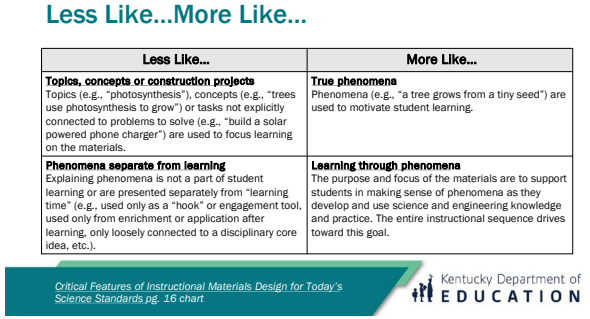
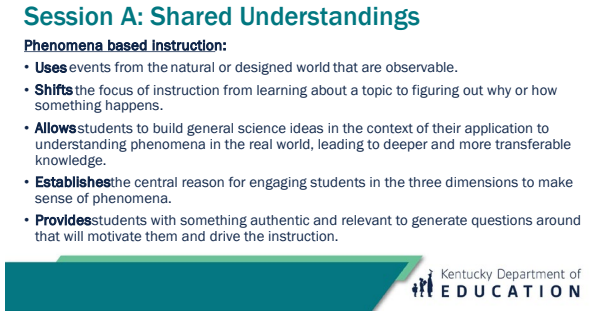
Guidance	Accompanying Slide(s)
• *Focuses on phenomena, which refers to real-world events that science seeks to explain or problems to engineer and solve.* • *Centers learning experiences on phenomena rather than presenting science ideas first, shifting the focus from learning about a topic to figuring out why or how something happens.* • *Encourages students to develop explanations for phenomena, advancing their understanding through meaningful, three-dimensional learning experiences.*	
Explain: We are going to push further into thinking about "Using Phenomena" in the science classroom by actively reading a resource from Next Generation Science Standards, "Using Phenomena in NGSS". Take a moment to read this individually. As you read, identify evidence that supports the importance of phenomena-based instruction in building strong science classrooms. Choose a method to mark or highlight key points that stand out. Then, use your annotations to craft a two-sentence argument explaining why phenomena-based instruction is essential. Record your argument in your participant packet.	**Slide10** 
Explain: We will now engage in a single round robin to share our two-sentence cases in small groups of 3–4 people. Each person will share their argument for phenomena-based instruction. After everyone has shared, discuss as a group to reflect on the article and the cases presented. What are your thoughts now about the importance of phenomena-based instruction? Once your group discussion is complete, record your synthesis and choose a spokesperson to share with the whole group. You will have about 7 minutes for this activity. Are there any questions before we begin? Let's take a moment to share your group's synthesis with everyone. ***Facilitator Note:*** *Allow groups to share their synthesis in whole group. Capture the groups' syntheses on a sticky note and place on the chart labeled, "Making the Case" as an artifact once they have all shared.*	**Slide 11** 

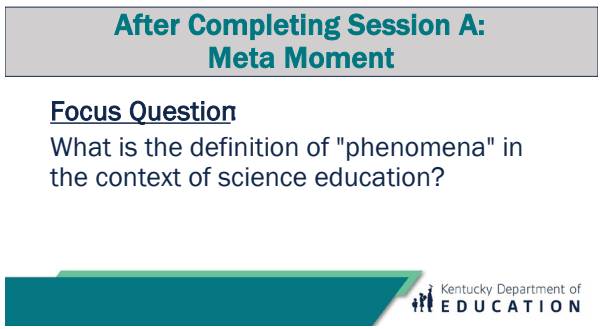
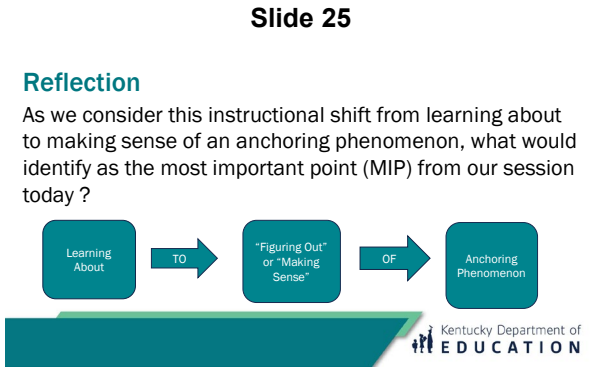
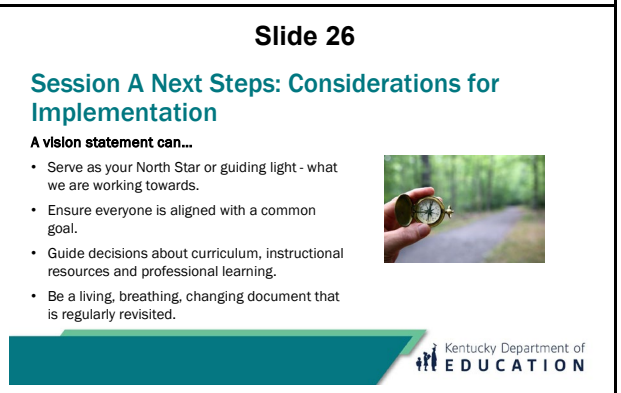
Guidance	Accompanying Slide(s)
Explain: Let us consider this possible shared definition from EdReports on the screen: A phenomenon is any event in the **natural or designed world** that can be **experienced** and that can be **observed** and/or **measured** either directly by one's senses or by use of technological devices. Phenomena are **specific examp**les of something in the world that is happening, an event or a specific example of a general process. Phenomena can be **explained or predicted by science knowledge and ideas**. Scientific phenomena provide the opportunity to **wonder, ask questions and seek explanations**. ***Facilitator Note:*** *Connect aspects of this definition with the ideas previously revealed.*	**Slide 12** 
Explain: Let's take a moment to revisit your initial thoughts on how the term, "phenomena" can be defined in the context of science education. Consider adding to or revising your initial thinking. What wonderings might you have? ***Facilitator Note:*** *Encourage participants to record their wonderings on a sticky note and place them on the parking lot poster. Determine if the question needs to be addressed in the moment or if it will be addressed in a later session.*	**Slide 13** 
Explain: Now that we have a foundational understanding of what a phenomenon is, let's use the information we have gathered so far to sort through some descriptors of what phenomena are and are not. We will break into the same small groups as before. **Look** through the various descriptions and determine which description is aligned with phenomena-based instruction in the classroom. **Sort** the descriptions into two columns: "phenomena are" and "phenomena are not." **Justify** the assortment of descriptions based on our discussion and reading of *Using Phenomena in NGSS-Designed Lessons and Units*. You will have 5 minutes to complete the card sort and justify your assortment of descriptors on a sticky note. What questions might you have? *Monitor the room to check for understanding and answer questions the groups may have.*	**Slide 14** 

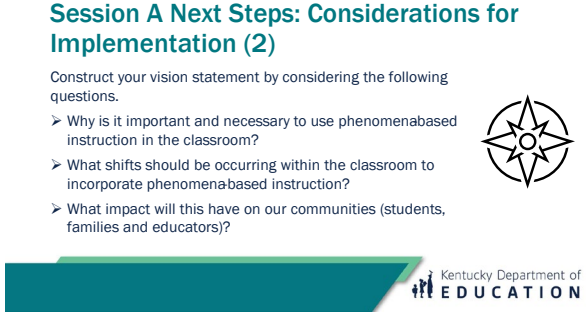
Guidance	Accompanying Slide(s)
Explain: To check your understanding from the sorting activity, Phenomena are… (read from the slide).	**Slide *15*** 
Explain: To check your understanding from the sorting activity, Phenomena are not… (read from the slide).	***Slide 16*** 
Explain: As we wrap up solidifying our understanding of phenomena, we have a resource to share: the Anchoring Phenomena poster. This is an excellent tool to share with others as you deepen your understanding of phenomena. ***Facilitator Note:*** Using an Anchoring Phenomenon to Drive Three-Dimensional Teaching and Learning Poster	**Slide 17** **Anchoring Phenomena Descriptors Resource** Kentucky Department of Education (KDE) Anchoring Phenomena Poster  

Guidance	Accompanying Slide(s)
Explain: Now we are going to complete a polling activity to see how comfortable we are with being able to identify phenomena. Based on our understanding which one of these selections is an anchoring phenomenon and why? Make your selection and consider why you think that is the phenomenon. ***Facilitator Note:*** *There are several ways to facilitate this activity. You can use a digital polling platform or the "Sticky Bars" strategy. For the Sticky Bars method, participants write their answers on sticky notes and place them on a board or wall above the number they chose, creating a visual bar graph of the group's opinions. Allow time for discussion and invite someone who selected #3 to explain their reasoning. Use the explanations provided to guide participants through the options and clarify why #3 is the correct answer.* ***Explanation of each descriptor.*** *1: This is a science idea about magnetic forces.* *2: General question about magnetic forces.* *3: Detailed observation of something that happened in the natural world.* *4: A question stemming from the observation.*	**Slide 18** 
Explain: Based on our understanding, which one of these selections is an anchoring phenomenon and why? Make your selection and consider why you think that is the phenomenon. ***Facilitator Note:*** *Continue with the strategy you selected to facilitate this activity. Allow time for discussion and invite someone who selected #1 to explain their reasoning. Use the explanations provided to guide participants through the options and clarify why #1 is the correct answer.* ***Explanation of each descriptor.*** *1: Detailed observation of something that happened in the natural world.* *2: A question stemming from the observation.* *3: This is a science idea about populations of organisms.* *4: General question about organism populations.*	**Slide 19** 

Guidance	Accompanying Slide(s)
Explain: Based on our understanding which one of these selections is an anchoring phenomenon and why? Make your selection and consider why you think that is the phenomenon. ***Facilitator Note:*** *Continue with the strategy you selected to facilitate this activity. Allow time for discussion and invite someone who selected #4 to explain their reasoning. Use the explanations provided to guide participants through the options and clarify why #4 is the correct answer.* ***Explanation of each descriptor.*** *1: A question stemming from the observation.* *2: This is a science idea about waves.* *3: General question about waves.* *4. Detailed observation of something that happened in the natural world.*	**Slide 20** 
Explain: The STEM Teaching Tools site offers resources to support teaching STEM subjects, with a focus on the Next Generation Science Standards (NGSS), closely aligned with the KAS for Science. Each tool addresses a specific issue, on research and best practices. One tool, *"Qualities of a Good Anchor Phenomenon for a Coherent Sequence of Science Lessons,"* outlines criteria for selecting anchor phenomena or design problems aligned with the NRC Framework for K-12 Science Education. Take a moment to read this tool independently. As you read, consider: • How does the experience we just engaged in address the criteria in this tool? • How might this tool help in planning and evaluating your science resources? Record your thoughts in your participant packet. You'll have 4 minutes to read and respond, then be ready to share with the whole group. ***Facilitator Note:*** *Discuss the second question…how might this tool be supportive while planning and evaluating your science resource? Ask for volunteers to share. As participants are sharing, consider using prompts such as, "Who would like to add on what _____ said or pose a new idea?"*	**Slide 21** 

Guidance	Accompanying Slide(s)
Explain: Access to high-quality, standards-aligned instructional resources (HQIRs) is crucial for ensuring all students receive science education that prepares them for future success. According to KDE, a key feature of an HQIR is providing all students with sustained, authentic learning opportunities driven by phenomena. These materials prioritize sense-making through real-world phenomena, rather than focusing on topics, concepts, or construction projects. Take a moment to review the chart. How does this align with that vision? What stands out to you? Feel free to share your thoughts.	**Slide 22** 
Explain: At the end of each session in this module, you will find shared understandings that summarize the key takeaways from the session. Here are some shared understandings from session A. **Phenomena based instruction:** • **Uses** events from the natural or designed world that are observable. • **Shifts** the focus of instruction from learning about a topic to figuring out why or how something happens. • **Allows** students to build general science ideas in the context of their application to understanding phenomena in the real world, leading to deeper and more transferable knowledge. • **Establishes** the central reason for engaging students in the three dimensions to make sense of phenomena. • **Provides** students with something authentic and relevant to generate questions around that will motivate them and drive the instruction.	**Slide 23** 

Guidance	Accompanying Slide(s)
Explain: Take a moment to go back and look at your individual meta moment recorded at the start of this session. Consider adding on to your initial thoughts in a different color. How have your thoughts grown or changed after completing session A?	**Slide 24** 
Explain: To reflect on our learning this evening, consider the instructional shift from learning about to making sense of an anchoring phenomenon. What would you identify as the most important point (MIP) from our session today? Record your MIP in Session A: Reflection of your participant packet. ***Facilitator Note:*** *Once participants finish, have them stand and share their most important point (MIP) with a partner. Alternatively, allow time for participants to discuss their MIPs at their tables and agree on one table MIP to share with the group.*	**Slide 25** 
Explain: "A journey of a thousand miles begins with a single step." This quote by Lao Tzu embodies the reasoning behind our "Next Steps: Considerations for Implementation." Each of the sessions will include a next step for you to begin to take action in your classroom/school/district/region. The first step is to consider a vision statement for science teaching and learning.	**Slide 26** 

Guidance	Accompanying Slide(s)
Explain: Record your response in Session A: Next Steps – Considerations for Implementation section of your participant packet. ***Facilitator Note:*** *This will be a good time to pause and see if anyone has a clarifying question they would like to ask before moving onto their reflection. The facilitator may also want to check on the "Parking Lot" to see if any questions have been posted there and need to be addressed during this session. Group questions by common categories to help save time. Keep note of the questions that are not addressed in this session to be addressed later in another session.*	**Slide 27** 

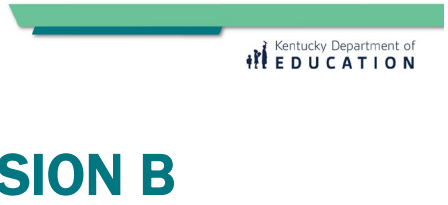
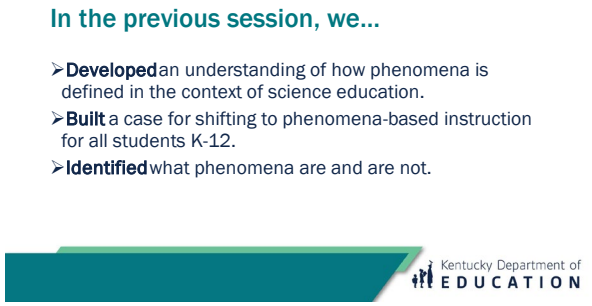
Preparation for Session B

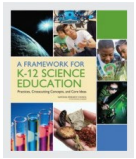
Focus Question: **How does the launch of an anchoring phenomenon engage all students in sensemaking?**

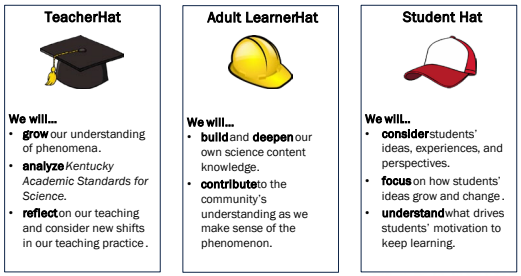
Agenda: **1hour 30 minutes**

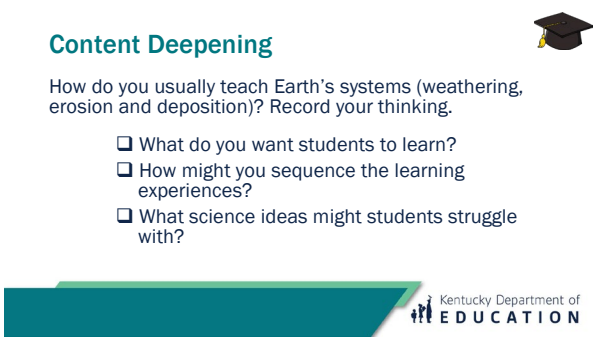
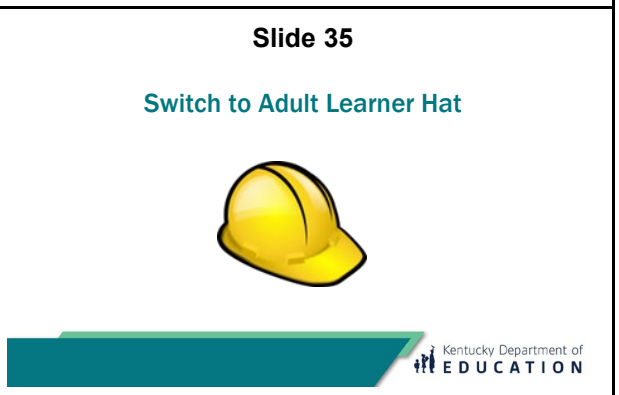
Time	Slides #'s	Outline	Materials Needed
5 minutes	28-31	Introduction • Revisit What Was Learned in Session A • Module Goals • Focus Question	• Agreements Poster • Parking Lot Poster • Participant Packet
55 minutes	32-51	Symmetrical-like Experience	• Communicating in Scientific Ways Poster • Mississippi River Delta Map and Reading Passage
15 minutes	52-53	Debrief and Analysis	• NGSS Storyline Tool #1 - AnchoringPhenomenon - v 2.0
10 minutes	54-56	Shared Understanding and Reflection	
5 minutes	57	Next Steps - Considerations for Implementation	• NGSS Storyline Tool #1 - AnchoringPhenomenon - v 2.0

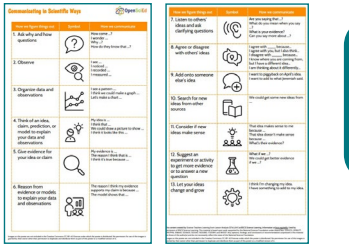
Session B: How does the launch of an anchoring phenomenon engage all students in sensemaking?

