



# Improving Student Engagement in the Science Classroom Using a Driving Question Board (DQB)

## Facilitator's Guide

Winter 2023

## **Module Overview**

The *Improving Student Engagement in the Science Classroom Using a Driving Question Board (DQB)* contains materials to be used in professional learning sessions at the district, school or department level. This module is intended to provide guidance in the successful implementation of a driving question board, supporting the three-dimensional student learning called for in the *Kentucky Academic Standards (KAS) for Science*.

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 the driving question board can support coherence and equity in the science classroom.

## **Goals**

At the completion of *Improving Student Engagement in the Science Classroom Using a Driving Question Board (DQB)* Module, participants will be able to:

- Explain what a driving question board is and understand its purpose in the science classroom.
- Identify ways that the driving question board can build a community of learners.
- Analyze how a cohesive storyline can be built around an anchoring phenomenon.
- Generate ideas for how a driving question board can be used as a formative assessment tool.

## **Module Sessions**

Completing this module in its entirety will take approximately six hours.

**[Session A \(1 hr.\): What is a driving question board and what is its purpose in the science classroom?](#)**

**[Session B \(2 hrs.\): How does the use of a driving question board foster a community of learners in terms of student engagement and motivation?](#)**

**[Session C \(1 hr. 40 min.\): How can a driving question board anchored in a phenomenon be used to build a cohesive storyline?](#)**

**[Session D \(1 hr. 30 min.\): Why should the driving question board be used as a formative assessment tool to foster an equitable learning community?](#)**

## **Materials**

The Kentucky Department of Education (KDE) developed materials that are part of this module:

- *Improving Student Engagement in the Science Classroom Using a Driving Question Board (DQB) Facilitator's Guide*
- [Improving Student Engagement in the Science Classroom Using a Driving Question Board \(DQB\) slide presentation](#)
- [Driving Question Board Participant Packet](#)
- [Driving Question Board Poster](#)

These materials are available at [KYStandards](#).

Materials also needed for this module:

- [Article 1: The Driving Question Board \(NSTA\)](#)
- [Article 2: Driving Question Board \(OpenSciEd\)](#)
- [Storyline Document: Where does our clean water come from and where does it go after we make it dirty?](#)
- [Article: Supporting Three-Dimensional Learning from Students' Questions About Water with a Storyline Unit](#)
- [STEM Teaching Tool #47- How Can I Promote Equitable Sensemaking by Setting Expectations for Multiple Perspectives?](#)
- [STEM Teaching Tool #54- How to Build an Equitable Learning Community in your Science Classroom](#)
- [STEM Teaching Tool #16- Research Brief: The Informal Formative Assessment Cycle as a Model for Teacher Practice](#)

## **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 norms 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 norms 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 norms 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**

The sessions within this module range from one to two hours in length. To reduce time within the session, consider assigning the reading selections and accompanying questions prior to the session for participants to complete. In addition, you can allow participants to finish their “Next Steps – Considerations for Implementation” following the session and have them prepare to share at the following session.

It is important to realize that while you are the facilitator of these work sessions, you may not have all the answers to the questions asked by participants. And that is okay. When this happens, reflect on this quote from Graham Fletcher, *“Every teachable moment,*

*doesn't need to be a teachable moment, in that moment.*" Use these moments to encourage participants to engage in discussion with other participants so that a shared understanding may be developed. If participants ask questions, you are not prepared to answer, offer to seek out answers to those questions and share with the larger group. If the question is pressing and doesn't appear to be addressed in this module, talk to your district team and determine who would be the best person to contact at the KDE. You may also e-mail questions or feedback to [kdescience@education.ky.gov](mailto:kdescience@education.ky.gov).

## **Planning Ahead**

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

## **Preparation**

All sessions have specific materials that are needed for that learning experience and 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 projection capability and access to the module slide presentation
- Copies of handouts needed for each session
- Charts/Posters for the Room
  - Driving Question Board Poster
  - Norms Chart
    - Post a copy of these norms in the room so it can be referred to throughout the sessions. As participants come back for the sessions, revisit these norms and continue to give participants time to adjust these norms 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 that you can modify as the participants work through the sections of the module. The purpose of the Parking Lot is to provide participants with a safe way of asking questions or suggesting ideas. Participants should feel free to add to the Parking Lot throughout the module.

- General Supplies: paper, poster paper, self-sticking notes, colored markers and tape

## **Work Cited Listed**

- Brinza, G., Larson, K., McGreal, A. & Novak, M. (n.d). *Where Does Our Clean Water Come From and Where Does It Go After We Make It Dirty?* NextGenStorylines. [Where Does Our Clean Water Come from and Where Does it Go After We Make it Dirty? — Next Generation Science Storylines \(nextgenstorylines.org\)](https://nextgenstorylines.org).
- Brinza, G., Larson, K., McGreal, A. & Novak, M. (2022, March 1). Supporting Three-Dimensional Learning From Students' Questions About Water With a Storyline Unit. *Science and Children*. (75-79).
- De Leo'n, Vanessa & Allen, Annie. (2015, May). Practice Brief 16: *The Informal Formative Assessment Cycle as a Model for Teacher Practice*. Stem Teaching Tools. <https://stemteachingtools.org/assets/landscapes/STEM-Teaching-Tool-16-Formative-assessment.pdf>.
- Miller, E., Simani, M. & Debarger, A. (2017, March). Practice Brief 47: *How Can I Promote Equitable Sensemaking by Setting Expectations for Multiple Perspectives?*. Stem Teaching Tools. <https://stemteachingtools.org/brief/47>
- Morrison, Deb & Bell, Phillip. (2018, May). Practice Brief 54: *How to Build an Equitable Learning Community in Your Science Classroom*. Stem Teaching Tools. <https://stemteachingtools.org/brief/54>.
- OpenSciEd. (n.d.). *On Demand Teacher Support: Driving Question Board*. OpenSciEd Professional Learning. <https://www.openscienced.org/professional-learning/on-demand-teacher-support/driving-question-board/>.
- Weizman, A., Shwartz, Y. & Fortus, D., (2008, November). The Driving Question Board. *The Science Teacher*, 33-37.

## Preparation for Session A


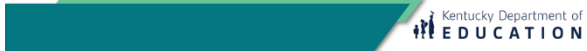
**Focus Question: What is a driving question board and what is its purpose in the science classroom?**




**Agenda: 1 hour**

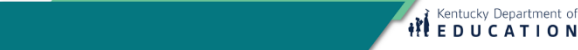



<b>Time</b>	<b>Slides #'s</b>	<b>Outline</b>	<b>Materials Needed</b>
10 minutes	1-5	Introduction <ul style="list-style-type: none"> <li>• Establishing Module Goals</li> <li>• Establishing and Revising Norms</li> <li>• Sessions in this Module</li> <li>• Focus Question</li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">Driving Question Board Participant Packet</a> (Used throughout the session.)</li> <li>• Norms Poster</li> <li>• Parking Lot Poster</li> </ul>
30 minutes	6-7	Driving Question Board <ul style="list-style-type: none"> <li>• Articles to Read</li> <li>• Discussion</li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">Article 1: The Driving Question Board (NSTA)</a></li> <li>• <a href="#">Article 2: Driving Question Board (OpenSciEd)</a></li> <li>• Poster labeled “A DQB is...” on slide 7</li> <li>• Poster labeled “The Purposes of a DQB are...” on slide 7</li> </ul>
10 minutes	8-11	Shared Understanding and Reflection	<ul style="list-style-type: none"> <li>• Poster of “Shared Definition of a Driving Question Board” written out on slide 8</li> </ul>
10 minutes	12	Next Steps - Considerations for Implementation	




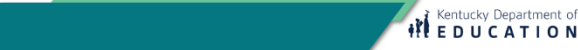
# Session A: What is a driving question board and what is its purpose in the science classroom?





Guidance	Accompanying Slide(s)
<p><i>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.</i></p> <p><b>Explain:</b> This module is intended to build or reinforce your understanding on how to improve student engagement in the science classroom using a driving question board (DQB).</p>	<p style="text-align: center;"><b>Slide 1</b></p> 
<p><b>Explain:</b> Throughout this module, the goals are for you to:</p> <ul style="list-style-type: none"> <li>● Explain what a driving question board is and understand the purpose in the science classroom.</li> <li>● Identify ways that the driving question board can build a community of learners.</li> <li>● Analyze how a cohesive storyline can be built around an anchoring phenomenon.</li> <li>● Generate ideas for how a driving question board can be used as a formative assessment tool.</li> </ul>	<p style="text-align: center;"><b>Slide 2</b></p> <p style="text-align: center;"><b>Module Goals</b></p> <ul style="list-style-type: none"> <li>• Explain what a driving question board is and understand its purpose in the science classroom.</li> <li>• Identify ways that the driving question board can build a community of learners.</li> <li>• Analyze how a cohesive storyline can be built around an anchoring phenomenon.</li> <li>• Generate ideas for how a driving question can be used as a formative assessment tool.</li> </ul> 



Guidance	Accompanying Slide(s)
<p><b>Explain:</b> Group norms can help to create a safe space where participants feel comfortable sharing their ideas and experiences. This slide is a starting place for us to begin considering what norms would work best for us to work together as a group. Take a moment to read and reflect on these norms. Would anyone like to revise, edit or add any norms to the list?</p> <p><b>Facilitator Note:</b> <i>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 norms will be placed in the space in a different color than the original text.</i></p> <p>We will continue to revisit these norms as we work through this module. Please keep in mind that anyone may have suggestions or edits to the norms. Also, as we work together, I realize you may not want to pose every question to the whole group, or we may not have time in the session to get to every question. Therefore, I want us to have a place to address those issues, questions or ideas. We will refer to this place as the parking lot. Feel free to write your questions down and add them to the parking lot during all sessions of the module. We will take moments throughout our time together to address those thoughts and questions as we grow in our learning together of the use of a driving question board in our science classrooms.</p>	<p style="text-align: center;"><b>Slide 3</b></p> <p style="text-align: center;"><b>Group Norms</b></p> <ul style="list-style-type: none"> <li>• Presume positive intentions.</li> <li>• Listen carefully to one another.</li> <li>• Be open to new ideas.</li> <li>• Be open to productive struggle.</li> <li>• Ask questions.</li> <li>• Allow a chance for everyone to participate.</li> </ul>  
<p><b>Explain:</b> This slide shows the content incorporated within this module. At the end of each session, you should have a deeper understanding of the driving question board in order to answer the focus question aligned to the session.</p> <p><b>Facilitator Note:</b> <i>Allow participants time to read though each of the focus questions outlined for the sessions in this module.</i></p>	<p style="text-align: center;"><b>Slide 4</b></p> <p style="text-align: center;"><b>Sessions in this Module</b></p> <p><b>Session A:</b></p> <ul style="list-style-type: none"> <li>• What is a driving question board and what is its purpose in the science classroom?</li> </ul> <p><b>Session B:</b></p> <ul style="list-style-type: none"> <li>• How does the use of a driving question board foster a community of learners in terms of student engagement and motivation?</li> </ul> <p><b>Session C:</b></p> <ul style="list-style-type: none"> <li>• How can a driving question board anchored in a phenomenon be used to build a cohesive storyline?</li> </ul> <p><b>Session D:</b></p> <ul style="list-style-type: none"> <li>• Why should the driving question board be used as a formative assessment tool to foster an equitable learning community?</li> </ul> 

Guidance	Accompanying Slide(s)
<p><b>Explain:</b> As we begin session A, our focus question for this section of the module is: What is a driving question board and what is its purpose in the science classroom?</p> <p><b>Facilitator Note:</b> <i>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.</i></p>	<p style="text-align: center;"><b>Slide 5</b></p> <div style="background-color: #e0e0e0; text-align: center; padding: 5px;"><b>Session A</b></div> <p><u>Focus Question:</u> What is a driving question board and what is its purpose in the science classroom?</p> 
<p><b>Explain:</b> To ground our understanding of a driving question board we will engage in two reading experiences. Open the two resources on the right of the screen and turn to <u>Session A: Notes</u> section of the participant packet. We will read the following two articles to gather information about the driving question board. The first article, "The Driving Question Board" was used with permission from the National Science Teacher Association (NSTA). As you read, jot your responses to the following questions in the Session A Notes section of your participant packet.</p> <p><u>Focus Questions:</u></p> <ol style="list-style-type: none"> <li>1. What is the driving question board?</li> <li>2. What is the purpose of the driving question board in the science classroom?</li> <li>3. How does the driving question board support equitable science classrooms?</li> <li>4. What resonates with you in how this can be impactful in the classroom?</li> </ol> <p><i>Advance the slide for discussion.</i></p> <p><b>Facilitator Note:</b> <u>Possible Set-ups for this exploration:</u> <i>Although we recommend participants read both articles to develop a deeper understanding of the driving question board, due to time constraints, facilitators may choose to jigsaw the reading of the articles. Allow ample time for groups to discuss the articles they read. As the groups are sharing the findings from their articles, they should add to their responses of the focus questions.</i></p>	<p style="text-align: center;"><b>Slide 6</b></p> <p style="text-align: center;"><b>Articles to Read</b></p> <p>Read the following two articles about a driving question board. As you read, jot your responses to the following questions in the <u>Session A: Notes</u> section of your participant packet.</p> <p><u>Focus Questions:</u></p> <ol style="list-style-type: none"> <li>1. What is the driving question board?</li> <li>2. What is the purpose of the driving question board in the science classroom?</li> <li>3. How does the driving question board support equitable science classrooms?</li> <li>4. What resonates with you in how this can be impactful in the classroom?</li> </ol> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p><b>Article 1:</b> The Driving Question Board <small>(Based with permission from National Science Teaching Association (NSTA))</small></p> </div> <div style="text-align: center;">  <p><b>Article 2:</b> Driving Question Board (OpenSciEd)</p> </div> </div> 

Guidance	Accompanying Slide(s)
<p><b>Explain:</b> We are going to share our thoughts on the focus questions in small groups. As you discuss, add on to one another's thoughts or ask clarifying questions. Point out evidence from the articles to support your thinking.</p> <p><b>Facilitator Note:</b> <i>Provide time for some discussion in small groups. As participants share in small groups encourage participants to add on to one another's thinking and clarify statements that are made. As the discussion develops, anchor thoughts back to these documents and allow participants to point out what parts of the article that support their thinking. Here are some things to listen for while participants are engaged in discussing the focus questions.</i></p> <ol style="list-style-type: none"> <li>1. <u>What is the driving question board?</u> <ol style="list-style-type: none"> <li>a. An instructional strategy used to facilitate students learning focused around a guided question anchored to an engaging phenomenon.</li> <li>b. Collective questions generated by students and the teacher at the start of the learning, grouped together by categories represented in a visible space in the room for all students to see.</li> <li>c. A place where connections are made between the investigations and the driving question.</li> <li>d. Allows for review of questions that have already been answered or additional student questions that may arise later on in the learning.</li> <li>e. A collection of relevant artifacts placed beside questions that are being answered throughout the learning experience.</li> </ol> </li> <li>2. <u>What is the purpose of the driving question board in the science classroom?</u> <ol style="list-style-type: none"> <li>a. Provides explicit connections between the various activities and the context set by the driving question.</li> <li>b. Organizes learning and serves as a road map that guides the student sensemaking as they work to figure out the anchoring phenomenon.</li> <li>c. Scaffolds the science and engineering practice of asking questions.</li> <li>d. Gives ownership to the community of learners.</li> <li>e. Provides a visual reminder and organizer for the students and teacher.</li> </ol> </li> </ol>	<p style="text-align: center;"><b>Slide 7</b></p> <p style="text-align: center;"><b>Stop and Discuss</b></p> <p>Discuss each question with a colleague(s):</p> <ol style="list-style-type: none"> <li>1. What is the driving question board?</li> <li>2. What is the purpose of the driving question board in the science classroom?</li> <li>3. How does the driving question board support equitable science classrooms?</li> <li>4. What resonates with you in how this can be impactful in the classroom?</li> </ol> <div style="display: flex; align-items: center;"> <div style="background-color: #00728f; color: white; padding: 5px; margin-right: 10px;">       Group Synthesis     </div> <ul style="list-style-type: none"> <li>➤ What common themes arose in your discussion?</li> <li>➤ What wonderings does your group have?</li> </ul> </div> <div style="text-align: right; margin-top: 10px;">  </div>