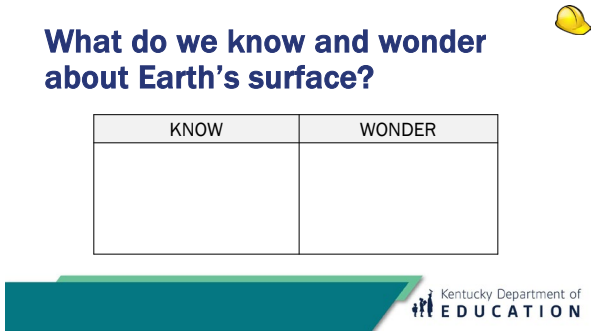
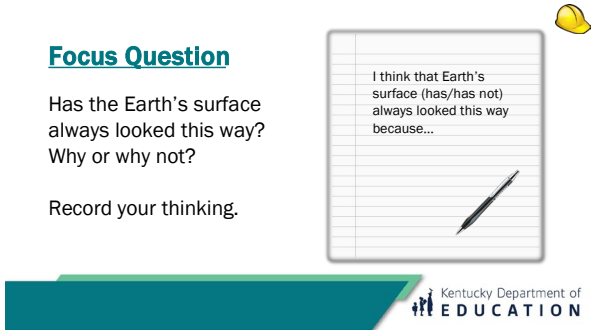
Guidance	Accompanying Slide(s)
Explain: Welcome to Session B of Using Anchoring Phenomena to Drive Three-dimensional Science Teaching and Learning. ***Facilitator Note:*** *The first 4 slides within this module will be used to begin each session. Slide 4 contains bookmarks directly to the session needed. Ensure that all participants have their participant packet. If they do not, provide them with one.*	**Slide 28** 
Explain: To link the ideas learned from session A to session B, we want to review the learning from session A. In the previous session, we… • **Developed** an understanding of how phenomena are defined in the context of science education. • **Built** a case for shifting to phenomena-based instruction for all students K-12. • **Identified** what phenomena are and are not. ***Facilitator Note:*** *Allow participants a moment to reflect on session A and add any questions they may have to the "Parking Lot" as they prepare to continue deepening their understanding of using an anchoring phenomenon to drive three-dimensional teaching and learning.*	**Slide 29** 

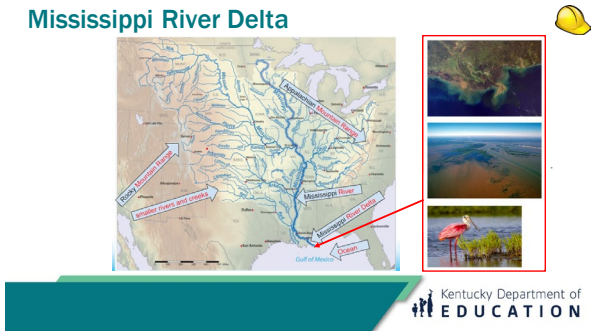
Guidance	Accompanying Slide(s)
Explain: Let's take a meta moment and jot down our initial ideas in the participant packet around today's focus question, how does the launch of an anchoring phenomenon engage all students in sensemaking.	**Slide 30** **Session B Meta Moment** Focus Question How does the launch of an anchoring phenomenon engage all students in sensemaking? Kentucky Department of EDUCATION
Explain: We shared some quotes out of the Framework for K-12 Science Education during session A. To build on those ideas, let's consider the quote on the screen. This quote is broken down into 3 different parts to call attention to each portion. As I read this quote aloud, consider what stands out to you. Would a few of you want to share out? ***Facilitator Note:*** *Let a few share out.*	**Slide 31** **Connecting to Students Interest and Experiences** ➢"A rich science education has the potential to capture students' sense of wonder about the world and to spark their desire to continue learning about science throughout their lives. ➢Research suggests that personal interest, experience, and enthusiasm –critical to children's learning of science at school or in other settings – may also be linked to later educational and career choices. ➢Thus, in order for students to develop a sustained attraction to science and for them to appreciate the many ways in which it is pertinent to their daily lives, classroom learning experience in science need to connect with their own interest and experiences."  National Research Council, 2012, p. 28 Kentucky Department of EDUCATION
Explain: We are going to move into engaging in a symmetrical-like experience to that of a classroom. This experience is essential for educators to engage in because it… • Provides teachers with opportunities to experience high quality instructional resources (HQIR) as learners and then go deeper into understanding the curriculum's design and instructional approach. • Teachers are active learners, like their students, who construct their knowledge and beliefs based on direct experience. Teachers need to experience curriculum and instruction and see how an approach benefits students rather than just hearing about it. • Experiencing new instructional approaches from a learner perspective	**Slide 32** **Engaging in a Symmetrical-like Experience** ➢Provides teachers with opportunities to experience high quality instructional resources (HQIR) as learners and then go deeper into understanding the curriculum's design and instructional approach. ➢Teachers are active learners, like their students, who construct their knowledge and beliefs based on direct experience. ➢Experiencing new instructional approaches from a learner perspective • helps teachers **trust** that student-led discussions can be productive, • **anticipate** questions and ideas that will likely surface, • gives teachers a novel vantage point, showing them what it feels like to **experience** the curriculum as a students and • provides **evidence** that unfamiliar lessons can work well. Kentucky Department of EDUCATION

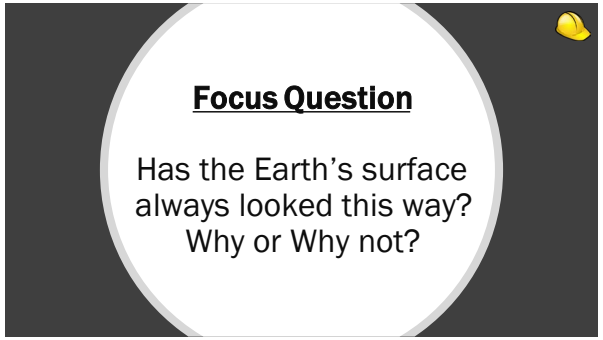
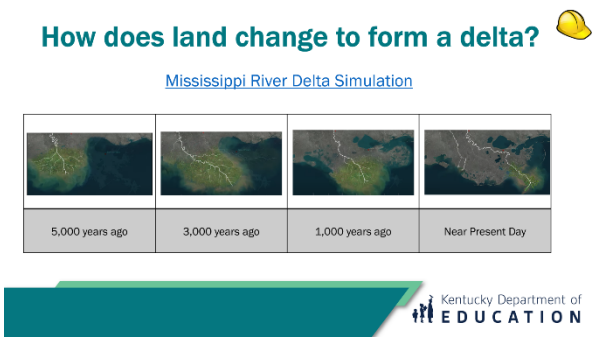
Guidance	Accompanying Slide(s)
○ helps teachers trust that student-led discussions can be productive ○ anticipate questions and ideas that will likely surface ○ gives teachers a novel vantage point, showing them what it feels like to experience the curriculum as a student ○ provides evidence that unfamiliar lessons can work well. In schools, it's ideal for groups engaging in similar experiences to be at the same grade level, using lessons from the same high-quality instructional resource. Since our community spans grades K–12, we will use a Grade 4 lesson to create a shared experience for discussion during this session and throughout the workshop. This lesson is part of a unit on Earth's surface, developed by the nonprofit Biological Sciences Curriculum Study (BSCS), which focuses on science education. We will engage in Lesson 1 of the unit to experience the launch of an anchoring phenomenon. ***Facilitator Note:*** *To learn more about why engaging in a symmetrical like experience is important, consider reading the book, "Transforming Teaching Through Curriculum Based Professional Learning- The Elements" by Stephanie Hirsh and Jim Short.*	
Explain: Throughout this module, you will engage through three intentional perspectives: **teacher**, **adult learner**, and **student**. Each perspective, or "hat," helps us strengthen our understanding of phenomenon-driven, three-dimensional science teaching and learning. **Teacher Hat**: In this role, we will deepen our understanding of phenomena, analyze the *Kentucky Academic Standards for Science*, and reflect on our teaching practices to identify shifts that can enhance instruction. Being in the teacher hat will help us examine teacher moves that draw on students' expertise and value their contributions as they work to figure things out together. **Adult Learner Hat**: Here, it's important to stay fully engaged in the learning for yourself as a contributing member of the learning community, rather than speaking as your students. This creates a safe and supportive space for all to contribute, ask questions, and deepen our science content knowledge. Staying in this hat honors the investigative process and recognizes that everyone brings varied experiences and prior understanding of the content.	**Slide 33** Viewing Learning from Every Angle 

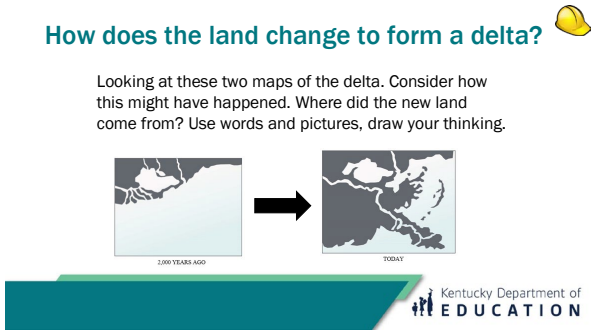
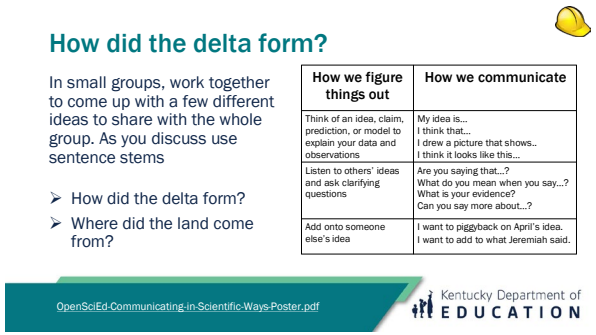
Guidance	Accompanying Slide(s)
Student Hat: In this role, we will consider students' backgrounds, experiences, and perspectives that shape their learning process. We'll also examine how students' initial ideas contribute to sensemaking, highlighting the importance of building on their thinking to deepen understanding over time. We'll focus how science ideas grow and change and explore what motivates them to continue their learning journey. To help you navigate between these perspectives, a corresponding symbol will appear in the upper-right corner of each slide.	
Explain: Note the "teacher hat" in the upper right-hand corner of the slide. We will begin this common learning experience by first giving you some time to think and write about how you might teach students about water, earth systems (weathering, erosion, and deposition). Collect your responses and thoughts to these questions by turning to Session B: Notes- Teacher Hat in your participant packet. To answer this question, you might consider what you want students to learn, how you would sequence the learning, and what ideas your students might struggle with.	**Slide 34** 
Explain: We will now switch to the adult learner hat. 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 sticky note and post on the parking lot.	**Slide 35** 

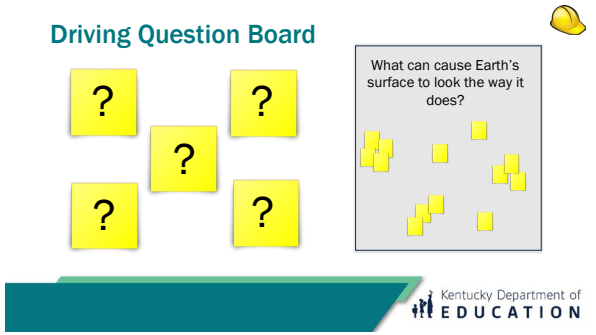
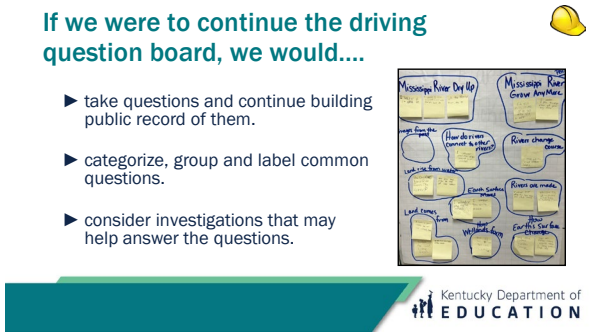
Guidance	Accompanying Slide(s)
Explain: Let's take a moment to review the *Communicating in Scientific Ways* (CSW) resource from OpenSciEd. This document will support our group discussions by providing strategies for effective scientific discourse. We will focus on specific rows that guide how we communicate our findings, using the provided sentence stems to actively listen and respond to one another. These sentence stems encourage everyone to share, revise, clarify, or challenge ideas in a productive way, fostering deeper thinking. As we progress through the module, we will explore different ways to develop and communicate our understanding. ***Facilitator Note:*** *When using this strategy, participants will naturally engage in deeper, more challenging discussions as their thinking evolves. The facilitator's role shifts to that of a mediator, actively listening to the conversation and posing questions to elicit, probe, or challenge ideas. Displaying these sentence stems will help prompt meaningful communication among participants throughout the sessions in this module. A large printable version of this can be found at www.openscied.org/communicating-poster/. It is also helpful to place a copy at each table for participants to refer to.*	**Slide 36** **Communicating in Scientific Ways Resource**  As we work through these sessions, we will be using the Communicating in Scientific Ways from OpenSciEd to support our academic discourse. Kentucky Department of EDUCATION
Explain: To start, we will focus on three discussion moves: #1 - Ask why and how questions, #7 - Listen to others' ideas and ask clarifying questions, and #9 - Add onto someone else's idea. As we begin the learning, rely on these communication stems to guide your discussions. ***Facilitator Note:*** *Place a sticky note with an arrow near the numbers on the Communicating in Scientific Ways poster to indicate the discussion moves we'll focus on. Encourage participants to use a small sticky note to note these discussion moves on their table copy.*	**Slide 37** **Communicating in Scientific Ways** How we figure things out / Symbol / How we communicate Ask why and how questions — How come...? I wonder...? Why...? How do they know that...? Listen to others' ideas and ask clarifying questions — Are you saying that...? What do you mean when you say...? What is your evidence? Can you say more about...? Add onto someone else's idea — I want to piggyback on April's idea. I want to add to what Jeremiah said. OpenSciEd Communicating-in-Scientific-Ways-Poster.pdf Kentucky Department of EDUCATION

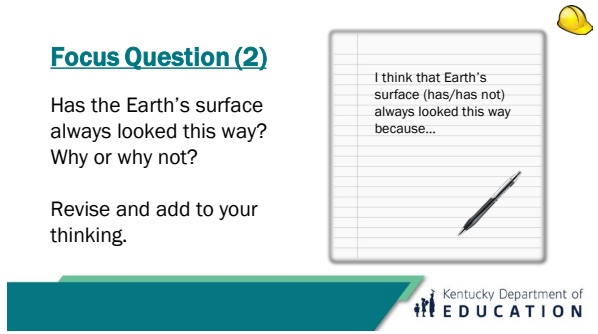
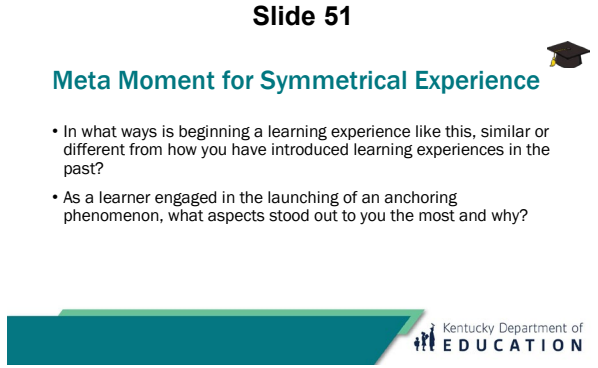
Guidance	Accompanying Slide(s)
Explain: We are going to begin by thinking about what we know or wonder about Earth's surface. What are your ideas about the Earth's surface? Remember to use CSW 1,7,9. ***Facilitator Notes:*** *Use chart paper to record the know and wonder t-chart and add the groups' thinking.* *Here are some questions to guide the discussion:* • *Great question! What do others think?* • *Can you say more about how _____?* • *Has anyone else used a map to learn more about what Earth's surface looks like?* • *What other land and water features have you seen on a map?* *Some wonderings from the group may be:* • *Why are there islands in the ocean?* • *Why do some places have a lot of lakes and rivers, but other places have fewer?* • *Why does Earth's surface look different in different places?* • *What is Earth's surface made of?*	**Slide 38** 
Explain: We have lots of great ideas and wonderings about the Earth's surface. We will begin investigating these ideas and wonderings about the Earth's surface by starting with the focus question, "How has the Earth's surface always looked this way? Why or why not?" Take a moment in your participant packet to record your best ideas. Would anyone be willing to share your response? As participants share, ask what do others think? Do you agree? ***Facilitator Notes:*** *Record the participants' responses on an anchor chart labeled, "I think that Earth's surface (has/has not) always looked this way because...".*	**Slide 39** 

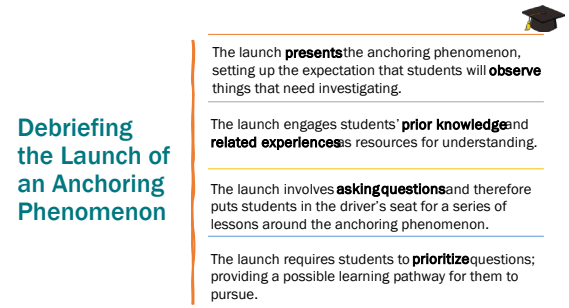
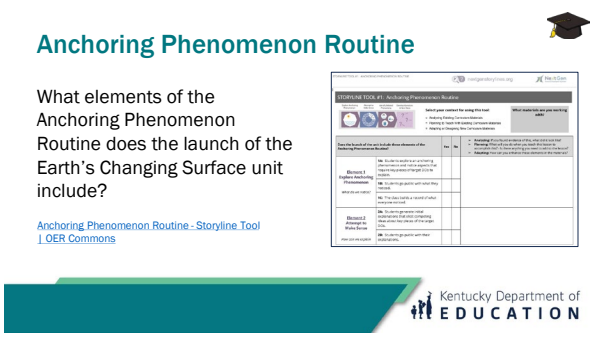
Guidance	Accompanying Slide(s)
Explain: Let's consider our focus question: *Has the Earth's surface always looked this way? Why or why not?* To explore this, we'll examine a specific area of the Earth's surface. On the screen, you'll see a map of a unique location in North America. Ask: • What do you notice and wonder about the land and water features on this map? • What do you notice and wonder about the images? As we make our observations and ask questions about the Earth's surface in this area, let's use CSW #1-Ask why and how questions and CSW #2- Observe. ***Facilitator Note:*** *Move the sticky arrows to CSW #1 and #2 and ask participants to do the same on their table copy.* *Create a notice and wonder chart and record the participants' ideas.*	**Slide 40** 
Explain: To help us describe what we observe on the Earth's surface, the map includes labeled land and water features for reference. Take note of the labels, especially the Mississippi River Delta, as we'll focus on this area during our exploration. Now, we'll read about the Mississippi River Delta. As you read, underline or circle any words you find important or want to learn more about. Keep our focus question in mind: *Has the Earth's surface always looked this way? Why or why not?* ***Facilitator Note:*** *Provide time to read and then share some things you noticed from the reading. Add additional thoughts from the reading to the notice and wonder chart.* Mississippi River Delta Map and Reading Passage	**Slide 41** 

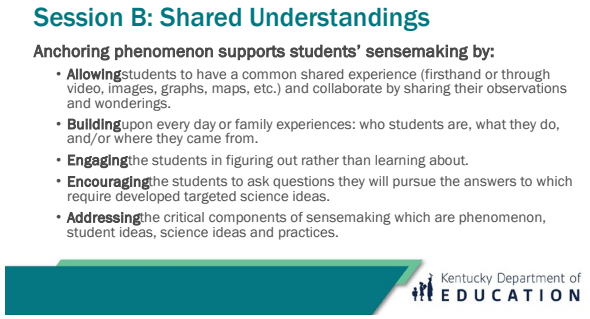
Guidance	Accompanying Slide(s)
Explain: You made some excellent observations from the reading! I was also curious about why the Mississippi River Delta looks the way it does. Let's take a closer look at this area while keeping our focus question in mind: *Has the Earth's surface always looked this way? Why or why not?*	**Slide 42** 
Explain: We're about to watch a simulation of the Mississippi River Delta from a bird's-eye, or satellite, perspective, looking down at the land below. Pay attention to the timeline at the bottom of the animation, which highlights four specific points in time. For this first viewing, simply observe without taking notes. The simulation lasts just 33 seconds. *Play the animation but stop at the :33 second mark.* Use probing questions such as: • What are we looking at? • What is the dark white line on the animation? Your participant handout includes a section to record your observations during the second viewing. We will pause the simulation a few times to give you time to jot down any what you notice or questions you have as you watch the animation. ***Facilitator Notes:*** *Play it again the second time: (give about 1 minute in between each pause to record)* *Pause :06 seconds for 5,000 years ago* *Pause :15 seconds for 3,000 years ago* *Pause :22 seconds for 1,000 years ago* *Stop :33 seconds for near present day*	**Slide 43** 

Guidance	Accompanying Slide(s)
Allow participants to share their notices and wonderings. Continue adding to the notice and wonder chart. Mississippi River Delta Simulation	
Explain: Those are great observations. Let's continue to look at maps of the delta. On the screen you see two maps. One is a map of what the coastline looked like about 2,000 years ago and what it looks like today. Ask: • How did this happen? • Where did the land come from? Take 2 minutes in your participant packet to draw and/or write words to describe your thinking to those two questions. You are welcome to include questions you have as well.	**Slide 44** 
Explain: We watched an animation showing how the Mississippi River Delta has changed over time and learned that the Earth's surface has not always looked this way. Now, we're wondering: How did this happen? How did the land form? Where did it come from? We'll break into small groups to brainstorm ideas to share with the whole group. Start by discussing what you drew in your participant packet to spark the conversation. As you discussed, use CSW #4, #7 and #9. Using sentence stems such as… • I think that… • My idea is… • Can you say more about… • Are you saying that… • I want to piggyback on ____Idea. ***Facilitator Notes:*** *Move the sticky arrows to CSW #4, #7 and #9 on the poster and ask participants to do the same on their table copy.*	**Slide 45** 

Guidance	Accompanying Slide(s)
Explain: I know in Kentucky we do not have a delta. Can you think of other things you have observed in our local area that may remind you of what we observed with the delta? Ask: Does anyone have any new wonderings they would like to add to the notice and wonder chart? ***Facilitator Notes:*** *Create a chart labeled, "Related Phenomena" and jot down all the ideas of things in our local area or community that may related to or remind participants of what appears to be happening in the Mississippi Delta.*	**Slide 46** 
Explain: We have recorded some wonderings that you have throughout this experience. Take a moment to review those. We are going to gather our questions as a group to create a driving question board. Each person is going to get a sticky note for each question they have. You can think back from your wonderings you shared in your small group or a new wondering that has sparked from listening to other groups share. We will post these questions on the driving question board. ***Facilitator Notes:*** *Due to time constraints, we will not complete the driving question board. For more guidance on the driving question board, see the Driving Question Board module on the Science Professional Learning Modules webpage.*	**Slide 47** 
Explain: Due to time constraints, we won't be constructing our driving question board as a group. If we had more time, we would continue to gather questions, group and categorize similar questions and consider investigations that could help answer them.	**Slide 48** 

Guidance	Accompanying Slide(s)
Explain: Today, we focused on the question: *Has the Earth's surface always looked this way? Why or why not?* How would you answer this now? Before I ask a few of you to share, take a moment to add to or revise your thoughts using a different color pen. ***Facilitator Notes:*** *Provide time for a few to share.*	**Slide 49** 
Explain: We will now switch to the teacher hat where we will reflect on the experience as a teacher and consider new shifts in our teaching practice. Ask, How is beginning a learning experience like this similar to or different from how you have introduced the learning in the past? ***Facilitator Notes:*** *Allow participants to share their thoughts and considerations.*	**Slide 50** 
Explain: Take 2 minutes to consider the questions on the screen and record your thoughts in your participant packet.	**Slide 51** 

Guidance	Accompanying Slide(s)
Explain: Let's take a moment to debrief the launch of an anchoring phenomenon. • The launch presented the phenomenon, setting up the expectation that they will observe some things that needed investigating. • The launch engaged students in asking questions and, therefore, puts students in the driver's seat for a series of lessons. • The launch asked them to come up with initial ideas and related phenomena. • The launch required students to prioritize when to take up what questions, providing a possible learning pathway for them to pursue. In Session A, we read a publication from NGSS titled *Using Phenomena in NGSS-Designed Lessons and Units* to make a case for phenomena-based instruction. It emphasized that using phenomena to drive instruction helps students engage in practices that develop the knowledge needed to explain or predict the phenomena. The focus is not just on the phenomenon itself, but also on the student-generated questions about it, which guide the learning process. Asking questions or identifying problems becomes a crucial part of figuring things out. While students should be able to make sense of anchoring phenomena, they won't do so immediately or without further investigation through the science and engineering practices in future lessons. With instruction and guidance, students should be able to figure out, step by step, how and why the phenomenon works.	**Slide 52** 
Explain: The Northwestern Storylines offers a support tool called the Anchoring Phenomenon Routine, which can be used in three contexts: • Analyzing existing curriculum materials • Planning to teach with existing materials • Adapting or designing new materials We will focus on the first context: analyzing the learning experience you just had as an adult learner on Earth's changing surface. The tool identifies four key elements for launching an anchoring phenomenon in a unit: • Explore anchoring phenomena • Attempt to make sense	**Slide 53** 

Guidance	Accompanying Slide(s)
• Identify related phenomena • Develop questions and next steps Each element includes descriptors that break down key components. For each descriptor, you can select “yes” or “no” to indicate if the launch meets that component. The last column offers three questions to consider when analyzing, planning, or adapting: • If you selected "yes," what evidence supports this? What did it look like? • If you selected "no," how will the lesson need to be adapted to improve this element? • When planning to teach the lesson, what will you do to accomplish this? Is there anything to add to the lesson? We will work in our small groups to analyze the learning experience you just encountered together by using the Anchoring Phenomenon Routine Storyline Tool. ***Facilitator Note:*** *Have participants work in their small group to analyze the learning experience they just encountered together by using the Anchoring Phenomenon Routine Storyline Tool. Allow groups to share their findings.*	
Explain: As always, we want to end our session with some shared understandings. Anchoring phenomenon supports students’ sensemaking by: • **Allowing** students to have a common shared experience (firsthand or through video, images, graphs, maps, etc.) and collaborate by sharing their observations and wonderings. • **Building** upon every day or family experiences: who students are, what they do, and/or where they came from. • **Engaging** the students in figuring out rather than learning about. • **Encouraging** the students to ask questions they will pursue the answers to which require developed targeted science ideas. • **Addressing** the critical components of sensemaking which are phenomenon, student ideas, science ideas and practices.	**Slide 54** 

Guidance	Accompanying Slide(s)
Explain: Go back to your meta moment at the beginning of this session. Consider adding on to your initial thoughts in a different color. How have your thoughts grown or changed after completing session B?	**Slide 55** **After Completing Session B: Meta Moment** Focus Question How does the launch of an anchoring phenomenon engage all students in sensemaking?
Explain: As a reflection for today, we'll complete a "Gots and Needs" activity. Take two sticky notes: on the first, write something you "got" from today's experience, and on the second, write something you still "need" to know. You can also record these in your participant packet under Session B: Reflection. In the table, add your "got" in the left-hand column and your "need" in the right-hand column.	**Slide 56** **Reflection** • What is something that you "got" after today's experience. • What is something that you still "need" to know after today's experience?
Explain: As part of the Next Steps: Considerations for Implementation, return to your vision statement to add or revise your vision after engaging as an adult learner. In addition, we always want to provide you with some actionable steps you can begin to consider shifting your practice. Using the Anchoring Phenomenon Routine Storyline Tool, analyze your upcoming unit. Go through each criterion and determine if the criterion is included in your resource. If you find evidence of the criterion, note what it looks like. ***Facilitator Note:*** *The facilitator should determine how to proceed with the next steps. This could involve having participants complete the task independently, providing feedback on their tool, or using the*	**Slide 57** **Session B Next Steps: Considerations for Implementation** **Vision Statement:** Return to your vision statement to add or revise your vision after completing this session. **Anchoring Phenomenon Routine:** How is your instructional resource leveraging or not the use of an anchoring phenomenon towards sensemaking? Use the Storyline Tool #1: Anchoring Phenomenon Routine to analyze your upcoming unit. • Go through each criterion and determine if the criterion is included in your resource. • If you found evidence of the criterion, note what it looks like. 

Guidance	Accompanying Slide(s)
completed tools as a basis for group discussion.	

Preparation for Session C

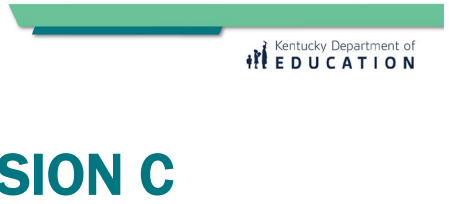
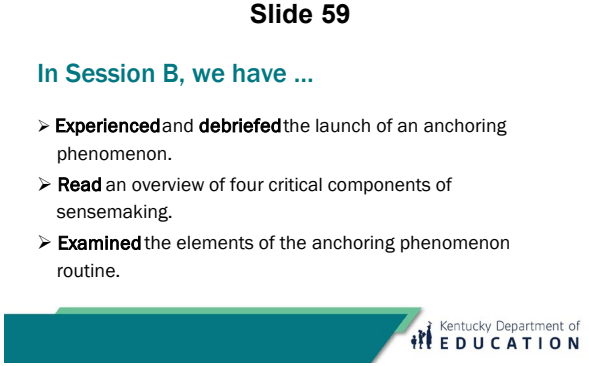
Focus Question: How might utilizing an anchoring phenomenon assist students in growing their science ideas and skills within the contact of the *Kentucky Academic Standards for Science*?

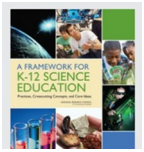
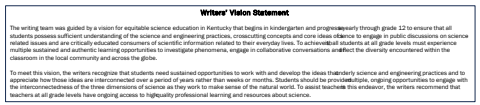
Agenda: 2 hours

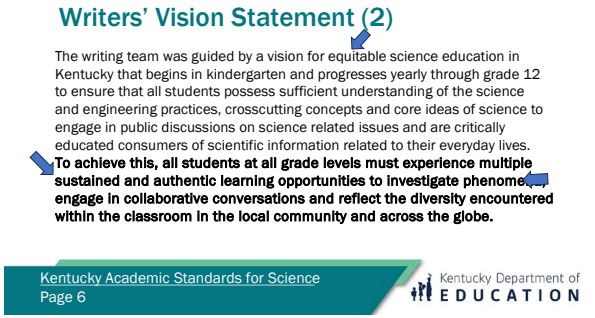
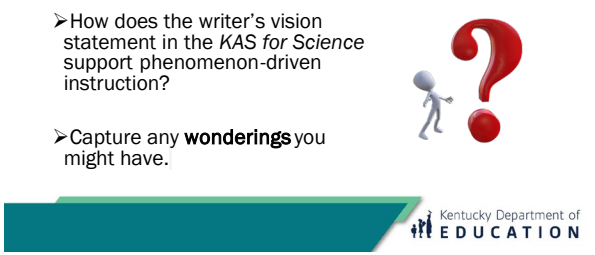
This session can be broken up into two sessions each lasting 1 hour. The first session (part 1) would include the introduction, achieving the vision and learning experience. The second session (part 2) would include the connections to the KAS, critical components of sensemaking, shared understanding, reflection, and next steps.

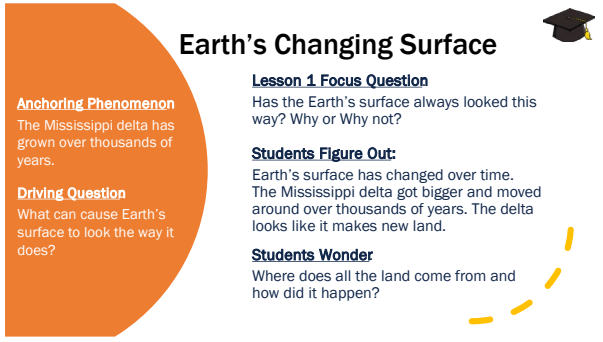
Time	Slides #'s	Outline	Materials Needed
5 minutes	58-60	Introduction • Revisit What Was Learned in Session B • Module Goals • Focus Question	• Agreements Poster • Parking Lot Poster • Participant Packet
20 minutes	61-65	Achieving the Vision • Framework vision • KAS Writers' vision • Your vision	• Kentucky Academic Standards for Science Writers' Vision Statement Page 6
45 minutes	66-83	Learning Experience for developing science ideas	• *Communicating in Scientific Ways Poster* • *Video of the stream table*
20 minutes	84-90	Connections to the *KAS for Science*	• *Kentucky Academic Standards for Science* • Appendix E–Disciplinary Core Idea (DCI) Progressions • Appendix F: Science and Engineering Practices • Appendix G: Crosscutting Concepts
15 minutes	91-97	Anchoring Phenomenon and Sensemaking	• NSTA Critical Components of Sensemaking
10 minutes	98-101	Shared Understanding and Reflection	
5 minutes	102	Next Steps - Considerations for Implementation	

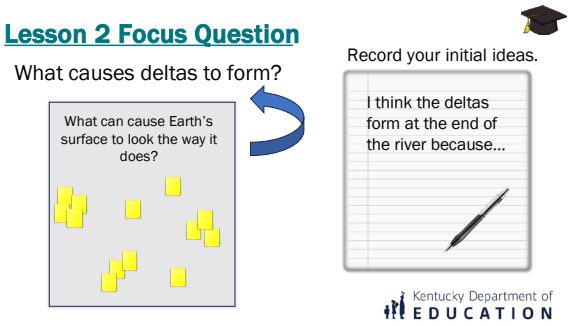
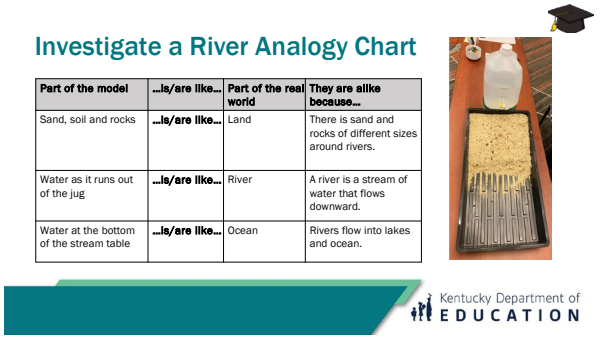
Session C: How can a driving question board anchored in a phenomenon be used to build a cohesive storyline?