Guidance	Accompanying Slide(s)
<p>f. <i>Allows students to draw from their prior knowledge to make connections to newly learned concepts.</i></p> <p>3. <u><i>How does the driving question board support equitable science classrooms?</i></u></p> <ol style="list-style-type: none"> <li><i>Engages all students in a common experience.</i></li> <li><i>Questions are generated by all students and categorized together.</i></li> <li><i>Values the diverse ideas and the backgrounds of all students.</i></li> <li><i>Available to all students through the learning experience.</i></li> </ol> <p>4. <u><i>What resonates with you in how this can be impactful in the classroom?</i></u>  <i>The responses to this question will depend upon the participants.</i></p> <p><b>Explain:</b>            As we come back together as a group, we are going to synthesize our group’s thinking. (Advance the slide.) What common themes arose in your discussion? What wonders does your group have?</p> <p><b>Facilitator Note:</b>  <i>To make the thinking visible in the room, you might consider adding the group’s thinking to a poster. One poster could be “A DQB is…” and the other could be “The purposes of the DQB are…”.</i></p>	
<p><b>Explain:</b> Please take a moment to read the shared definition for your consideration. How does this definition align with what you discovered in your reading and discussion?</p> <p><b>Facilitator Note:</b>  <i>The facilitator may choose to read it aloud or have the participants read it silently to themselves. Try to make connections to what has surfaced in their discussion. It may be beneficial for your group to revise this definition if needed. The participants need to take ownership of the definition, so it is important they feel comfortable with the definition moving forward. If revisions are made, consider having the participants use their text as evidence for why it should be revised. Make revisions in a different color. Consider transferring the working definition onto a poster to keep in the space as you work through the other sessions.</i></p>	<p style="text-align: center;"><b>Slide 8</b></p> <p style="text-align: center;"><b>Shared Definition for Consideration</b></p> <p>The driving question board is a <u>jointly constructed visual representation</u> of a class’s <u>shared mission of learning</u>, a place for <u>ALL</u> students to record their questions about the anchoring phenomenon or problem <u>used to drive the classroom instruction</u>.</p> 

Guidance	Accompanying Slide(s)
<p><b>Explain:</b> Share that, in summary, the purpose of the driving question board...</p> <p><b>Facilitator Note:</b> <i>Read aloud or allow participants to read as you advance through these shared understandings the group should have on the purpose of the driving question board. Again, try to make connections with what the group shared in the discussion of the purpose for the DQB.</i></p>	<p style="text-align: center;"><b>Slide 9</b></p> <p style="text-align: center;"><b>Session A Shared Understandings</b></p> <p>The purpose of the driving question board is to:</p> <ul style="list-style-type: none"> <li>➤ Build a classroom culture of appreciation and values diverse ideas.</li> <li>➤ Provide students with a sense of ownership and shifts the focus of learning from an individual experience to a collective one that moves thinking forward.</li> <li>➤ Capture students' wonderings about a phenomenon that is categorized to lead investigations to help students figure out the phenomenon.</li> <li>➤ Serve as a "road map" for student learning - shows where students have been, what they have learned and done along the way, and where they will be going since it is revisited throughout the learning.</li> </ul>  
<p><b>Explain:</b> As we are completing session A, you should be able to answer the following questions:</p> <ul style="list-style-type: none"> <li>• What is a driving question board?</li> <li>• What is its purpose in the science classroom?</li> </ul> <p><b>Facilitator Note:</b> <i>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 on time. Keep note of the questions that are not addressed in this session to be addressed later in another session.</i></p>	<p style="text-align: center;"><b>Slide 10</b></p> <p style="text-align: center;"><b>After completing session A, you should be able to answer the following questions.</b></p> <ul style="list-style-type: none"> <li>✓ What is a driving question board?</li> <li>✓ What is its purpose in the science classroom?</li> </ul>  

Guidance	Accompanying Slide(s)
<p><b>Explain:</b> Please take a moment to reflect on the learning experience from today’s session and record your thoughts in <u>Session A: Overall Reflection</u>.</p> <p><b>Facilitator’s Note:</b> <i>You may choose to have the participants write their questions on a post it and place in the center of their table or walk around to make note of their questions to address in the next session.</i></p>	<p style="text-align: center;"><b>Slide 11</b></p> <p style="text-align: center;"><b>Session A Overall Reflection</b></p> <p>Take some time to record your responses to the following prompts in <u>Session A: Overall Reflection</u> of the participant packet.</p> <ul style="list-style-type: none"> <li>• What are your takeaways from this session?</li> <li>• What questions might you have as a result of your learning from this session?</li> </ul> 
<p><b>Explain:</b> Steve Maraboli says, “Take action! An inch of movement will bring you closer to your goals than a mile of intention.” Consider what small step you might take as a result of learning from this session that can lead you to reaching your goal. Encourage participants to Record in <u>Session 1: Next Steps – Considerations for Implementation</u>, how they envision incorporating the driving question board into their classroom routine.</p> <p><b>Facilitator Note:</b> <i>Allow the participants time to think about how they may be able to incorporate what they learned today into their classroom routine. Some may choose to share, and some may not. To ensure that all feel safe and supported in the space, allow them to decide if they want to discuss it or not. Some may feel more comfortable sharing with a thinking partner first before considering sharing with the entire group. Encourage participants as they share to add on to one another’s thinking or ask clarifying questions. You may encourage them to use sentence stems such as:</i></p> <ul style="list-style-type: none"> <li>• <i>I want to add on to...</i></li> <li>• <i>I was also considering...</i></li> <li>• <i>Can you clarify...</i></li> <li>• <i>How are you considering...</i></li> <li>• <i>When might you...</i></li> </ul>	<p style="text-align: center;"><b>Slide 12</b></p> <p style="text-align: center;"><b>Session A Next Steps - Considerations for Implementation</b></p> <p>Record in <u>Session A: Next Steps- Considerations for Implementation</u> in the participant packet.</p> <p style="text-align: center;">How do you envision incorporating the driving question board into your classroom routine?</p> 

## Preparation for Session B

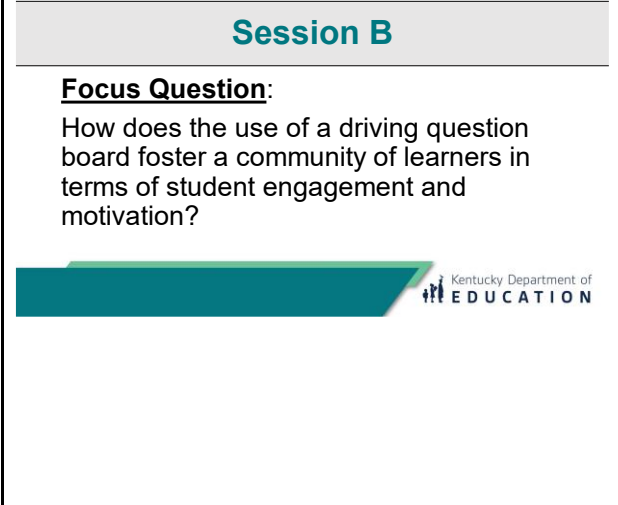
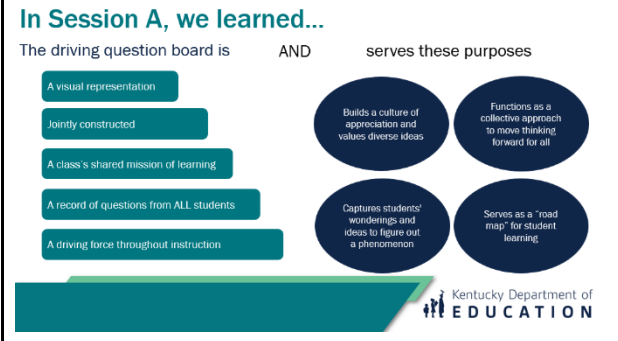
**Focus Question: How does the use of a driving question board impact the classroom experience in terms of student engagement and motivation for learning?**