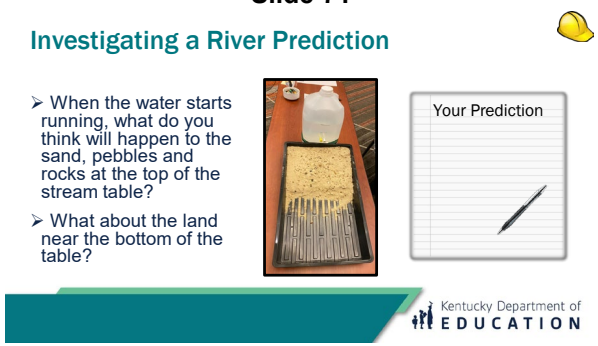
Guidance	Accompanying Slide(s)
Explain: Welcome to Session C of Using Anchoring Phenomena to Drive Three-dimensional Science Teaching and Learning. ***Facilitator Note:*** *Ensure that all participants have their participant packet. If they do not, provide them with one. The first 4 slides within this module will be used to begin each session. Slide 4 contains bookmarks directly to the session needed.*	**Slide 58** 
Explain: In session B, we experienced and debriefed the launch of an anchoring phenomenon, read an overview of four critical components of sensemaking, and examined the elements of the anchoring phenomenon routine. ***Facilitator Note:*** *This is a great time to consider questions that surfaced in session B if they are not going to be addressed during future sessions.* *Allow participants a moment to reflect on session B and add any questions they may have to the "Parking Lot" as they prepare to continue deepening their understanding on using an anchoring phenomenon to drive three-dimensional teaching and learning.*	**Slide 59** 

Guidance	Accompanying Slide(s)
Explain: Let's take a meta moment to respond to tonight's focus question: How might utilizing an anchoring phenomenon assist students in growing their science ideas and skills within the context of the Kentucky Academic Standards for Science? We will take 2 minutes to jot your initial ideas down. When I see pencils down, I will know you are ready to move forward.	**Slide 60** **Session C Meta Moment** Focus Question: How might utilizing an anchoring phenomenon assist students in growing their science ideas and skills within the context of the *Kentucky Academic Standards for Science*? Kentucky Department of EDUCATION
Explain: We shared a quote from A Framework for K-12 Science Education in session A. Connecting this module back to the vision of the Framework for K-12 Science Education *[Read the quote on the screen]*. How do the ideas from this quote align with what we've already learned? ***Facilitator Note:*** *Here is the link to the Framework in the event you want to explore more.* A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas | The National Academies Press	**Slide 61** **Achieving the Vision** ➢ "The vision of the framework is built on the notion of learning as a developmental progression. It is designed to help children continually build on and revise their knowledge and abilities, starting from their curiosity about what they see around them and their initial conceptions about how the world works." ➢ "The framework is motivated around the need for greater coherence in K-12 science education. Too often, standards are long lists of detailed and disconnected facts. This approach is alienating to young people and can leave them with fragments of knowledge." A Framework for K-12 Science Education, pg 10-11 
Explain: The KAS was strongly influenced by the *Framework for K-12 Science Education*, as reflected in the Writer's Vision in the front matter of the KAS for Science. Take a moment to read the Writer's Vision and note key foundational beliefs about instruction by highlighting, underlining, or writing them down. Would anyone like to share their notations around instruction? ***Facilitator Note:*** *Give participants about 3 minutes to read, highlight, underline or note their findings.*	**Slide 62** **Writers' Vision Statement** • Go to page 6 of the *Kentucky Academic Standards for Science* to read the **Writers' Vision Statement**. • As you read, write down or highlight some of the foundational beliefs of the writers around instruction.  Kentucky Department of EDUCATION

Guidance	Accompanying Slide(s)
Explain: As you noted, the writers emphasized the importance of equity in science education, ensuring all students, at all grade levels, have multiple, sustained, and authentic opportunities to investigate phenomena.	**Slide 63** 
Explain: Take a moment to reflect on how the writer's vision statement supports phenomenon-driven instruction. Use the space in your participant packet to record your response. ***Facilitator Note:*** *Have participants post their wonderings on the parking lot. This allows you to address them at the most appropriate time.*	**Slide 64** 
Explain: We've explored the vision from the K-12 Framework for Science Education and the Writer's Vision of the KAS for Science. Now, take a moment to reflect on your personal vision for incorporating phenomenon-driven instruction in your classroom. As part of the asynchronous work, you'll share your vision in small groups. This is a great opportunity to exchange ideas and gain insights from others. You'll have 5 minutes to discuss and share. If you heard something powerful from your group that could benefit everyone, please feel free to share with the whole group. ***Facilitator Note:*** *Allow participants to share one thing from their group that could benefit everyone.*	**Slide 65** 

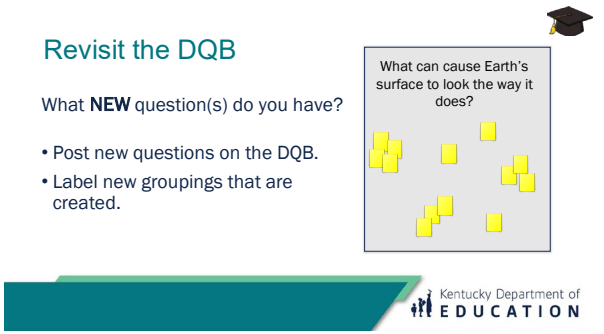
Guidance	Accompanying Slide(s)
Explain: As a reminder, during this session, we will be focusing on two perspectives introduced in Session B: the **teacher hat** and the **adult learner hat**. During this session, it's essential to set aside the teacher hat while wearing the adult learner hat and fully engage in building and deepening your science content knowledge as you contribute to the learning community. If thoughts arise related to the teacher or student perspective, jot them down on a sticky note to revisit at the appropriate time. ***Facilitator Note:*** *If participants share thoughts related to the teacher or student perspective, kindly ask them to jot those down on a sticky note and set them aside. This honors their need to share while ensuring the thoughts can be revisited at the appropriate time.*	**Slide 66** Viewing Learning from Two Perspectives **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.
Explain: Let's review Lesson one of the Earth's Changing Surface Unit we experienced in session B. • **Anchoring Phenomenon** in the Unit, Earth's Changing Surface, is the Mississippi delta has grown over thousands of years. • **Driving Question**: What can cause Earth's surface to look the way it does? • **Lesson 1 Focus Question**: Has the Earth's surface always looked this way? Why or Why not? • **Students Figure Out:** Earth's surface has changed over time. The Mississippi delta got bigger and moved around over thousands of years. The delta looks like it makes new land. • **Students Wonder**: Where does all the land comes from and how did it happen.	**Slide 67** 

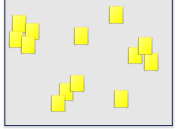
Guidance	Accompanying Slide(s)
Explain: The second lesson begins with students revisiting the driving questions board, reviewing questions about how deltas are formed. The teacher introduces the focus question, “What causes deltas to form?” Students write down the question and use the sentence starter, “I think deltas form at the end of the river because...” to share their ideas. As students share, the teacher refrains from asking challenge questions to avoid indicating correct or naïve ideas, instead simply recording their initial thoughts visually. Now, let’s take a moment to record your initial thoughts on the focus question. ***Facilitator Note:*** *Note the "teacher hat" in the top right corner. To save time, this is a fast-forward version to build background for Lesson 2. Participants will not engage with this slide as adult learners.*	**Slide 68** 
Explain: Students are introduced to the stream table model and learn how they will use it to investigate the lesson's focus question: how deltas form at the end of rivers. In this lesson, students will become "stream scientists" and explore the formation of deltas. Before using the model, they will use an analogy chart to connect the model to the real world. The chart highlights three parts of the model: the sand, soil, and rocks; the water flowing from the jug; and the water collecting in the stream table. Students identify these parts and relate them to real-world counterparts, explaining the similarities. For example, the water flowing from the jug is like a river, since both involve water flowing downward. As students discuss, they will be encouraged to share personal experiences that relate to the model. ***Facilitator Note:*** *Be sure to explain what each part of the model represents as we will be using the model in the adult learning experience.*	**Slide 69** 

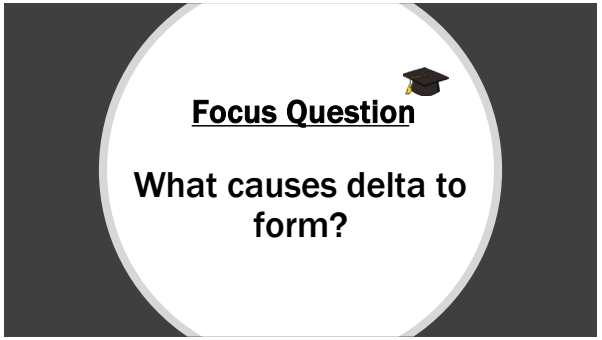
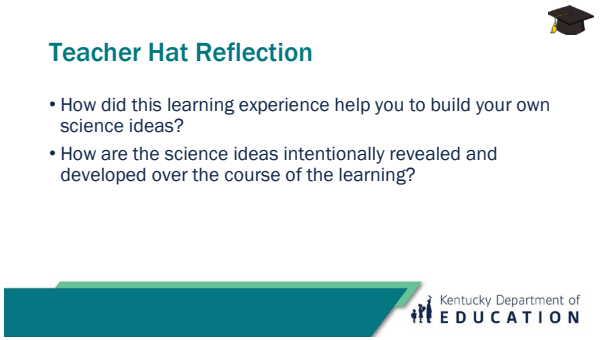
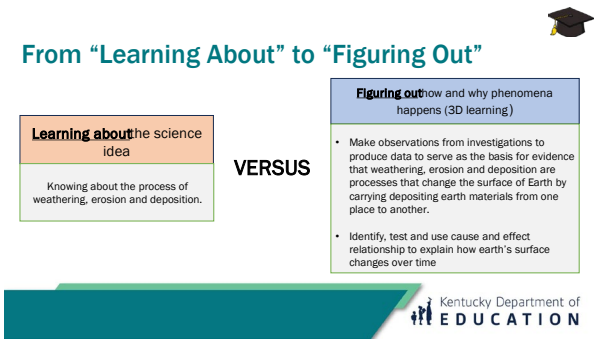
Guidance	Accompanying Slide(s)
Explain: As we move forward in this lesson let's switch to the adult learner hat to engage in an investigation about the river.	**Slide 70** 
Explain: As shown in the picture, our stream model is set up. When the golf tee is removed from the jug, water will flow into the stream table. Now, if we allow the water to run through the soil, sand, gravel, and rocks in the stream bed, what do you think might happen? Take a moment to record your prediction in the participant packet. Two guiding questions are on the screen to help shape your thoughts. Who would like to share their prediction? ***Facilitator Note:*** *As they share, record their ideas on chart paper for future reference and listen for responses that describe how flowing water moves earth materials to a new location or where materials are deposited. Encourage them to focus on a few pieces of sand or pebbles to refine their prediction. This will help them think through the process more clearly.* *You can complete this investigation in one of two ways: either use the video recording or set up the stream table(s) for an investigation. To set up the stream table place sand and some small pebbles on one side of the stream table. Place a golf tee towards the bottom of a milk jug and mark the jug into thirds. Fill the milk jug to the top line and place it on some books where the water will begin flowing into the stream table when the golf tee is pulled. To adjust the flow of water turn the cap on top.*	**Slide 71** 

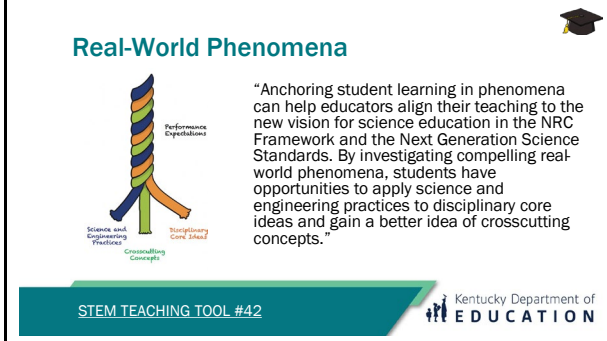
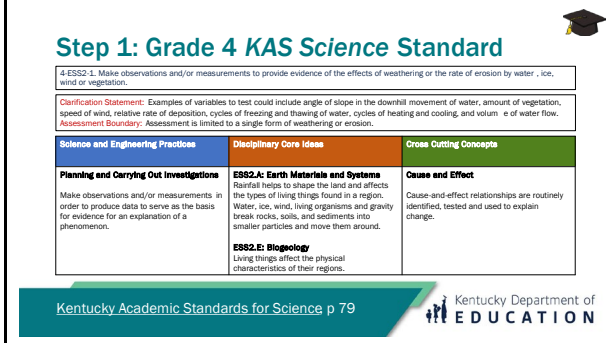
Guidance	Accompanying Slide(s)
Explain: In your participant packet, record using illustrations and words, what the stream table looks like before the investigation begins. ***Facilitator guide:*** *As you are preparing the participants for the investigation you can set up one at each table or set this up as a demonstration for others to gather around depending on the availability of resources. Provide an opportunity for participants to record observation of what the stream table looks like through both words and drawings with labels. Their drawing should be a bird's eye view of the stream table showing where the materials are located.*	**Slide 72** Investigating a River Record, using illustrations and words, what the stream table looks like before the investigation begins. 
Explain: As we get ready to begin our investigation look for where you see flowing water moving earth materials to a new location and where the earth materials are left or deposited in a new location. ***Facilitator Note:*** *Play the video or begin the investigation. If you are conducting the investigation in the session rather than using the video, remind participants to remove the golf tee to allow the water to run through the earth materials. They will need to let about one-third of the water in the jug flow slowly through the earth materials and then replace the golf tee to stop the water. Participants will observe where the water and earth materials move in the stream model. Have participants identify where earth materials are being taken away by water and where they end up on the stream table. If time is available repeat the water flowing one more time to see if they notice anything new or different.* Video of Stream Table	**Slide 73** Investigating a River (2) As you investigate, look for… • Where you see flowing water moving earth materials to a new location and • Where the earth materials are left or deposited in a new location. Video of Stream Table 

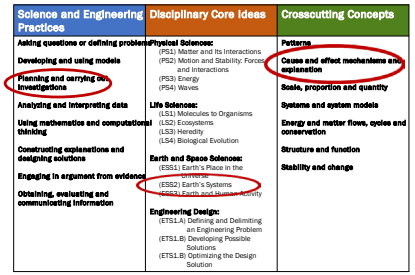
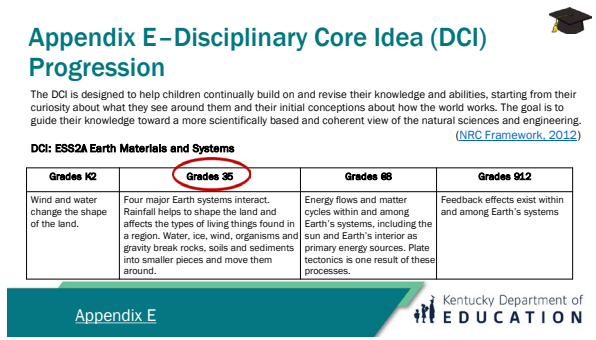
Guidance	Accompanying Slide(s)
Explain: Record your observations in your participant packet by drawing a bird's eye view of the stream table showing what you saw happen in the investigation. Be sure to use labels to communicate your observations.	**Slide 74** Investigating a River (3) ❑ In the box, draw a bird's-eye view of your stream table showing where materials were moved from one place to another. ❑ Use labels to communicate your observations. Kentucky Department of EDUCATION
Explain: Use CSW #1, #2 and #9 to discuss your observations in a whole group discussion. Consider using the following sentence stems: • I noticed…. • I wonder… • How come...? • I want to add to what (name) said. • I want to piggyback on (name) said.	**Slide 75** Communicating in Scientific Ways (2) How we figure things out / Symbol / How we communicate Ask why and how questions — How come...? I wonder... Why...? How do they know that...? Observe — I see... I noticed... I recorded... I measured... Add onto someone else's idea — I want to piggyback on April's idea. I want to add to what Jeremiah said. OpenSciEd-Communicating-in-Scientific-Ways-Poster.pdf Kentucky Department of EDUCATION
Explain: Let's share our ideas about how water changed the land in the stream table by considering the questions on the screen. ***Facilitator Note:*** *The following questions may help to guide the discussion. It is not necessary you use every question if the questions on the screen are addressed.* • *Where did the materials start out and where did they end up?* • *Why do you think this happened?* • *Which earth materials were carried by water most easily?* • *What evidence supports that these moved more easily?*	**Slide 76** How did water change the land? ❑ On your stream table, where are earth materials being taken away? ❑ On your stream table, where are earth materials being built up? ❑ How is your stream model the same from the Mississippi River and its delta? ❑ How is your stream model different from the Mississippi River and its delta? 