**Agenda: 2 hours**






<b>Time</b>	<b>Slides #'s</b>	<b>Outline</b>	<b>Materials Needed</b>
15 minutes	13-14	Introduction <ul style="list-style-type: none"> <li>• Focus Question</li> <li>• Revising Norms</li> <li>• Revisit Parking Log</li> <li>• Revisit What Was Learned</li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">Driving Question Board Participant Packet</a> (Used throughout the session.)</li> <li>• Norms Poster</li> <li>• Parking Lot Poster</li> </ul>
1 hour 15 minutes	15-29	Content Deepening: Adult Learning Experience	<ul style="list-style-type: none"> <li>• Printed image of the pile of dirty dishes from slide 17: One per table</li> <li>• Poster of Driving Question on slide 21</li> <li>• Paper for the participants initial models on slide 22</li> <li>• Poster of the t-chart on slide 25</li> <li>• Poster paper for the consensus model on slide 26</li> <li>• Driving Question Board on slide 27</li> <li>• Driving Question Board Poster on slide 29</li> </ul>
15 minutes	30-32	Shared Understanding and Reflection	
15 minutes	33	Next Steps - Considerations for Implementation	










## Session B: How does the use of a driving question board impact the classroom experience in terms of student engagement and motivation for learning?







Guidance	Accompanying Slide(s)
<p><b>Explain:</b> We will begin session B of <u>Improving Student Engagement in the Science Classroom Using a Driving Question Board (DQB)</u>. Our focus question for this section of the module is: How does the use of a driving question board foster a community of learners in terms of student engagement and motivation?</p> <p><b>Facilitator Note:</b> <i>Utilizes slides 1-4 to begin this session. Check to make sure participants have their copy of the participant packet as a digital file or printed. They will continue recording their thoughts throughout this session. 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 a DQB. Review the norms the group agreed upon in Session A. Allow participants to reflect and offer any changes they want to propose to the group for them to consider. Make those adjustments the group decided on in a visual way where the norms are posted. Each Session is bookmarked on slide 4 and will take you directly to the session you selected.</i></p>	<p style="text-align: center;"><b>Slide 13</b></p> <div style="background-color: #e0e0e0; text-align: center; padding: 5px;"><b>Session B</b></div> <p><b>Focus Question:</b> How does the use of a driving question board foster a community of learners in terms of student engagement and motivation?</p> 
<p><b>Explain:</b> In the last session we learned what the driving question board is and the purposes it serves in the classroom. Take a moment to review what the driving question board is and the purpose it serves in the science classroom.</p> <p><b>Facilitator Note:</b> <i>To link this learning with the previous learning, consider allowing the participants to recall what they learned about the previous session, then reveal the contents of this slide.</i></p>	<p style="text-align: center;"><b>Slide 14</b></p> <p><b>In Session A, we learned...</b></p> <p>The driving question board is AND serves these purposes</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <ul style="list-style-type: none"> <li>A visual representation</li> <li>Jointly constructed</li> <li>A class's shared mission of learning</li> <li>A record of questions from ALL students</li> <li>A driving force throughout instruction</li> </ul> </div> <div style="width: 45%;"> <ul style="list-style-type: none"> <li>Builds a culture of appreciation and values diverse ideas</li> <li>Functions as a collective approach to move thinking forward for all</li> <li>Captures students' wonderings and ideas to figure out a phenomenon</li> <li>Serves as a "road map" for student learning</li> </ul> </div> </div> 




Guidance	Accompanying Slide(s)
<p><b>Explain:</b> During this learning session, you will be experiencing the learning from both a teacher and an adult learner perspective. When in “teacher hat,” we will grow our understanding of the phenomenon and take time to analyze the <i>Kentucky Academic Standards for Science</i>. Most importantly, we will reflect on our teaching and consider new shifts in our teaching practice.</p> <p>As we shift our focus from the “teacher hat” to the “adult learner hat,” it is very important we do not speak as one of our students, but rather be engaged in the learning for ourselves. This will provide a safe space for all participants to engage in the phenomenon, ask questions and deepen their own understanding of the science. In the “adult learner hat” it is very important that the participant <b>stays</b> in the learner hat. Staying in the “adult learner hat” will honor the investigative process for the adult learning community as it is very likely that the adults in the room have varying past opportunities to make sense of the science content they are learning. There will be an opportunity in the session to visit those thoughts of what the students may think and say and engage in conversation around that once we shift back to the “teacher hat.” As we navigate between these two hats the corresponding symbol can be found in the upper right-hand corner of the slide.</p>	<p style="text-align: center;"><b>Slide 15</b></p> <p style="text-align: center;"><b>Teacher Hat Versus Adult Learner Hat (1)</b></p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p><b>Teacher Hat</b></p>  <p>While in <b>teacher hat</b>, we will:</p> <ul style="list-style-type: none"> <li>• grow our understanding of phenomena.</li> <li>• analyze <i>Kentucky Academic Standards for Science</i>.</li> <li>• reflect on our teaching and consider new shifts in our teaching practice.</li> </ul> </div> <div style="text-align: center;"> <p><b>Adult Learner Hat</b></p>  <p>While in <b>adult learner hat</b>, we will:</p> <ul style="list-style-type: none"> <li>• build and deepen our own science content knowledge.</li> <li>• engage in a learning opportunity that is symmetrical to the student experience.</li> </ul> </div> </div> 
<p><b>Explain:</b> As we begin session B, we first want to deepen our own content knowledge – to learn some science together. We’ll do that through a common learning experience from. open educational resource, called NextGen Storylines. 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 usually teach students about water, earth systems and structures and properties of matter. Collect your responses and thoughts to these questions by turning to <u><a href="#">Session B: Notes- Teacher Hat</a></u> 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.</p> <p><b>Facilitator Note:</b> <i>Provide time for the participants to think and write their ideas in session B notes. This open education resource can be found here:</i> <u><a href="#">Where Does Our Clean Water Come from and Where Does it Go After We Make it Dirty? — Next Generation Science Storylines (nextgenstorylines.org)</a></u></p>	<p style="text-align: center;"><b>Slide 16</b></p> <p style="text-align: center;"><b>Content Deepening</b></p>  <p>Respond to the following prompts in <u><a href="#">Session B: Notes- Teacher Hat</a></u> in your participant packet.</p> <p>How do you usually teach water, earth systems and structure and properties of matter?</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> What do you want students to learn?</li> <li><input type="checkbox"/> How might you sequence the learning experiences?</li> <li><input type="checkbox"/> What ideas do students struggle with?</li> </ul> 