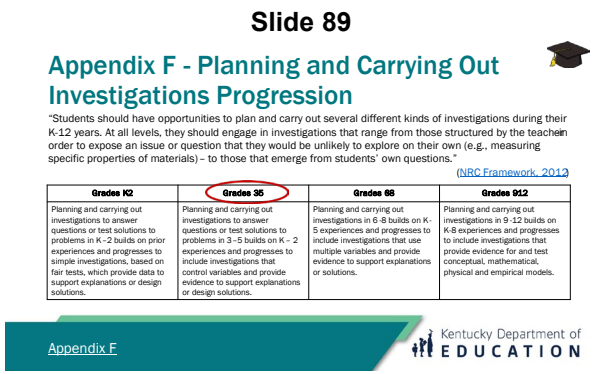
Guidance	Accompanying Slide(s)
• *Which materials were not easily carried by water, and how do you know?* • *Where did most of the earth's materials end up, and why do you think this occurred?* • *What do you think would happen in a real river where it meets the ocean and why?* • *How is your stream model like the Mississippi River delta?* • *Did anyone observe a delta forming?* • *How is it different?* • *How might it change if the river were larger or longer?* *If anyone illustrated that earth materials are deposited when water (or wind) slows down, we could test that idea as a group. You may have been thinking about how energy affects the movement of objects.*	
Explain: We will now switch back into the teacher hat to discuss the conclusion of lesson 2.	**Slide 77** 
Explain: As students wrap up their discussion of the four questions, they will take a moment to note any new questions they have about the stream table and delta formation. These questions would be added to the driving question board, with any new themes or groups labeled accordingly.	**Slide 78** 

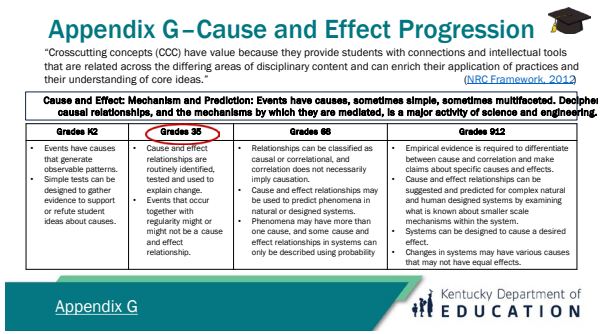
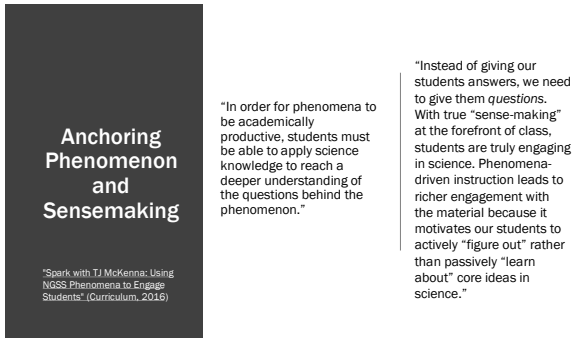
Guidance	Accompanying Slide(s)
Explain: The teacher explains two processes observed in the stream table: erosion: where water moved sand and pebbles, and deposition: where eroded materials piled up in a new location at the end of the river. Scientific vocabulary is introduced **after** students have engaged in the investigation and made connections to the shared class experience. The vocabulary is directly tied to the observations made from the stream table.	**Slide 79** Scientific Vocabulary Scientific Vocabulary is introduced **after** students have engaged in the investigation and are able to make connections back to a common experience the class has shared. The vocabulary is **connected directly to the observations** made from the stream table. As you **investigate** look for... • Where you see **flowing water moving** earth materials to a new location and • Where the earth materials are **left or deposited in a new location** **erosion** – the process where flowing water or wind moves earth materials, such as sand, soil, gravel and rocks to a different location. **deposition** – when eroded earth materials, such as sand, soil, gravel and rocks are deposited or dropped in a new location.
Explain: From lessons one and two, students would share what science ideas they understand at this point and the teacher would record them in a visual way. As you read them what stands out to you? ***Facilitator Note:*** *Allow participants to share a few ideas.*	**Slide 80** What Science Ideas Do We Know At This Time? • Earth's surface has **changed over time** • **Water moves** sand, rocks, pebbles, and soil in a river from higher places to lower places. • Where the river meets the ocean, the water has **less energy** and slows down. • The sand and soil that the river was carrying is **deposited** in a new location • **Erosion** is the process by which earth materials, such as rock fragments, sand, and soil, are removed from one place on Earth's surface and transported by wind and/or water. • As the **motion energy** of the water decreases, the earth materials are deposited, building up new land. • **Deltas** form at the end of rivers when this new land builds up over time. 
Explain: At this point, students will review the questions on the driving question board and identify which ones can be answered. They will write down the answers and place them next to the relevant question groups, marking the answered questions with a check mark. The teacher will pay particular attention to questions about the speed of these changes to anticipate the direction of lesson 3.	**Slide 81** Revisit the DQB (2) What questions have we **ANSWERED**? • Capture the **answer** and **place** it beside the grouping of questions. • Check off questions answered with a **check mark**. • Look for a grouping of questions around how **fast or slow** can these changes occur to forecast where students are going in lesson 3. What can cause Earth's surface to look the way it does? 

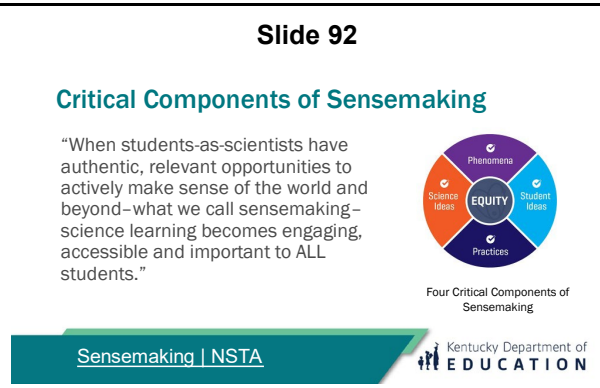
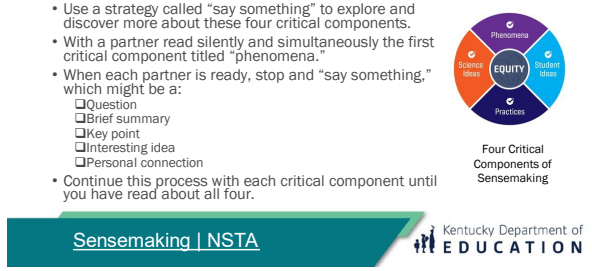
Guidance	Accompanying Slide(s)
Explain: Students revisit the focus question and update or refine their initial ideas from the beginning of the lesson using a different color. After recording their thoughts, students share how their ideas have evolved, while the teacher visually records these changes or additions.	**Slide 82** 
Explain: In your participant packet take a moment to reflect on how lessons one and two help students build their science ideas? How are the science ideas intentionally revealed and developed over the course of the learning? ***Facilitator Note:*** *Allow a few participants to share.*	**Slide 83** 
Explain: Our focus as educators has shifted from students learning about science to students figuring out science. Learning about science would involve students simply understanding concepts like weathering, erosion, and deposition, with the focus primarily on disciplinary core ideas. In contrast, figuring out how and why phenomena occur engages all three dimensions of learning. Students make observations during investigations to collect data (science and engineering practices), which serves as evidence that weathering, erosion, and deposition are processes that change Earth's surface by moving and depositing materials (disciplinary core idea). They identify, test, and apply cause-and-effect relationships (crosscutting concepts) to explain how Earth's surface changes over time.	**Slide 84** 

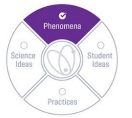
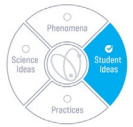
Guidance	Accompanying Slide(s)
Explain: As we begin shifting to look at the *Kentucky Academic Standards for Science* there is a place in your participant packet to record any thoughts you would like to capture. Think of the three components of three-dimensional learning as three intertwining strands 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 (science and engineering practices, core ideas, and crosscutting concepts working together) is therefore a non-negotiable for science lessons and units.	**Slide 85** 
Explain: The *Earth's Changing Surface* unit aligns with performance expectation 4-ESS2-1 in the KAS for Science. The performance expectation (PE) at the top includes all three dimensions and outlines what students must demonstrate to show mastery. For this PE, students make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion caused by water, ice, wind, or vegetation. The clarification statement offers examples or additional information, such as variables to test. The assessment boundary defines the scope for large-scale assessments. In this case, the focus is limited to a single form of weathering or erosion. Below the PE, the three foundation boxes provide detailed information about each dimension that was integrated to develop the PE. KAS for Science page 79 Kentucky Academic Standards for Science	**Slide 86** 

Guidance	Accompanying Slide(s)
Explain: This table summarizes each science dimension found in the foundational boxes. For this PE, the Science and Engineering Practice (SEP) focuses on planning and carrying out investigations, the Crosscutting Concept (CCC) emphasizes cause and effect, and the Disciplinary Core Idea (DCI) centers on Earth's systems. Let's review some support documents that outline the progression of these elements in the foundational boxes.	**Slide 87** **Three-Dimensional Standards (3)** 
Explain: The vision of *A Framework for K-12 Science Education* emphasizes coherence across all grade levels. The following excerpt from the Framework elaborates on this approach: "First, it is built on the notion of learning as a developmental progression. It is designed to help children continually build on and revise their knowledge and abilities, starting from their curiosity about what they see around them and their initial conceptions about how the world works. The goal is to guide their knowledge toward a more scientifically based and coherent view of the natural sciences and engineering, as well as of the ways in which they are pursued, and their results can be used. Second, the framework focuses on a limited number of core ideas in science and engineering both within and across the disciplines. The committee made this choice in order to avoid the shallow coverage of a large number of topics and to allow more time for teachers and students to explore each idea in greater depth. Reducing the sheer number of details to be mastered is intended to give time for students to engage in scientific investigations and argumentation and to achieve a depth of understanding of the core ideas presented. Delimiting what is to be learned about each core idea within each grade band also helps clarify what is most important to focus on, avoiding a proliferation of detail to be learned without conceptual grounding." Next, we will examine Appendix E from the NGSS resource, which focuses on the progressions of DCIs. DCIs are designed to help students build and revise their knowledge and abilities over time, starting with their natural curiosity and initial conceptions about the world. The goal is to guide	**Slide 88** **Appendix E – Disciplinary Core Idea (DCI) Progression** 

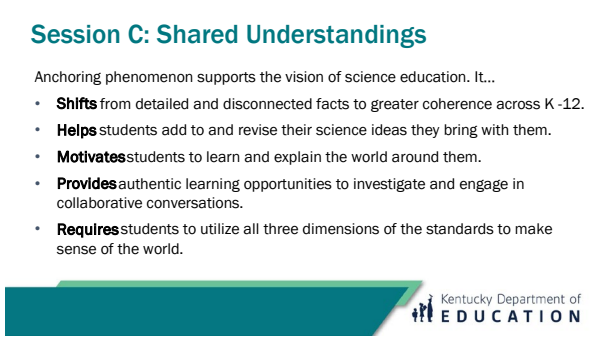
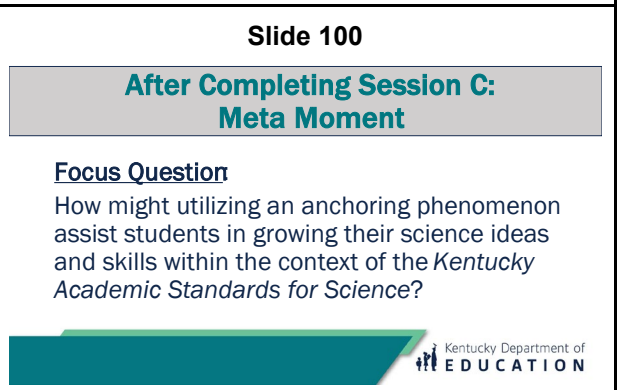
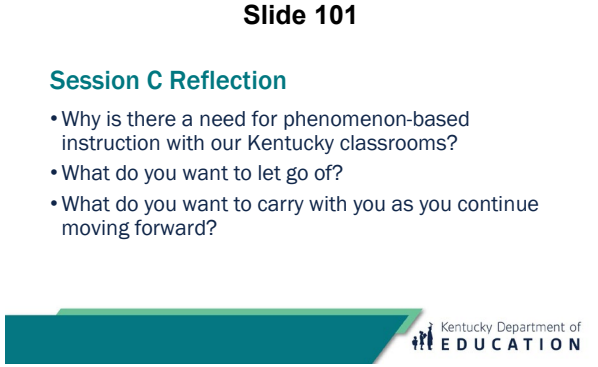
Guidance	Accompanying Slide(s)
students toward a scientifically coherent understanding of natural sciences and engineering. Take a moment to look at the progression for the disciplinary core ideas (DCIs) in this PE. What should students know at the end of grades 3-5? What should students understand coming into third grade? What will students be learning later in grade 6-12? ***Facilitator Note:*** *Allow time for participants to look closely at the DCI progression for ESS2.A Earth Materials and Systems.* *Link to Appendix E: AppendixE-ProgressionswithinNGSS-061617.pdf (nextgenscience.org) This DCI can be found on page 2.*	
Explain: Appendix F is dedicated to science and engineering practices (SEP). The example on the screen is the progression for planning and carrying out investigations. The framework states, "Students should have opportunities to plan and carry out several different kinds of investigations during their K-12 years. At all levels, they should engage in investigations that range from those structured by the teacher-in order to expose an issue or question that they would be unlikely to explore on their own (e.g., measuring specific properties of materials) to those that emerge from students' own questions." What do you notice as you look at the progression? ***Facilitator Note:*** *Link to Appendix F: Appendix F Science and Engineering Practices in the NGSS - FINAL 060513.pdf (nextgenscience.org) The SEP of Planning and Carrying Out Investigations can be found on page 7.*	**Slide 89** 

Guidance	Accompanying Slide(s)
Explain: Appendix G focuses on the progression of the crosscutting concept (CCC) of cause and effect. The Framework explains: "When students perform the practice of 'Planning and Carrying Out Investigations, they often address cause and effect. At early ages, this involves 'doing' something to the system of study and observing what happens. At later ages, experiments are designed to test the sensitivity of parameters by making a change (cause) to a single component of a system and examining, often quantifying, the resulting effect. Cause and effect is also closely tied to the practice of 'Engaging in Argument from Evidence.'" As you review the progression, what do you notice? How could using these three resources—Appendices E, F, and G—support you as an educator? ***Facilitator Note:*** *Allow time for participants to look closely at the progression for the Cause and Effect Crosscutting Concept.* *Link to Appendix G: Appendix G - Crosscutting Concepts FI NAL edited 4.10.13.pdf (nextgenscience.org). The CCC of Cause and Effect can be found on pages 5 and 15.*	**Slide 90** 
Explain: Let's read the two quotes on the screen regarding anchoring phenomenon and sensemaking and consider which statement resonates with you most. ***Facilitator Note:*** *[Read the slide] Have participants share which quote they chose and why with their group or partner. Then share a couple in the whole group.* **Explain:** If you resonated most with the quote on the left and are willing to share your thoughts, please share. Would anyone be willing to share their thoughts on the quote to the right?	**Slide 91** 

Guidance	Accompanying Slide(s)
Explain: "When students, as scientists, have authentic and relevant opportunities to actively make sense of the world—what we call sensemaking—science learning becomes engaging, accessible, and meaningful to *all* students." This quote highlights the essence of sensemaking in science: students actively working as scientists to figure out how the world works (science) or how to design solutions to problems (engineering). The National Science Teaching Association (NSTA) identifies four critical attributes of sensemaking: 1. **Phenomena** 2. **Science and Engineering Practices** 3. **Student Ideas** 4. **Science Ideas** (grade-appropriate disciplinary core ideas) These four components of sensemaking come together around the phenomenon.	**Slide 92** 
Explain: We will now read more about these critical components in small groups by using a strategy called "say something". • With a partner read silently and simultaneously the first critical component titled "phenomena." • When each partner is ready, stop and "say something," which might be a: ❑ Question ❑ Brief summary ❑ Key point ❑ Interesting idea ❑ Personal connection • Continue this process with each critical component until you have read about all four. • You can record your thoughts on each component of sensemaking in the designated section of your participant packet. Are there any questions? We will come back to the whole group in approximately 6 minutes. ***Facilitator Note:*** *Here is the link to the webpage: Sensemaking | NSTA*	**Slide 93** 

Guidance	Accompanying Slide(s)
Explain: "In sensemaking lessons, students **experience** a phenomenon together (firsthand or through video, images, graphs, maps, etc.) and share their **observations** and **wonderings** with the class. The focus of the lesson is **pursuing** an answer to a **question *students* shared**; the answer to which requires students to **develop** a targeted science idea needed to explain how or why the phenomenon occurred." Does anyone want to share what they noted about Phenomena? What was your key takeaway? Sensemaking | NSTA	**Slide 94** **Critical Component - Phenomena** "In sensemaking lessons, students **experience** a phenomenon together (firsthand or through video, images, graphs, maps, etc.) and share their **observations** and **wonderings** with the class. The focus of the lesson is **pursuing** an answer to a **question *students* shared**; the answer to which requires students to **develop** a targeted science idea needed to explain how or why the phenomenon occurred."  Four Critical Components of Sensemaking Sensemaking | NSTA Kentucky Department of EDUCATION
Explain: Another critical component to sensemaking is student ideas. During the launch, the initial student ideas are revealed through discussion and the driving question board. "Students' ideas–conveying their **prior knowledge**, experiences as a member of a family and other communities, interests and curiosities–can be **leveraged** to move the whole class's learning forward. Students are aware their **ideas** are **valued** and **important**." Would someone want to share what they noted about student ideas? What was your key takeaway? ***Facilitator Note:*** *It is important to note that student ideas grow and change all through the learning experience as they engage in investigations and draw conclusions. It is imperative that the teacher is constantly engaging in discussion and activities to reveal student ideas all throughout the learning.* Sensemaking | NSTA	**Slide 95** **Critical Component – Student Ideas** "Students' ideas–conveying their **prior knowledge** experiences as members of a family and other communities, interests and curiosities–can be **leveraged** to move the whole class's learning forward. Students are aware their **ideas** are **valued** and **important**."  Four Critical Components of Sensemaking Sensemaking | NSTA Kentucky Department of EDUCATION