Guidance	Accompanying Slide(s)
<p><b>Explain:</b> In this section, you will note the “adult learner hat” symbol. As we reflected about our students’ thoughts and what they may have struggled with, let’s take some time to allow ourselves to engage in the activity as adult learners not as one of your students. To make the most of this time, set aside your “teacher hat” with your thoughts or questions about how you’d do this in your classroom with your students. Give yourself the time and opportunity to experience this as a science learner. When you find yourself within these expected wonderings about your students, capture them on a sticky note.</p>	<p style="text-align: center;"><b>Slide 17</b></p> <p style="text-align: center;"><b>Adult Learner Hat (1)</b></p> <p>While in <b>adult learner hat</b>, we will:</p> <ul style="list-style-type: none"> <li>• Build and deepen our own science content knowledge; and</li> <li>• Engage in a learning opportunity that is symmetrical to the student experience.</li> </ul>  
<p><b>Explain:</b> In the right-hand corner of this slide, you will note the “adult learner hat” symbol.</p> <p><i>Tell participants a story about the messes you have in your kitchen (related to cups/plates/buckets that have dirty stuff in or on them and need to be cleaned.)</i></p> <p><u>Here is an example (feel free to add to the story to engage participants):</u> “My kitchen is a mess. I always have dirty dishes and cups lying around after eating a meal. I want to clean this mess up. What do you notice about them? What would you notice about them if they were clean? What can you do to get them clean? I also have a couple of buckets of some kind of dirty water that looks like someone left them here.” Use <u>Session B: Adult Learner Notebook</u> in the participant packet to record your thinking.</p> <p><b>Facilitator Note:</b> <i>Be sure to refer to this common experience as an “adult learner hat” not student hat. The focus for the participants is to engage in the activities as adult science learners not as one of their students. As participants engage in the learning experience keep in mind ways you may facilitate this to keep their thinking within this moment of the module. You may consider using some of the following:</i></p> <ul style="list-style-type: none"> <li>• <i>Acknowledging that later within the session there will be a moment to return to their</i></li> </ul>	<p style="text-align: center;"><b>Slide 18</b></p> <p style="text-align: center;"><b>Anchoring Phenomenon</b></p>  <p>Think about the pile of dirty dishes sitting in your kitchen after you have finished eating a meal. Use the <u>Session B: Adult Learner Notebook</u> in the participant packet to record your thinking.</p> <ul style="list-style-type: none"> <li>• What do you notice and wonder from the picture?</li> <li>• What can you do to get the items clean?</li> <li>• What would happen to the dirty stuff on/in the items?</li> </ul>  

Guidance	Accompanying Slide(s)
<p><i>teacher questions and invite them to remain in the “adult learner hat” for now.</i></p> <ul style="list-style-type: none"> <li>• <i>Turn their “teacher hat” question into an “adult learner hat” question.</i></li> <li>• <i>Acknowledge this is something you would do with students and take the moment to show the importance of doing it within this learning experience as adults in the “adult learner hat.”</i></li> </ul>	
<p><b>Explain:</b> We will divide into small groups to begin developing a plan to get the dishes clean. Use the “Developing a Plan” section of the <u>Session B: Adult Learner Notebook</u> as a place to record your plan.</p> <p><i>Divide groups into three to four members. As groups are working on their plan to get the dishes clean, listen for participant ideas that refer to things like:</i></p> <p><i>There is stuff stuck to it.</i></p> <ul style="list-style-type: none"> <li>• <i>It smells bad.</i></li> <li>• <i>One spot is a different color from the rest.</i></li> <li>• <i>We should wash it off in the sink.</i></li> <li>• <i>We could wipe it off with a sponge and soap.</i></li> <li>• <i>We could dump it in the garbage can.</i></li> </ul> <p><i>Have each group share their plans with the whole group. Discuss similarities and differences between cleaning methods.</i></p> <p><i>Listen for responses such as:</i></p> <ul style="list-style-type: none"> <li>• <u><i>Possible Similarities:</i></u> <ul style="list-style-type: none"> <li>• <i>Everyone used water.</i></li> <li>• <i>Everyone’s dirty stuff went down a drain (toilet or sink).</i></li> <li>• <i>Clear water came out of a specific location (e.g., the faucet or the top of the toilet).</i></li> </ul> </li> <li>• <u><i>Possible Differences:</i></u> <ul style="list-style-type: none"> <li>• <i>Some used soap/some didn’t.</i></li> </ul> </li> </ul>	<p style="text-align: center;"><b>Slide 19</b></p> <p style="text-align: center;"><b>Developing a Plan</b> </p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>In a group develop a plan to get the dishes clean.</p> </div> <div style="text-align: center;">  <p>Share out each in whole group. Look for similarities and differences within plans.</p> </div> </div> <div style="text-align: right; margin-top: 20px;">  </div>

Guidance	Accompanying Slide(s)
<ul style="list-style-type: none"> <li>• <i>Some of the solid stuff went into the toilet first, and some went directly into the sink.</i></li> <li>• <i>Some of the water went down the sink drain, while other water went down the toilet.</i></li> <li>• <i>Some of the water that was used came from a faucet.</i></li> </ul>	
<p><b>Explain:</b>          Besides cleaning dirty dishes, when have you done something similar and/or seen other examples of using clean water and making the water dirty? Take a moment to record your thinking in <u>Session B: Adult Learner Notebook</u>. We will share these out.</p> <p><i>Listen for responses such as:</i></p> <ul style="list-style-type: none"> <li>• <i>Washing dishes, doing laundry, taking a shower, going to the bathroom, brushing teeth, mopping the floor</i></li> </ul> <p>Many of these examples seem to come from your experiences using water and making dirty water inside your homes. I wonder if we can come up with other ways people use clean water or make water dirty anywhere outside of your home or school. Let's brainstorm those. Take a moment to add some of those experiences to your <u>Session B: Adult Learner Notebook</u>.</p> <p><i>Give participants a couple minutes to write their ideas down and then ask them to share their responses. Add what they share to the poster of related phenomena. Make a list of these, too.</i></p> <p><i>Listen for responses such as:</i></p> <ul style="list-style-type: none"> <li>• <i>Fire hydrant</i></li> <li>• <i>Water recreation (swimming pools, water/splash parks)</i></li> <li>• <i>Washing the car</i></li> <li>• <i>Sprinklers/watering plants</i></li> <li>• <i>Street cleaners (spraying water)</i></li> <li>• <i>Pollution (litter, outfall pipes, vehicles, oil, farms, etc.)</i></li> </ul> <p><i>A key element of the anchoring phenomenon routine is letting participants share their experiences with related phenomena. By doing this, participants can connect their diverse experiences with a shared phenomenon that is the focus of the unit. Remember that phenomena are things that</i></p>	<p style="text-align: center;"><b>Slide 20</b></p> <div style="text-align: right;"></div> <p style="text-align: center;"><b>Identify Related Phenomena</b></p> <p>We decided getting clean water and getting rid of it when it was dirty was important for us when cleaning our dishes. Record your thoughts in <u>Session B: Adult Learner Notebook</u>.</p> <p style="text-align: center;"><u>Stop and Think</u></p> <p style="text-align: center;">Where else might we use clean water and make it dirty?</p>  <div style="text-align: right;"></div>

Guidance	Accompanying Slide(s)
<p><i>happen in the world that we have observed and can use our science understanding to explain.</i></p>	
<p><b>Explain:</b> The driving question of this unit is: “Where does our clean water come from, and where does it go after we make it dirty?”</p> <p><b>Facilitator Note:</b> <i>Remind participants of the driving question as they go through this learning experience. Post the driving question in the room.</i></p>	<p style="text-align: center;"><b>Slide 21</b></p> <p style="text-align: center;"><b>Driving Question</b> </p> <p style="text-align: center;">Where does our clean water come from and where does it go after we make it dirty?</p>  
<p><b>Explain:</b> We are going to develop an initial model of where we think the clean water comes from and where the dirty water goes. Use the large chart paper provided to draw your initial model. Remember that modeling is not just a drawing or an art activity. When engaging in modeling, the focus should be on explaining the how and why of a phenomenon, not just the what. For this model, you will need to focus on explaining where you think the water goes after the drain and where it comes from before the faucet. When you are finished hang them on the wall.</p> <p><b>Facilitator Note:</b> <i>Consider giving groups a large chart paper, or a digital whiteboard if you are online for each group to draw their initial model on. As the facilitator, you can use these to conduct a pre-assessment of the adult learner ideas. In order to complete the gallery walk, the participants will need to post their initial models on the wall.</i></p>	<p style="text-align: center;"><b>Slide 22</b></p> <p style="text-align: center;"><b>Initial Model</b> </p> <p style="text-align: center;">Create an <b>initial model</b> on a separate piece of paper showing where you think the clean water comes from and where the water goes after we make it dirty.</p> <p><u>Things to keep in mind:</u></p> <ul style="list-style-type: none"> <li>• When engaging in modeling, the key should be on explaining the “how” (and why) of a phenomenon.</li> <li>• Focus on explaining where the water comes from before the faucet and where you think water goes to after the drain.</li> </ul>  