Guidance	Accompanying Slide(s)
Explain: The third critical component of sensemaking is the practices. "Sensemaking lessons **require** students to engage in ***elements*** of science and engineering practices (discrete pieces of knowledge and skills that make up the practice and are **grade-band** specific) to make sense of the science ideas needed to explain the *how* or *why* of the phenomenon." Would someone share about practices? What was your key takeaway? Why is this component critical to sensemaking? ***Facilitator Note:*** *When we consider this critical component, As we examined earlier, we see evidence of the practices in the adult learning experience we engaged in, specifically making observations from investigations to produce data to help us make sense of the phenomenon.*	**Slide 96** **Critical Component–Practices** "Sensemaking lessons **require** students to engage in ***elements*** of science and engineering practices (discrete pieces of knowledge and skills that make up the practice and are **grade-band** specific) to make sense of the science ideas needed to explain the *how* or *why* of the phenomenon."  Four Critical Components of Sensemaking Sensemaking | NSTA Kentucky Department of EDUCATION
Explain: The final critical component of sensemaking is science ideas. These are different from student ideas. "Pursuing a question students raise about a phenomenon they have experienced together; students engage in science and engineering practices to make sense of targeted science ideas they need to explain how or why the phenomenon occurs." What was your key takeaway around science ideas? How are science ideas different from the student ideas? Sensemaking | NSTA	**Slide 97** **Critical Component–Science Ideas** "Pursuing a **question** students raise about a phenomenon they have **experienced** together; students **engage** in science and engineering practices to **make sense** of targeted science ideas they need to **explain *how* or *why*** the phenomenon occurs."  Four Critical Components of Sensemaking Sensemaking | NSTA Kentucky Department of EDUCATION
Explain: The goal of today's instructional materials is to support students in using all three dimensions of science learning in an integrated way to engage in sensemaking or problem-solving. This approach shifts away from traditional methods (shown on the left) and embraces practices more aligned with the items on the right. Learning should not just *relate* to the phenomenon—it should actively *explain* it. Similarly, learning should not occur separately from sensemaking; rather, it should happen *through* the sensemaking process. All three dimensions—science and engineering practices, crosscutting concepts, and disciplinary core ideas—should play a central role in the sensemaking process. Critical Features of Instructional Materials Design for Today's Science Standards (nextgenscience.org)	**Slide 98** **Less Like...More Like (2)...** **Less Like...** **Learning is only *related to* phenomena.** The expected learning in the three dimensions is only loosely connected to the phenomenon or problem **Learning is separate from sensemaking.** Students see their three-dimensional learning as separate from their sensemaking or problem solving. **One or more dimensions is unnecessary.** Students would be able to explain the phenomenon without persuing or developing one of the dimensions (often CCCs). **More Like...** **Learning *explains* phenomena.** The three dimensions work together to help students explain a phenomenon and/or design solutions to a problem. **Learning is through sensemaking.** Students see how their learning for each targeted learning goal works in service of sensemaking and/or problem solving. **All three dimensions are necessary** All three dimensions are necessary for sensemaking and problem solving. *Critical Features of Instructional Materials Design for Today's Science Standards pg. 24 chart EdReports* Kentucky Department of EDUCATION

Guidance	Accompanying Slide(s)
Explain: During this session, we examined how anchoring phenomenon supports the vision of science education. It… • **Shifts** from detailed and disconnected facts to greater coherence across K-12. • **Helps** students add to and revise their science ideas they bring with them. • **Motivates** students to learn and explain the world around them. • **Provides** authentic learning opportunities to investigate and engage in collaborative conversations. • **Requires** students to utilize all three dimensions of the standards to make sense of the world.	**Slide 99** 
Explain: Let's go back to our meta moment at the beginning of this session. How have your ideas changed or grown? Consider adding to your response to the focus question with a different color to show how your thoughts have evolved throughout the course of this session.	**Slide 100** 
Explain: Take a moment for personal reflection. Think about what you want to let go of and what you want to carry forward as you continue this journey. Write your thoughts on two sticky notes: use a blue sticky note for what you want to carry with you and a yellow sticky note for what you want to let go of. Take a few moments to capture your reflections. ***Facilitator Note:*** *Create a T-chart with "Carry With Me" on the left and "Let It Go" on the right. Participants will place their sticky note reflections on the chart as they leave the room.*	**Slide 101** 

Guidance	Accompanying Slide(s)
Explain: We aim to apply what we've learned to our own classrooms. Here are your next steps: considerations for implementation to help you continue progressing toward phenomena-driven instruction.	**Slide 102** **Session C Next Steps: Considerations for Implementation** **Vision Statement:** Return to your vision statement to add or revise your vision after completing this session. **Anchoring Phenomenon Routine:** Use the Storyline Tool #1: Anchoring Phenomenon Routine to take a second look at the unit you analyzed at the end of session B next steps. Based on that analysis, select the context for using the tool that best meets your needs. • Planning to teach existing curriculum materials • Adapting or designing new curriculum materials Then complete the analysis and next step columns to begin thinking about the shifts need to strength the launch of the anchoring phenomenon. 

Kentucky Department of EDUCATION

Preparation for Session D

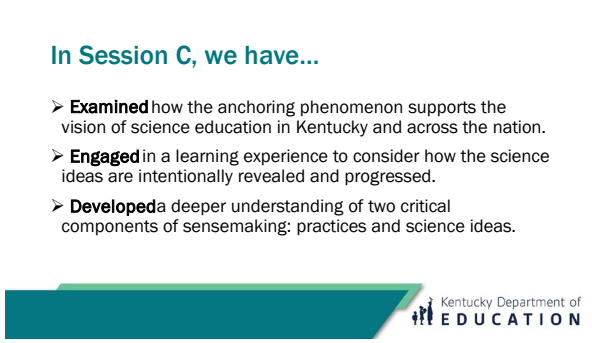
Focus Question: Why is a storyline centered around an anchoring phenomenon crucial for achieving coherence from the students' perspective?

Agenda: 1 hour and 30 minutes

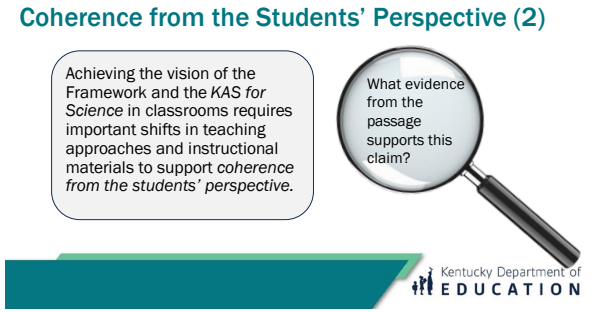
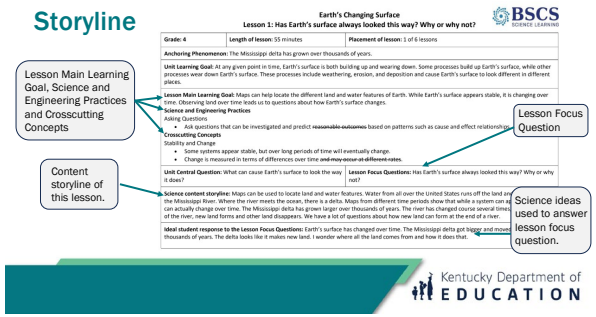
Time	Slides #'s	Outline	Materials Needed
5 minutes	103-105	Introduction • Revisit What Was Learned in Session C • Module Goals • Focus Question	• Norms Poster • Parking Lot Poster • Participant Packet
20 minutes	106-108	Storyline and Coherence	• Coherence from the Students' Perspective: Why the Vision of the Framework for K-12 Science Requires More than Simply "Combining" Three Dimensions of Science Learning
50 minutes	109-123	Building the Conceptual Story • Student hat • Teacher hat	• BSCS Earth's Changing Surface Unit ○ Common Student Ideas ○ Scope and Sequence ○ Lesson 1 ○ Lesson 2 ○ Lesson 3 ○ Lesson 4 ○ Lesson 5 ○ Lesson 6 • The Conceptual Story from Different Perspectives Slide Deck • Science Instructional Resources Consumer Guide

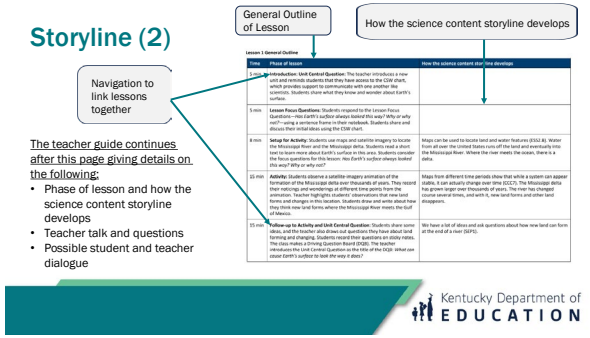
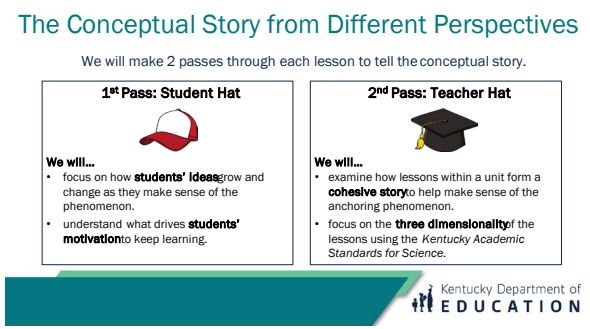
10 minutes	124-127	Shared Understandings and Reflection	
5 minutes	128	Next Steps - Considerations for Implementation	

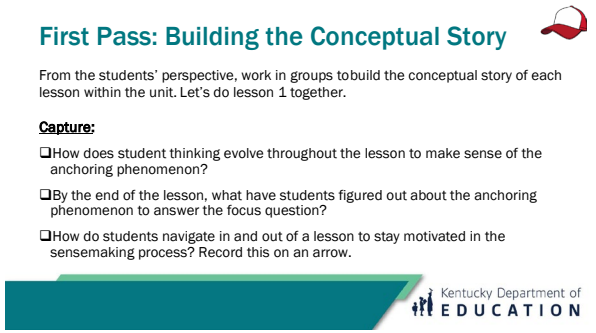
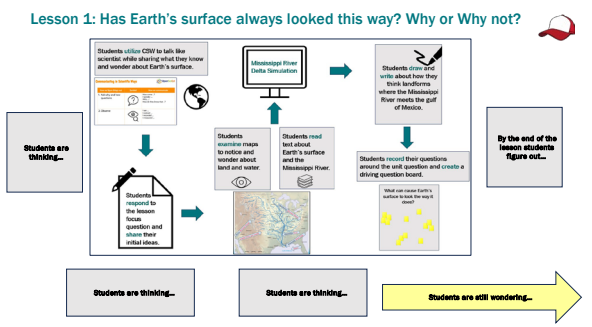
Session D: How can the driving question board be used as a formative assessment tool to foster an equitable learning community?

Guidance	Accompanying Slide(s)
Explain: We will now begin session D. ***Facilitator Note:*** *The first 4 slides within this module will be used to begin each session. Slide 4 contains bookmarks directly to the session needed.*	**Slide 103** 
Explain: Last session we examined how the anchoring phenomenon supports the vision of science education in Kentucky and across the nation, engaged in a learning experience to consider how the science ideas are intentionally revealed and progressed and developed a deeper understanding of the critical components of sensemaking.	**Slide 104** 

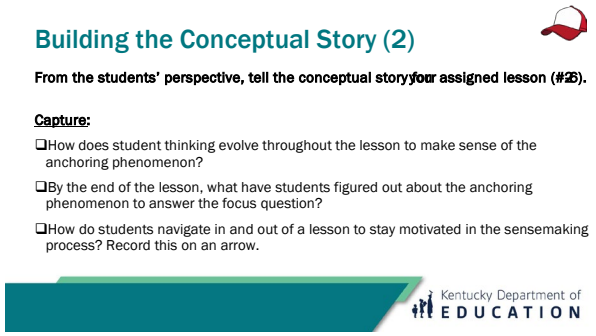
Guidance	Accompanying Slide(s)
Explain: Please locate your participant packet to use throughout this session. In the gray box at the top of the participant packet, let's take a meta moment to respond to tonight's focus question: Why is a storyline centered around an anchoring phenomenon crucial for achieving coherence from the students' perspective? We will take 2 minutes to jot your initial ideas down.	**Slide 105** **Session D Meta Moment** Focus Question Why is a storyline centered around an anchoring phenomenon crucial for achieving coherence from the students' perspective? Kentucky Department of EDUCATION
Explain: "Coherence from the student's perspective happens when a classroom community engages in meaningful investigations in which students are partners in managing the trajectory of their knowledge building. "Storylines support a classroom culture that can be characterized by three norms governing the classroom community's engagement in knowledge building: • We figure out the science ideas. • We figure out where we are going at each step. • We figure out how to put the ideas together over time."	**Slide 106** **Norms to Engage Knowledge Building** "Storylines support a classroom culture that can be characterized by three norms governing the classroom community's engagement in knowledge building: ➢We figure out the science ideas. ➢We figure out where we are going at each step. ➢We figure out how to put the ideas together over time." Coherence from the Students' Perspective: Why the Vision of the Framework for K-12 Science Requires More than Simply "Combining" Three Dimensions of Science Learning p 5 Kentucky Department of EDUCATION
Explain: We will now take time to review the text *Coherence from the Students' Perspective: Why the Vision of the Framework for K-12 Science Requires More than Simply "Combining" Three Dimensions of Science Learning*. To save time, we'll jigsaw this reading. Group 1 will read pages 1-3, focusing on the need for coherence, and Group 2 will read pages 3-5, which discuss the argument for coherence from the students' perspective. You'll have 12 minutes to read and share key points with your expert group. When we return to the main group, please choose one person from each group to share the key points.	**Slide 107** **Coherence from the Students' Perspective** Jigsaw Reading Strategy ➢ Read pages 1-5 of the Coherence from the Students' Perspective: Why the Vision of the Framework for K-12 Science Requires More than Simply "Combining" Three Dimensions of Science Learning in two groups. Group 1: The Need for Coherence pages 1-3 Group 2: The Argument for Coherence from the Students' Perspective pages 3-5. ➢ Share out key ideas in your expert groups. Coherence from the Students' Perspective: Why the Vision of the Framework for K-12 Science Requires More than Simply "Combining" Three Dimensions of Science Learning p 5 Kentucky Department of EDUCATION

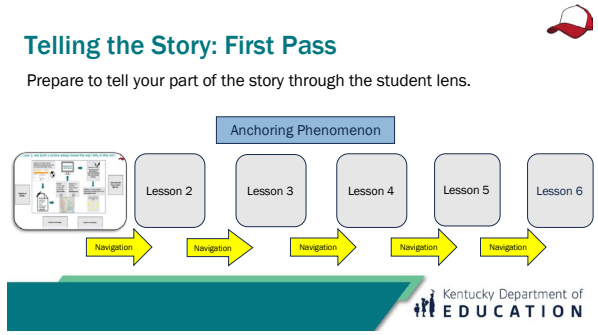
Guidance	Accompanying Slide(s)
Explain: As each group shares out, we will Capture ideas from each group in a visual way on the anchor chart. As you are sharing, identify evidence from the passage that supports the need for coherence. ***Facilitator Note:*** *Allow one person from each group to share their key points from the reading.*	**Slide 108** 
Explain: We're going to take a closer look at Earth's Changing Systems unit from BSCS. This is the unit we explored as adult learners during Session B, where we experienced the launch of an anchoring phenomenon. In our last session, you also engaged with parts of Lesson 2, where students investigated how Earth materials move using stream tables and explored the science concepts related to these observations. These ideas help students answer the unit's central question, or driving question: *What can cause Earth's surface to look the way it does?* Each lesson begins with front matter that highlights key details. On the left, you'll see arrows pointing to the main learning goal, the Science and Engineering Practice (SEP), and the Crosscutting Concepts (CCC) students will engage with during that lesson. On the right, you'll find the lesson's focus question, and at the bottom, the ideal student response to that question. Finally, I want to point out where the science content storyline is located. This section explains how the lesson fits into the broader unit storyline.	**Slide 109** 