Guidance	Accompanying Slide(s)
<p><b>Explain:</b>            We will now take a gallery walk to view the other models that were created. As we explore other models, note your responses to the following questions in their <u>Session B: Adult Learner Notebook</u>.</p> <ul style="list-style-type: none"> <li>• What was similar and different in the ideas that you saw represented in your model compared to the other models?</li> <li>• What did you notice was similar and different across all the models?</li> </ul> <p><u>Once participants have had a chance to complete the gallery walk and had some small group discussion if needed, come back for a whole group discussion. Use some of the following prompts:</u></p> <ul style="list-style-type: none"> <li>• <i>What was similar in the ideas that you saw represented in the first model and the second model?</i></li> <li>• <i>What ideas were different?</i></li> <li>• <i>What did you notice was similar across all the models?</i></li> <li>• <i>What did you notice was different across all the models?</i></li> </ul> <p><u>Listen for responses such as:</u></p> <ul style="list-style-type: none"> <li>• <i>Some (or all) had pipes.</i></li> <li>• <i>Some showed water coming into or going out of the house.</i></li> <li>• <i>Some showed water coming from or going to a place far away (a large body of surface water).</i></li> <li>• <i>Some showed water towers.</i></li> <li>• <i>Some showed different pipes for water coming in versus going out, while some showed the same pipes.</i></li> <li>• <i>Some showed lots of pipes in the house.</i></li> <li>• <i>Some showed a toilet, while others showed a sink.</i></li> </ul> <p><b>Facilitator Note:</b>            You may want to look for a few different models and ask those participants if they would be willing to share their thinking.</p>	<p style="text-align: center;"><b>Slide 23</b></p> <p style="text-align: center;"><b>Comparing Models</b> </p> <p>Use a gallery walk to view the other models that were created. As you explore other models, note the following in the <u>Session B: Adult Learner Notebook</u> in your participant packet.</p> <ul style="list-style-type: none"> <li>• What was <b>similar</b> and <b>different</b> in the ideas that you saw represented in your model compared to the other models?</li> <li>• What did you notice was <b>similar</b> and <b>different</b> across all the models?</li> </ul>  

Guidance	Accompanying Slide(s)
<p><b>Explain:</b>            Invite participants to join in a “Scientists Circle” to have a consensus building discussion. Look across the models, what ideas did most of you agree on and what ideas were different across the models?</p> <p><i>For any idea that a group nominates was the same in the group, ask the other participants if ALL people in all groups had included this in their model.</i></p> <p><u>These are the type of responses to listen for, related to what is similar.</u></p> <ul style="list-style-type: none"> <li>• <i>We all agree that clean water is coming into the faucet from a pipe that gets it from somewhere.</i></li> <li>• <i>We all agree that dirty water is going down the drain into a pipe that goes somewhere.</i></li> </ul> <p><u>These are the type of responses to listen for, related to what is different.</u></p> <ul style="list-style-type: none"> <li>• <i>We are not sure how many pipes are involved. Do these go to and come from the same pipe? Does every sink have its own pipe? Are some connected together, and others aren't?</i></li> <li>• <i>We are not sure if the pipes go underground, but we know there isn't a big container of dirty water being stored in our house or school. But some of us wondered if there was a big container of clean water in our house or school (because some of us have seen things like water heaters).</i></li> <li>• <i>We are not sure where the dirty water goes to after it leaves a building.</i></li> <li>• <i>We are not sure where the clean water comes from.</i></li> </ul> <p><b>Facilitator Note:</b>  <i>A scientist circle reconfigures the learning space so students sit in a circle and can see and speak directly to each other. Scientist circles are most often used at moments in which the class needs to work towards consensus on ideas they have figured out. This formation leads to more opportunities for students to collaboratively make meaning through talk, because the students are better able to listen to one another, build upon ideas, and foster a sense of accountability to the group. See page 41 of the <a href="#">2022 OpenSciEd Teacher Handbook</a>.</i></p>	<p style="text-align: center;"><b>Slide 24</b></p> <p style="text-align: center;"><b>Consensus Building Discussion</b> </p> <p>Form a scientists' circle to have a consensus building discussion.</p> <ul style="list-style-type: none"> <li>➤ What ideas do you all agree on?</li> <li>➤ What ideas were different across the models?</li> </ul>  



### Guidance

**Explain:**

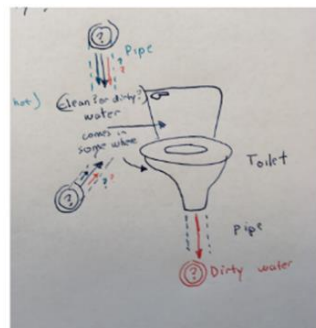
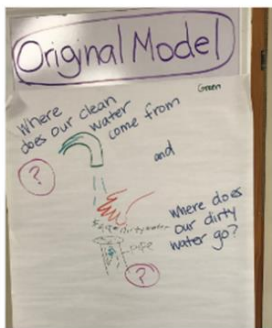
Now we are going to take all the ideas from your discussion and begin to organize your thinking. We all had in common the water coming out of the faucet and going down the drain, but we had different ideas about where the water came from before it came out of the faucet. Let's list all the places we saw from the models as to where the water came from before entering the faucet. Can you think of more places that were not captured in the initial models? How about where it goes once, we make it dirty? What ideas did you see represented in the models? Can you add to that list?

**Explain:**

We are now going to develop a consensus model to represent everything we agreed upon so that we can have a common foundation from which to build our understanding together. We are going to include question marks on the areas where we had different ideas.

*In these models, there should be a question mark at the clean water source and a question mark on the arrow from the drain to the outside of our building.*

*The model should represent what the group all agrees is known (which will be very little) and what is unknown (lots of question marks). Here are some examples of class-constructed models. There may be additional ideas that the group wants to represent about water used outside the house.*



### Accompanying Slide(s)

Slide 25

Making Sense of the Phenomenon

Where does our clean water come from?      Where does water go once we make it dirty?

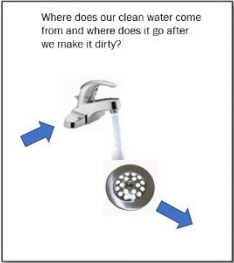








Slide 26



Consensus Building








- Develop a consensus model as a whole group that represents everything we agreed upon.
- Include question marks on the areas where there were different ideas.

Guidance	Accompanying Slide(s)
<p><b>Explain:</b> Consider all we have learned about so far. What questions do you have regarding the driving question, “Where does our clean water come from and where does it go when we make it dirty?” Write at least two phenomena-related questions on self-sticking notes, one question per sticky note that you are curious about and one phenomena-related question that the group generated earlier (refer to the consensus model poster) that you want to see on the class driving question board.</p> <p><i>It can help to model questions that, though interesting, may not be productive toward answering the Driving Question, i.e., “How many drains do you have in your house?” or “Do you like hot or cold water?” While these are questions, finding the answers to them wouldn’t help answer the Driving Question (DQ). Modeling these can help students start generating questions that pertain to the DQ.</i></p> <p><i>Additionally, encourage participants to use language that is as specific as possible. For example, the question “Where does it go when it goes down?” can be rewritten to be “Where does the dirty water go once it enters a drain in a house?” The detailed language clarifies a question that is confusing when taken out of context.</i></p> <p><i>Once participants have their questions, adult learners meet in a Scientists Circle around the large poster board containing the driving question and the initial model.</i></p> <p><i>This space for the DQB should be pre-prepared with the question “Where Does Our Clean Water Come From, and Where Does It Go To After We Make It Dirty?” across the top. Put the initial consensus model off to the side of the driving question board. In the middle of the board should be a picture of a faucet, a drain, an arrow coming in from the left and an arrow pointing out to the right. Include any outdoor structures that participants agree are part of the story of where water goes outside.</i></p> <p>To begin building the driving question board select a participant to share one of their questions with the group and post on the DQB. A participant with a similar question should read their question aloud, explain why/how it is related to someone else’s question (already posted on the board) and place alongside the related question. Once there are no more related questions, request a participant to share a different question and repeat the process.</p>	<p style="text-align: center;"><b>Slide 27</b></p> <div style="display: flex; justify-content: space-between;"> <div data-bbox="1428 418 1648 451"> <p><b>Asking Questions</b></p> <ul style="list-style-type: none"> <li>• Write at least two phenomena-related questions, one per sticky note that you are curious about.</li> <li>• One person will share their question. If anyone has a question that is related or similar, they will speak up and share their question and explain why/how it is related.</li> </ul> </div> <div data-bbox="1696 402 1927 662">  </div> </div> <div style="text-align: right; margin-top: 10px;">  </div>

Guidance	Accompanying Slide(s)
<p><b>Facilitator Note:</b>  <i>Emphasize that we need to hear from everyone, because we want to make a joint mission that reflects what the entire learning community wants to figure out. Reassure participants that when we get down to the last people who haven't shared, it may simply be because there isn't an obvious connection to another question they heard. At that point, we all can work together to help brainstorm ways we might be able to connect that person's question to a previous one posted on the board.</i></p>	
<p><b>Explain:</b>            As we wrap up our immersion activity for this part of session B, we are going to take this moment to pause and return back to our "teacher hat".</p> <p><b>Facilitator Note:</b>  <i>As you come back into "teacher hat" allow participants to take a moment to place their questions on the parking lot or provide some time for discussion. Not all questions need to be answered at this time. Some may be quick to answer, and others may need to be addressed later within the module.</i></p>	<p style="text-align: center;"><b>Slide 28</b></p> <p style="text-align: center;"><b>Teacher Hat(1)</b></p> <p>While in <u>teacher hat</u>, we will:</p> <ul style="list-style-type: none"> <li>• grow our understanding of phenomena.</li> <li>• analyze <i>Kentucky Academic Standards for Science</i>.</li> <li>• reflect on our teaching and consider new shifts in our teaching practice.</li> </ul>  
<p><b>Explain:</b>            Take a moment and collect your thoughts in teacher hat to the following prompts in the <u>Session B: Notes-Teacher Hat</u> section of their packet.</p> <ul style="list-style-type: none"> <li>• What did you learn from this experience?</li> <li>• How did the use of a driving question board impact your experience in terms of engagement and/or motivation for learning?</li> </ul>	<p style="text-align: center;"><b>Slide 29</b></p> <p style="text-align: center;"><b>Stop and Reflect</b></p> <p>Record your thinking in the <u>Session B: Notes - Teacher Hat</u> in your participant packet. You may use the <u>Driving Question Board Poster</u> to add to your thinking.</p> <ul style="list-style-type: none"> <li>• What did you learn from this experience?</li> <li>• How did the use of a driving question board impact your experience in terms of engagement and/or motivation for learning?</li> </ul>   

Guidance	Accompanying Slide(s)
<p><b>Explain:</b> In summary, a driving question board... (read the understandings on the screen). All these aspects of the driving question board help to foster a community of learners in terms of student engagement and motivation for learning.</p> <p><b>Facilitator Note:</b> <i>Read aloud or allow participants to read as you advance through these shared understandings the group should have on the purpose of the driving question.</i></p>	<p style="text-align: center;"><b>Slide 30</b></p> <p style="text-align: center;"><b>Session B Shared Understandings</b></p> <p>The driving question board...</p> <ul style="list-style-type: none"> <li>➤ Connects to students' experiences or the world around them</li> <li>➤ Encourages everyone to participate and share their voice</li> <li>➤ Focuses on the students' curiosities</li> <li>➤ Allows students to build on each other's ideas</li> <li>➤ Promotes collaboration among students</li> <li>➤ Builds a classroom community of learners as they work toward explaining the phenomenon.</li> </ul> 
<p><b>Explain:</b> As we complete Session B, you should be able to answer the following questions:</p> <ul style="list-style-type: none"> <li>• How does the use of a driving question board foster a community of learners?</li> <li>• How does the driving question board increase student engagement?</li> <li>• How does the driving question board motivate students to learn?</li> </ul> <p><b>Facilitator Note:</b> <i>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.</i></p>	<p style="text-align: center;"><b>Slide 31</b></p> <p style="text-align: center;"><b>After completing session B, you should be able to answer the following questions.</b></p> <ul style="list-style-type: none"> <li>✓ How does the use of a driving question board foster a community of learners?</li> <li>✓ How does the driving question board increase student engagement?</li> <li>✓ How does the driving question board motivate students to learn?</li> </ul> 

Guidance	Accompanying Slide(s)
<p><b>Explain:</b> At this time, take a moment and reflect on your learning by recording your thoughts from today's session by responding to the prompts on the screen. You can record this in <u>Session B: Overall Reflection</u> in the participant packet.</p> <p><b>Facilitator Note:</b> <i>Allow time for the participants to respond to the prompt for the reflection. Give them some time if they would like to share with their partner or table group.</i></p>	<p style="text-align: center;"><b>Slide 32</b></p> <p style="text-align: center;"><b>Session B Overall Reflection</b></p> <p>Take some time to record your thoughts from today's session by responding to the following prompts in <u>Session B: Overall Reflection</u> of the participant packet.</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;">  <p>What inspired you during this session?</p> </div> <div style="text-align: center;">  <p>Why did that inspire you?</p> </div> <div style="text-align: center;">  <p>What are your goals as a result of this experience?</p> </div> </div> 
<p><b>Explain:</b> Each session we will continue to take small actionable steps to implement the driving question board in your classroom. Take some time to think about your upcoming unit. Examine your current science resources, how does the resource support the implementation of the DQB? If it does not, how might you incorporate a DQB within the learning experience? If you do not have a science resource, you might want to consider some High-Quality Open Education Resources similar to the resource used within this module. Open Educational Resources can be found at <a href="#">Kentucky Department of Education Science Professional and Curricular Resource page</a>. To help you think about this, there are some questions to consider on the screen and in your <u>Session B: Next Steps- Considerations for Implementation</u> section of your participant packet.</p> <p><b>Facilitator Note:</b> <i>To help guide the participants in crafting a good driving question around a phenomenon, there are some guidelines on the screen. You may want to read through those as a group to assist them in that process.</i></p>	<p style="text-align: center;"><b>Slide 33</b></p> <p style="text-align: center;"><b>Session B</b></p> <p style="text-align: center;"><b>Next Steps - Considerations for Implementation</b></p> <p>Examine your current science resource, how does the resource support the implementation of the DQB? If it does not, how might you incorporate a DQB within the learning experience? Record your ideas in <u>Session B: Next Steps-Considerations for Implementation</u> section of your participant packet.</p> <p><b>Consider the following:</b></p> <ul style="list-style-type: none"> <li>➤What standards are being addressed during the instruction?</li> <li>➤What anchoring phenomenon might you use to frame the learning around?</li> <li>➤What might be your driving question?</li> </ul> <div style="text-align: center; border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;">DRIVING QUESTIONS</div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="background-color: #00728f; color: white; padding: 5px; font-size: 8px;">Are a rich open-ended question that cannot be solved immediately</div> <div style="background-color: #00728f; color: white; padding: 5px; font-size: 8px;">Use everyday language to connect with student's authentic curiosities</div> <div style="background-color: #00728f; color: white; padding: 5px; font-size: 8px;">Require a series of investigations that can be done over several weeks</div> </div> 