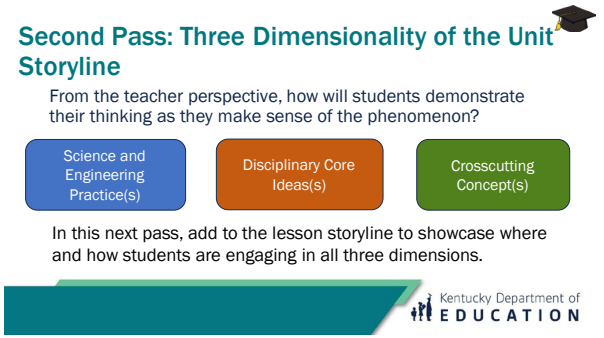
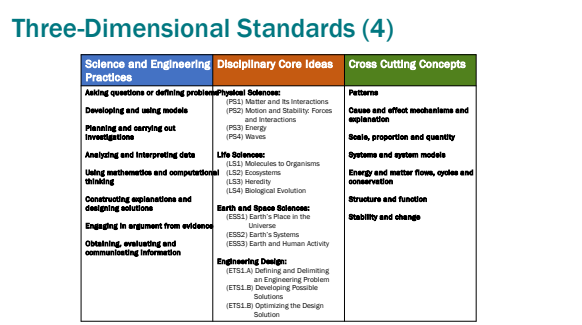
Guidance	Accompanying Slide(s)
Explain: The front matter also includes a general outline of the lesson, providing a brief description of each phase and explaining how the science content storyline develops. At both the beginning and end of each lesson, specific navigation tools are provided to link lessons together and maintain student motivation to understand the anchoring phenomenon. After the general outline, the following pages serve as a teacher guide, featuring: • Phases of the lesson with details on how the science content storyline unfolds. • Teacher talk and guiding questions to support learning. • Examples of possible teacher-student dialogue to model interactions and encourage discussion. This structure helps teachers navigate the lesson phases while maintaining alignment with the broader storyline and learning goals. These pages will assist you as we begin building the storyline of this unit.	**Slide 110** 
Explain: As we build the conceptual story, we will consider two perspectives: student and teacher. During the first pass through each lesson, we will adopt the student perspective, focusing on how students' ideas evolve as they make sense of the phenomenon and exploring what motivates their continued learning. In the second pass, we will take the teacher perspective, examining how each lesson contributes to a cohesive storyline that helps students understand the anchoring phenomenon, while also ensuring alignment with the three-dimensional learning called for in the *Kentucky Academic Standards for Science*.	**Slide 111** 

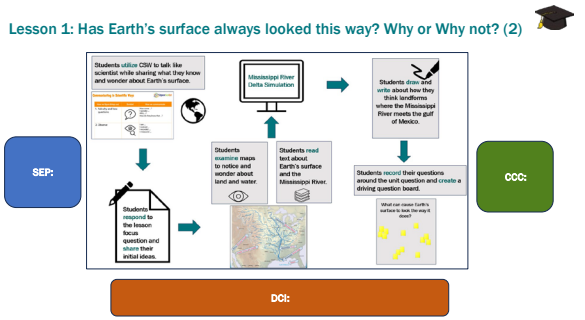
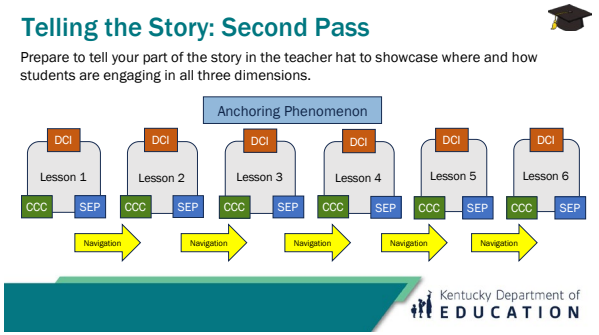
Guidance	Accompanying Slide(s)
Explain: Within each lesson, we will build a cohesive conceptual story that connects the content of Lesson 1 through Lesson 6 in Earth's Changing Surface unit. As we tell the story, we are going to go through the unit in two passes. The first pass will be in the student hat. Note the student hat in the upper right corner of the slide. We will examine the coherence of the story from the student perspective and unpack student sense making. As we explore how each lesson contributes to the overall storyline, we will focus on capturing: • How does student thinking evolve throughout the lesson to make sense of the anchoring phenomenon? • By the end of the lesson, what have students figured out about the anchoring phenomenon to answer the focus question? • How do students navigate in and out of a lesson to stay motivated in the sensemaking process? Record this on an arrow. We will complete lesson 1 together to model the process. ***Facilitator Note:*** *To complete this task, participants will use The Conceptual Story for Different Perspectives Slide Deck. You will need to download a copy of this slide deck and share it will your participants. Project slide 2 of the slide deck and model the process for lesson 1. Based on the needs or number of group members, you may choose to complete Lessons 1 and 2 as a group.*	**Slide 112** 
Explain: Just a reminder, lesson 1 is the symmetrical experience you, as an adult learner, engaged in during Session B, where we introduced the anchoring phenomenon. This time, we'll approach the story in student hat, as if we were fourth-grade students. By centering on students' questions, discoveries, and curiosity about what to explore next, we can more effectively guide them through the unit. Prioritizing the student perspective helps us see how each lesson contributes to the overall picture of the unit as they make sense of the anchoring phenomenon. On the screen you will notice images and texts describing what the students are doing throughout the lesson. Please locate and read Lesson one general outline. Compare the general outline to the images and text on the slide.	**Slide 113** 

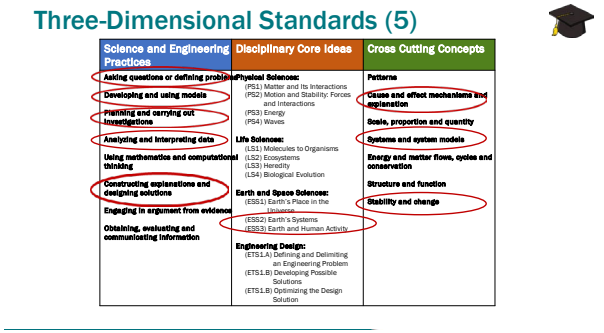
Guidance	Accompanying Slide(s)
[Pause here and allow participants to read the slide and outline found in the front matter of lesson one.] What are students doing? Now, let's dive in as I share the story from a student's point of view. As I share the story, listen and note what students are thinking and how those ideas are revealed throughout the lesson. *Be sure to tell the story as a grade four student.* The teacher introduces the new unit and reminds us to use communicating in scientific ways poster to talk like scientists. I share what I know and wonder about Earth's surface. Some of my classmates had similar ideas and some had ideas I had not thought about. We had lots of wonderings about the Earth's surface. The teacher introduces the focus question, has the earth's surface always looked this way? Why or Why not? I respond to the focus question in my science notebook and a few of my classmates share our initial ideas. The teacher shows us a map of a specific area unique to North America. I take some time to notice and listen to the ideas of my classmates. On the map, we located different land and water features, we noticed water from all over the United States eventually runs into the Mississippi River. The Mississippi River meets the ocean, there is a delta. We also noticed two large mountain ranges on each side of the rivers and streams that flow into the Mississippi River. Then we read about the Mississippi Delta and I underlined words that were important to me or what I wanted to know more about. I learned it takes three months for a drop of water to flow from the start of the river to the gulf, nearly half the land in the United States has creeks and rivers that flow into the Mississippi River and deltas are where the river meets the ocean. The teacher showed us a Mississippi River Delta Simulation. I jotted down things that I noticed and wondered as I saw the land and river was changing over time. The river looked like it changed course over time and with it, new land formed and other disappeared. The lines seemed to get longer at the end of the river and at times smaller lines branched off the thicker white line. This made me have even more questions about why the land grows or disappears. My class gathered our questions and grouped them together in categories on a driving question	

Guidance	Accompanying Slide(s)
board. We had a lot of questions about how new land can form at the end of a river, so we are going to begin investigating to see how Earth's surface changes over time. I can't wait to get the answer to my question. *Ask:* What are students thinking and how is their thinking revealed? What are students still wondering about and wanting to figure out about deltas? ***Facilitator Note:*** *If participants are struggling to identify what students are thinking, provide time for them to read lesson one in its entirety, focusing on the possible students and teacher dialogue.* *As participants are sharing what students are thinking, record those in the gray boxes on the slide. You will also record what the students are still wondering to motivate them to keep learning more about deltas in the yellow arrow.*	
Explain: The Earth's Changing Surface Unit includes six lessons. We have completed lesson one together and now we will divide ourselves into groups to complete lessons two through six. Each group will be responsible for the lesson(s) assigned. You will use the same process we used for lesson one. Remember, you are telling the story in student hat, as if you are a fourth-grade student. Now we will divide into groups and each group will take one lesson. Using The Conceptual Story Slide Deck, locate your lesson(s) assigned. On the screen you will notice images and texts describing what the students are doing throughout the lesson. Read your lesson outline and full lesson to capture what the students are thinking and how their thinking is revealed. Compare the general outline to the images and text on the slide. Record what students are thinking in the gray boxes on the slide and what the students are still wondering to motivate them to keep learning more about deltas in the yellow arrow. You will also notice a link in the top left corner of the slide. This is a place for you to note how students link to the previous lesson. ***Facilitator Note:*** *Download and share the slide deck so that all groups are working in the same file. Each group will complete the slide for their lesson(s). Be sure to monitor the group and check in to make sure the groups are not getting frustrated with the process. The facilitator will need to have a good understanding of all the lessons to be prepared to assist struggling participants. Feel free to remind them to keep their focus centered around the student perspective. If participants are*	**Slide 114** 

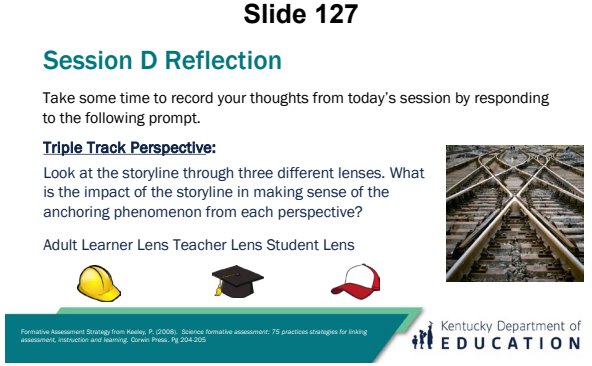
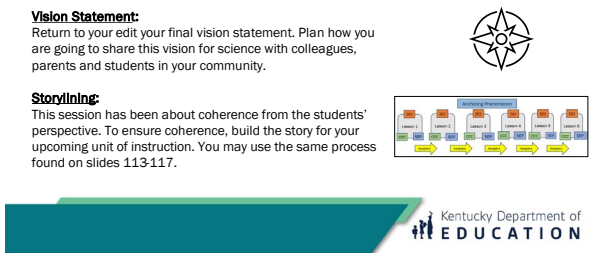
Guidance	Accompanying Slide(s)
struggling to identify what students are thinking, provide time for them to read lesson one in its entirety, focusing on the possible students and teacher dialogue.	
Explain: Now that you have taken a deep dive into the lesson(s) assigned, we will tell the story through the eyes of the students in the student hat. This is our first time communicating in the student hat. This means we are focusing on what the student is trying to figure out around the anchoring phenomenon. You are the student telling the story, so we will use words like "I am figuring out…, I am noticing…, we investigate..." We will begin with lesson 2 and go through lesson 6. ***Facilitator Note:*** *It is important that the participants really focus on putting themselves in the shoes of a fourth-grade student. There is not an answer key to Lessons two through six as this is an authentic opportunity for the participants to share their findings from the lesson outline. There is no right or wrong answer.*	**Slide 115** 
Explain: We will now switch from student hat to teacher hat.	**Slide 116** 

Guidance	Accompanying Slide(s)
Explain: In the teacher perspective, consider how science ideas are revealed and connected by responding to these questions: • What key science ideas about the anchoring phenomenon emerged from the lessons? • How are these science ideas connected across lessons?	**Slide 117** 
Explain: Now, let's take a second pass through the unit storyline from the teacher perspective. As we review the lesson, look for evidence of how students engage in all three dimensions of science. We will add these observations to our lesson storyline to highlight where students interact with each dimension.	**Slide 118** 
Explain: This table provides a summary of each science dimension noting the eight SEPs, seven CCCs and DCIs.	**Slide 119** 

Guidance	Accompanying Slide(s)
Explain: We will complete Lesson 1 together as a group. As we review the lesson, identify the Science and Engineering Practices (SEPs), Crosscutting Concepts (CCCs), and Disciplinary Core Ideas (DCIs) addressed within the lesson. Record this information in the corresponding boxes on the slide. You can also refer to the front matter of the lesson, which highlights how it incorporates all three dimensions of the *KAS for Science.* In Lesson 1, notice that students engage in asking questions through the lens of stability and change. The lesson introduces the concept of maps, helping students understand how maps can locate various land and water features on Earth. Although Earth's surface may appear stable, students begin to recognize that it is continually changing over time. Observing these changes leads students to ask deeper questions about how and why Earth's surface changes. ***Facilitator Note:*** *Provide time for participants to return to their group to complete their corresponding slide that matches their lesson number.*	**Slide 120** 
Explain: Let's keep our teacher hat on as we take a second pass through the storyline. This time, we'll retell the story from the perspective of a teacher, focusing on how students engage with all three dimensions (SEPs, CCCs, and DCIs) within the lesson and across the entire unit. Our goal is to see how these dimensions work together to support student sensemaking and deepen their understanding. ***Facilitator Note:*** *Guide participants to recognize that each lesson integrates all three dimensions (SEPs, CCCs, and DCIs), and these dimensions are also woven together across the entire unit to support coherent learning.*	**Slide 121** 

Guidance	Accompanying Slide(s)
Explain: On the screen you see that throughout this unit students work deeply within all three dimensions. This unit addressed five SEP's, three CCCs and two DCI's.	**Slide 122** 
Explain: The Kentucky Department of Education has developed a Science Instructional Resources Consumer Guide to help decision-makers in Kentucky districts and schools select high-quality science resources that meet the unique needs of students, educators, and families in their communities. The guide outlines KDE's Markers of High-Quality Science Instructional Resources, which are interdependent and must all be represented in a resource for it to be considered high-quality. We will focus on the first two markers: Three-dimensional science and investigating phenomena. We will divide into 2 groups: • **Group 1:** Three-dimensional science • **Group 2:** Investigating phenomena Each group will read their assigned section (pages 5-6) of the guide. Afterward, one person from each group will briefly share an overview of their marker and how the resource we've used in this experience aligns with these KDE markers. You will have 5 minutes to read and discuss in your groups. ***Facilitator Note:*** *You may choose to divide the group into more than 2 groups based on the number of participants.*	**Slide 123** 

Guidance	Accompanying Slide(s)
Explain: The EdReports and NextGenScience teams developed a resource called, *Critical Features of Instructional Materials Design for Today's Science Standards,* in collaboration to provide unified guidance to the field. The quote on the screen from this document sums up our learning from tonight and is clearly represented in the image of the puzzle on the screen. "When learning goals closely match driving phenomena and problems, the entire learning sequence becomes more engaging and authentic to students. No part of the learning seems like an isolated add-on."	**Slide 124**  "When learning goals closely match driving phenomena and problems, the entire learning sequence becomes more engaging and authentic to students. No part of the learning seems like an isolated add-on." Critical Features of Instructional Materials Design for Today's Science Standards (nextgenscience.org) pg 20
Explain: As we have explored today, storylines around the anchoring phenomenon supports the classroom community's engagement in knowledge building, builds cohesion between the learning experiences and the science ideas, connects one science idea to another science idea, encourages engaging and authentic three-dimensional learning where students are working to "figure out" and allows for transferable knowledge.	**Slide 125** **Session D: Shared Understandings** Storylines around the anchoring phenomenon… • **Supports** the classroom community's engagement in knowledge building. • **Builds** cohesion between the learning experiences and the science ideas. • **Connects** one science idea to another science idea. • **Encourages** engaging and authentic three-dimensional learning where students are working to "figure out." • **Allows** for transferable knowledge. Kentucky Department of EDUCATION
Explain: Take a moment and return to your meta moment at the beginning of this session to add to or revise your thinking to the focus question in a different color.	**Slide 126** **After Completing Session D: Meta Moment** **Focus Question** Why is a storyline centered around an anchoring phenomenon crucial for achieving coherence from the students' perspective? Kentucky Department of EDUCATION

Guidance	Accompanying Slide(s)
Explain: Our reflection tonight is what we call the triple track perspective. "A narrow mind cannot look at a subject from various points of view." - George Eliot. This quote emphasizes the importance of considering multiple perspectives to gain a broader understanding of a topic, suggesting that limiting yourself to one viewpoint restricts your knowledge. Look at the storyline through three different perspectives. What is the impact of the storyline in making sense of the anchoring phenomenon from each perspective: the adult learner, teacher and student. ***Facilitator Note:*** *Participants can capture their reflections in the participant packet. However, if you'd like to see their responses, have them write each perspective on a separate sticky note and place the notes in a three-column chart.*	**Slide 127** 
Explain: To continue our implementation journey, we will complete the final Next Steps: Considerations for Implementation. Return to edit your final vision statement with new information gained from this session. This session focused on coherence from the students' perspective. You've been reviewing an upcoming unit you're preparing to teach, and now we want to ensure its coherence from the students' perspective by building the story. You can apply the same process we used in this session to your upcoming unit.	**Slide 128** 

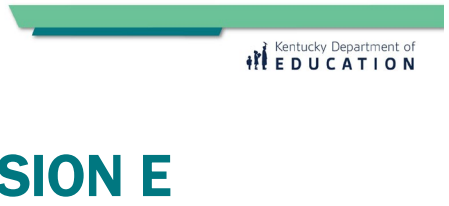
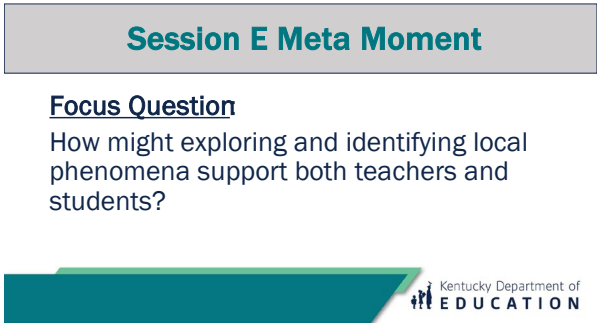
Preparation for Session E

Focus Question: How might exploring and identifying local phenomena support both teachers and students?

Agenda: 1.5 hours

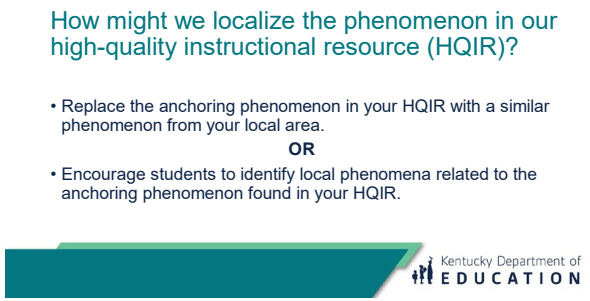
Time	Slides #'s	Outline	Materials Needed
5 minutes	129-130	Introduction • Module Goals • Focus Question	• Agreements Poster • Parking Lot Poster • Participant Packet
20 minutes	131-138	Localizing Phenomena • Classroom Video • Reading • Why Localization	• Grade 4 Classroom Video • STEM Teaching Tool #57 How place-based science education strategies can support equity for students, teacher, and communities
5 minutes	139-141	Kentucky Atlas of Phenomenon	• Kentucky Atlas of Phenomena Website
40 minutes	142-147	Build a phenomenon bundle	• Phone Phenomenon Slide Deck (Virtual) **OR** Phone Phenomenon Note Catcher (In-person) • Appendix G: Crosscutting Concepts • STEM Teaching Tool #41: Prompts for Integrating Crosscutting Concepts
15 minutes	148-150	Reflection and Next Steps	• Share a Phenomena Bundle form
5 minutes	151	Feedback and Certificate	• Kentucky Department of Education Professional Learning Modules Form

Session E: How might exploring and identifying local phenomena support both teachers and students?

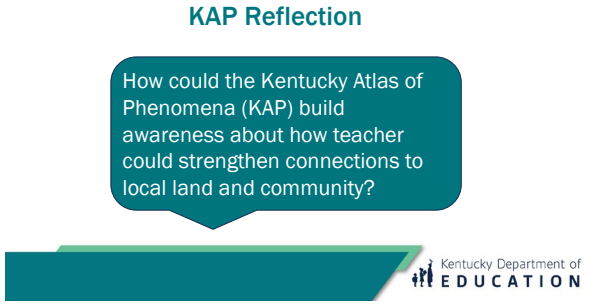
Guidance	Accompanying Slide(s)
Explain: We will now begin session E. ***Facilitator Note:*** *The first 4 slides within this module will be used to begin each session. Slide 4 contains bookmarks directly to the session needed. Ensure that all participants have their participant packet. If they do not, provide them with one.*	**Slide 129** 
Explain: Find your participant packet and let's take a meta moment to write our initial thoughts around our focus question on the screen: How might exploring and identifying local phenomena support both teachers and students? We will take 2 minutes to jot your initial ideas down.	**Slide 130** 

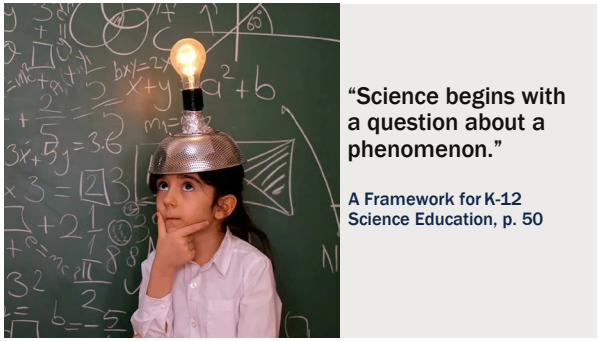
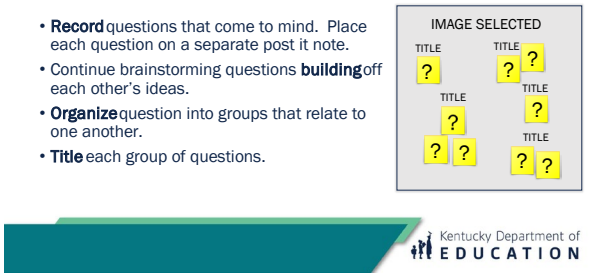
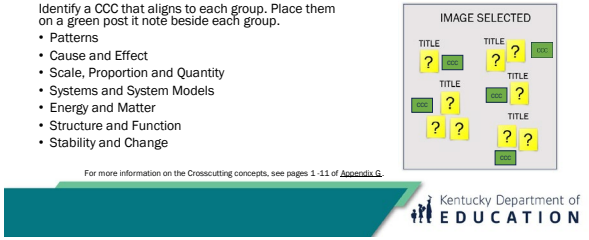
Guidance	Accompanying Slide(s)
Explain: In our first session together, we looked at a publication called Using Phenomena in NGSS-Designed Lessons and Units to help us make the case for phenomenon-based instruction. From that resource it stated, "*Natural phenomena are observable events that occur in the universe and that we can use our science knowledge to explain and predict. The goal of building knowledge in science is to develop general ideas, based on evidence, that can explain and predict phenomena.*" Microsoft Word - Using Phenomena in NGSS 090116.docx (stemteachingtools.org)	**Slide 131** Natural Phenomena *"Natural phenomena are observable events that occur in the universe and that we can use our science knowledge to explain and predict. The goal of building knowledge in science is to develop general ideas, based on evidence, that can explain and predict phenomena."* Using Phenomena in NGSS 
Explain: As we begin to think about local phenomena tonight, what does local and making something local mean to you? Please share your thoughts with the group.	**Slide 132** Local Phenomena What does "local" and "making something local" mean to you?
Explain: Let's take a moment to observe a 4th-grade classroom as students and their teacher discuss local phenomena. While watching, reflect on the following questions: • How are students engaging in discussions about local phenomena? • How is the teacher facilitating and supporting these discussions? There is space in your participant packet to record your thoughts.	**Slide 133** Elementary Students' Idea As you listen to these elementary students talk about local phenomena, consider the following questions… • How are students talking about local phenomena in their classroom? • How is the teacher supporting their discussion around local phenomena?  Grade 4 Classroom Video This video was collected by thePlace-Based Learning for Elementary Science at Scale project, led jointly by BSCS Science Learning and the Maine Mathematics and Science Alliance. Kentucky Department of EDUCATION

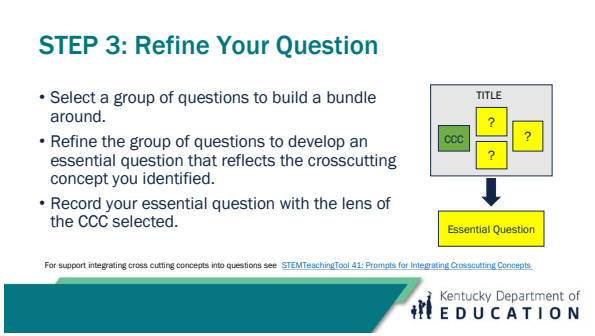
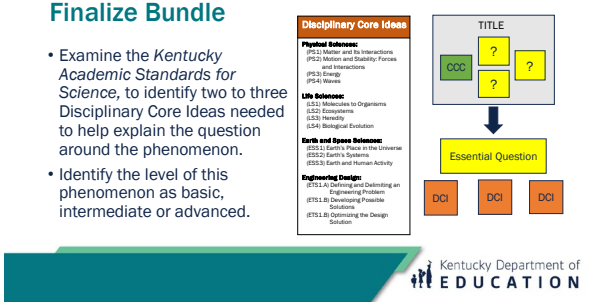
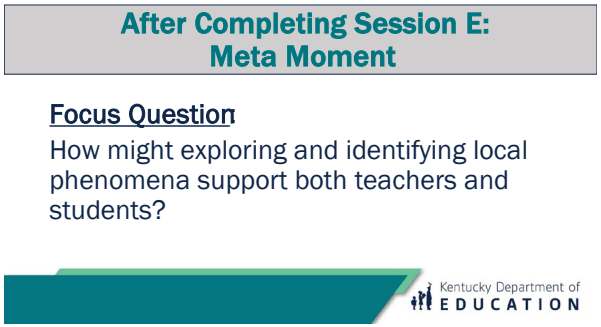
Guidance	Accompanying Slide(s)
Facilitator Note: ***Key ideas to listen for:*** *Students:* • *Share personal experiences related to the phenomenon.* • *Identify familiar places in their community that connect to the anchoring phenomenon.* • *Provide reasoning for their science ideas and refer to prior class discussions.* • *Decide where to place and record ideas based on their significance to the discussion.* *Teacher:* • *Gathers students in a circle with artifacts they can reference during the discussion.* • *Acknowledges students' observations and connections to science concepts.* • *Collects and records students' thoughts, emphasizing their relevance to real-world experiences.* • *Asks students if the phenomenon is significant to them, their community, or the world. The teacher uses a quadrant chart to organize these ideas, recording them on sticky notes and placing them in the appropriate section of the chart.* Grade 4 Classroom Video	
Explain: We will now quickly read STEM Teaching Tool #57. Take a moment to reflect on why it's important for students to study locally relevant phenomena. Identify 1–2 key points you'd like to share. Who would like to start? ***Facilitator Note:*** ***Listen for these key ideas:*** • *Studying locally relevant phenomena can foster agency, responsibility, accountability, and relationships by developing a shared sense of place. Place-based science education is inherently transdisciplinary and cross-cultural, encouraging the scientific communication needed to address current and future challenges while involving stakeholders from diverse backgrounds.* • *Teachers should connect classroom and out-of-classroom science experiences to students' sense of place, cultural perspectives, and community strengths and challenges.*	**Slide 134** **Localizing Phenomena (2)** STEM Teaching Tool #57 looks at how place-based science education strategies can support equity for students, teachers and communities. **As you read consider...** Why should students study locally relevant phenomena?  STEM Teaching Tool #57 Kentucky Department of EDUCATION

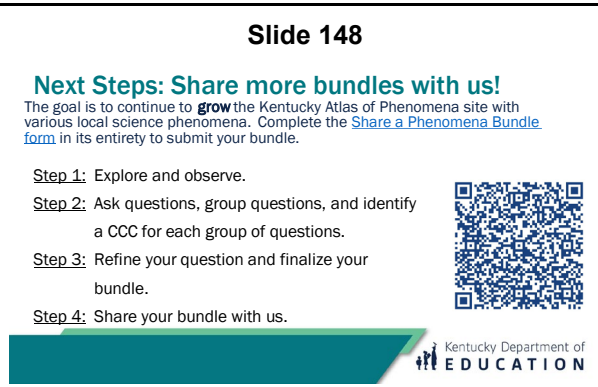
Guidance	Accompanying Slide(s)
Explain: Why Localization? Identifying local phenomena related to the anchoring phenomenon… • **helps** to broaden the scope of what the class is really interested in figuring out. • **encourages** a personal connection to the interests, identities and experiences of students. • **connects** to the goals and needs of the community.	**Slide 135** 
Explain: How can we localize the phenomenon in our high-quality instructional resource (HQIR)? One approach is to replace the anchoring phenomenon in your HQIR with a similar phenomenon from your local area. For example, a teacher in central Kentucky using a high school OpenSciEd unit on ecosystems and interactions reached out to a local nature preserve. The preserve is helping her identify local phenomena that connect directly to the unit, which originally focused on the Serengeti National Park. Alternatively, encourage students to identify local phenomena related to the anchoring phenomenon in your HQIR. For instance, in session B with the *Earth's Changing Surface* unit, the anchoring phenomenon focused on the Mississippi River Delta. Participants connected this phenomenon to local or related phenomena.	**Slide 136** 

Guidance	Accompanying Slide(s)
Explain: As we explore this resource, consider how you might incorporate connections to your local land and community into your HQIR? ***Facilitator Note:*** *This is a rhetorical question intended for reflection and does not require discussion. We will revisit it later.*	**Slide 137** **Using Local Phenomena in Your Area** How might you incorporate connections to your local land and community to your HQIR? Kentucky Department of EDUCATION
Explain: The Kentucky Atlas of Phenomena is a newly developed resource designed to help educators incorporate connections to local land and community into their HQIR. This website supports science teachers across Kentucky by providing insights into natural phenomena common to the state and the disciplinary core ideas needed to explain them. Created by Kentucky educators for Kentucky educators, it is a valuable tool for making science learning more locally relevant.	**Slide 138** **Localizing Phenomenon in Kentucky** The Kentucky Atlas of Phenomena (KAP) was ***developed by Kentucky educators for Kentucky educators***It is a resource to support science teachers throughout Kentucky to develop their own understanding of various natural world phenomena that are common to Kentucky and the disciplinary core ideas (DCIs) needed to explain those phenomena. Kentucky Atlas of Phenomena (KAP) Kentucky Department of EDUCATION
Explain: Let's explore the website together. Take a moment to browse and capture your observations and questions. Each phenomenon bundle includes the following key features: • A picture or video of the phenomenon • A description of the phenomenon • Its location or area in Kentucky • An essential question and other related questions • A crosscutting concept • Two or three disciplinary core ideas • The identified level of understanding What do you notice? What do you wonder? Share your thoughts!	**Slide 139** **Kentucky Atlas of Phenomena (KAP)** ➢ Each contribution to the atlas contains phenomena that has ties directly to Kentucky. ➢ Included in each phenomenon bundle: • Picture or video • Phenomenon description • Location or area in Kentucky • Essential question • Other related questions • Crosscutting concept • 2 or 3 disciplinary core ideas • Level of understanding  Kentucky Department of EDUCATION

Guidance	Accompanying Slide(s)
Explain: Now that you have had the opportunity to explore the website, consider how the Kentucky Atlas of Phenomena could help teachers strengthen connections to their local land and community. How might it build awareness and support the integration of locally relevant phenomena into instruction?	**Slide 140** 
Explain: We are going to start building additional bundles for the website and learn more about the process. In small groups of 2–3 participants, we'll focus on **Step 1: Explore and Observe**. Here's how: • Scroll through images on your phone or social media accounts. Share photos taken in Kentucky with your group and describe what each picture shows. Use the **Phone Phenomenon Note Catcher** or **slide deck** to document your work. • After everyone has shared a few photos, choose one picture that sparks curiosity and wonderings for your group. • Take time to closely observe the selected photo and record your observations in the last column of the note catcher. You'll have 10 minutes to complete this step, after which I'll provide further instructions. Do you have any questions?	**Slide 141** 

Guidance	Accompanying Slide(s)
Explain: Science begins with a question about a phenomenon. So, what questions do you have about the phenomenon in your photo?	**Slide 142** 
Explain: Next, we'll move to **Step 2: Ask Questions**. In your same groups: 1. Record any questions that come to mind, writing each question on a sticky note or in a separate square. 2. Brainstorm together, building on each other's ideas. 3. Organize the questions into related groups and give each group a title based on its category. You'll have 8 minutes to complete this portion. What questions do you have?	**Slide 143** 
Explain: Now, you'll… • identify the **Crosscutting Concept (CCC)** that aligns with each group of questions. • record the crosscutting concepts on a sticky note or in the green squares on the slide and place them next to the group of questions it aligns with. For support with the crosscutting concepts, use **Appendix G** which provides detailed explanations of each CCC. You'll have 5 minutes to complete this task. What questions do you have?	**Slide 144** 

Guidance	Accompanying Slide(s)
Explain: Now, we'll complete Step 3: select, refine, and finalize the bundle. • Choose a group of questions to build your bundle around. • Create an essential question that aligns with the crosscutting concept you identified. • Record your essential question on your phone phenomenon note catcher or in the yellow rectangle on your slide deck. You may find **STEM Teaching Tool 41: Prompts for Integrating Crosscutting Concepts** helpful as you refine your question.	**Slide 145** 
Explain: Once you've refined your question, • review the ***Kentucky Academic Standards for Science*** to identify two to three **Disciplinary Core Ideas** that help explain the question related to the phenomenon. • record the Disciplinary Core Ideas in your phone phenomenon note catcher or in the orange boxes on the slide. • identify the level of the phenomenon (basic, intermediate, or advanced) in the gray box. You will have about **10 minutes** to complete this task. Once finished, you will have created your first **Kentucky phenomenon bundle**, which we will consider for the website.	**Slide 146** 
Explain: As we return to our focus question for the night, take a moment to reflect on your initial thoughts and capture anything you would like to add to your thinking. Would anyone like to share their thoughts with the group? ***Facilitator Note:*** *Allow a few to share.*	**Slide 147** 

Guidance	Accompanying Slide(s)
Explain: As we look ahead, we invite you to share more bundles with us. The goal is to expand the **Kentucky Atlas of Phenomena** with additional local science phenomena. The bundles created during this session can be submitted for consideration as new additions to the ATLAS website using the form on this slide. A QR code on the screen will take you to the submission form to share your bundle with the Kentucky Department of Education science consultants. If you're willing, we encourage you to collaborate with other teachers in your area to create new bundles for potential inclusion in this resource.	**Slide 148** 
Explain: As we wrap up, let's take a moment for a final reflection on our workshop. Imagine you're having a brief conversation with a colleague or school administrator who asks about your recent professional development. In 45-60 seconds, craft an elevator speech that highlights the key insights and skills you gained from our sessions and how they will impact your teaching. Be concise, specific, and enthusiastic. Focus on how these insights will transform your teaching methods and engage your students more effectively. We will take 5 minutes to write your elevator speech. After 5 minutes, we'll offer a chance for a few of you to share. We encourage you to share your elevator speech with your colleagues and administration.	**Slide 149** 
Explain: Thank you so much for completing this module provided by the Kentucky Department of Education (KDE). Please use the link to obtain your certificate of completion.	**Slide 150**