## Preparation for Session C







**Focus Question:** How can a driving question board anchored in a phenomenon be used to build a cohesive storyline?

**Agenda:** 1 hour 40 minutes





Time	Slides #'s	Outline	Materials Needed
10 minutes	34-35	Introduction <ul style="list-style-type: none"> <li>• Focus Question</li> <li>• Revising Norms</li> <li>• Revisit Parking Lot</li> <li>• Revisit What Was Learned</li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">Driving Question Board Participant Packet</a> (Used throughout the session.)</li> <li>• Norms Poster</li> <li>• Parking Lot Poster</li> </ul>
20 minutes	36-41	Driving Question Board <ul style="list-style-type: none"> <li>• Examining Questions</li> <li>• Discussing Grouping Questions</li> <li>• Ideas for Investigations</li> </ul>	<ul style="list-style-type: none"> <li>• Driving Question Board created in session B</li> </ul>
25 minutes	42-46	Connections to <i>Kentucky Academic Standards for Science</i>	<ul style="list-style-type: none"> <li>• <a href="#">Kentucky Academic Standards for Science</a></li> </ul>
25 minutes	47-50	Storyline <ul style="list-style-type: none"> <li>• Unit Storyline</li> <li>• Article</li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">Storyline Document</a></li> <li>• Article: <a href="#">Supporting Three – Dimensional Learning form Students' Questions About Water With a Storyline Unit</a></li> </ul>
10 minutes	51-53	Shared Understanding and Reflection	
10 minutes	54	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)
<p><b>Explain:</b> We will begin session C of <u>Improving Student Engagement in the Science Classroom Using a Driving Question Board (DQB)</u>. Our focus question for this section of the module is: How can a driving question board anchored in a phenomenon be used to build a cohesive storyline?</p> <p><b>Facilitator Note:</b> <i>Utilizes slides 1-4 to begin this session. Check to make sure participants have their copy of the participant packet as a digital file or printed. They will continue recording their thoughts throughout this session. Allow participants a moment to reflect and add any questions they may have to the “Parking Lot” as they prepare to continue deepening their understanding of a DQB. Review the norms the group agreed upon in previous sessions. Allow participants to reflect and offer any changes they want to propose to the group for them to consider. Make those adjustments the group decided on in a visual way where the norms are posted. Each session is bookmarked on slide four and will take you directly to the session you selected.</i></p>	<p style="text-align: center;"><b>Slide 34</b></p> <div style="background-color: #e0e0e0; padding: 5px; text-align: center; margin: 10px 0;"> <p><b>Session C</b></p> </div> <p><b>Focus Question:</b> How can a driving question board anchored in a phenomenon be used to build a cohesive storyline?</p> 
<p><b>Explain:</b> In the last session, we learned how the driving question board is an effective strategy for student engagement and motivation. We also had an opportunity in session B to experience learning symmetrical to the classroom. I would like us to reflect on that previous learning and share something that resonated with you in session B.</p> <p><b>Facilitator Note:</b> <i>Briefly review learning and experiences from the previous session, using information on this slide for guidance. You may also bring in any discussions that came out in the previous session.</i></p>	<p style="text-align: center;"><b>Slide 35</b></p> <p style="text-align: center; color: #008080;"><b>In the previous sessions, we learned...</b></p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;">  <p>The driving question board is an effective strategy for fostering student engagement and empowering them in their learning journey, fueling a strong motivation for learning.</p> </div> <div style="text-align: center;">  <p>What the student experience feels like when using a driving question board to engage in a learning experience that is symmetrical to the classroom.</p> </div> </div> 


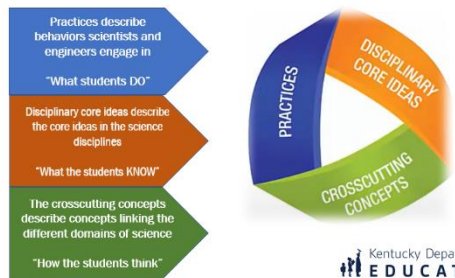



Guidance	Accompanying Slide(s)
<p><b>Explain:</b> Similar to session B, you will have the opportunity to experience the learning from both a teacher and an adult learner perspective. Just as a reminder when in “teacher hat” we will continue to grow our understanding of the phenomenon and the <i>Kentucky Academic Standards for Science</i>. Most importantly we will reflect on our teaching and consider new shifts in our teaching practice.</p> <p>When we shift our focus from the “teacher hat” to the “adult learner hat,” keep in mind the intention is not to speak as one of our students, but rather be engaged in the learning for ourselves, from our own scientific thinking. We want to keep our agreed norms in mind as we engage within this experience and continue honoring our thinking as we make sense of the science content.</p>	<p style="text-align: center;"><b>Slide 36</b></p> <p style="text-align: center;"><b>Teacher Hat Versus Adult Learner Hat (2)</b></p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p><b>Teacher Hat</b></p>  <p>While in <b>teacher hat</b>, we will:</p> <ul style="list-style-type: none"> <li>• grow our understanding of phenomena.</li> <li>• analyze <i>Kentucky Academic Standards for Science</i>.</li> <li>• reflect on our teaching and consider new shifts in our teaching practice.</li> </ul> </div> <div style="text-align: center;"> <p><b>Adult Learner Hat</b></p>  <p>While in <b>adult learner hat</b>, we will:</p> <ul style="list-style-type: none"> <li>• build and deepen our own science content knowledge.</li> <li>• engage in a learning opportunity that is symmetrical to the student experience.</li> </ul> </div> </div> 
<p><b>Explain:</b> In session B, the group created a driving question board together in the “adult learner hat.” Let’s take a moment to look at these questions through our “teacher hat.” Examining these questions allows us to gain a deeper understanding of how a driving question board can inform the teacher of initial students’ science ideas. As we begin looking let’s examine our own questions to gather initial science ideas and begin looking for patterns in our thinking.</p> <p>Provide time within small groups to take a closer look at the questions that were created and consider:</p> <ul style="list-style-type: none"> <li>• Which questions are testable?</li> <li>• Which questions might help us understand more about the driving question?</li> <li>• Which questions give us information “in addition to” the driving question?</li> </ul> <p>After groups have had time, allow for each group to share a few takeaways from their discussion.</p> <p><b>Facilitator Note:</b> <i>Assure the driving question board is visible for all participants.</i></p>	<p style="text-align: center;"><b>Slide 37</b></p> <p style="text-align: center;"><b>Questions on the DQB</b></p> <div style="display: flex; justify-content: space-between;"> <div> <p>Revisit and familiarize yourself with the questions on the DQB from session B.</p> <p>Consider and discuss within small groups:</p> <ul style="list-style-type: none"> <li>• Which questions are testable?</li> <li>• Which questions might help us understand more about the driving question?</li> <li>• Which questions give us information “in addition to” the driving question?</li> </ul> </div> <div style="text-align: right;">   </div> </div> 








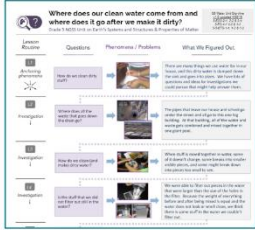




Guidance	Accompanying Slide(s)
<p><b>Explain:</b> Here are some ideas you might consider when you are thinking about how to categorize the questions on the DQB.</p>	<p style="text-align: center;"><b>Slide 38</b></p> <div style="text-align: right;"></div> <p><b>Big Ideas on Grouping Questions on the DQB</b></p> <ul style="list-style-type: none"> <li>• Categorizing in the moment with students is more powerful for the student learning because the students get to see how their questions connect and relate to other's questions.</li> <li>• This process puts the student at the center of their learning experience, while the teacher acts as a facilitator who is learning along with the student.</li> <li>• This also helps with teacher management of the DQB. If the teacher has worked with students to categorize, they will not have to come back and do it later after class.</li> <li>• Students have the ownership to continue adding to groups, creating new groups, and checking groups of questions that are answered.</li> </ul> 
<p><b>Explain:</b> We will now remove the “teacher hat” and put on the “adult learner hat” to continue engaging in the learning opportunity while deepening our own content knowledge.</p> <p><b>Facilitator Note:</b> <i>You may need to remind the participants that this is an opportunity for them to really engage as a learner. See facilitator notes from slide 36 if participants struggle with staying in the “adult learner hat.”</i></p>	<p style="text-align: center;"><b>Slide 39</b></p> <p style="text-align: center;"><b>Adult Learner Hat (2)</b></p> <p>While in <b>adult learner hat</b>, we will:</p> <ul style="list-style-type: none"> <li>• Build and deepen our own science content knowledge; and</li> <li>• Engage in a learning opportunity that is symmetrical to the student experience.</li> </ul> <div style="text-align: right;"></div> 



Guidance	Accompanying Slide(s)
<p><b>Explain:</b>            We will take another look at our group’s DQB. The science and engineering practice of “Planning and carrying out investigations requires us to figure out what kind of information and observations we need to address our questions about a phenomenon and to decide how to systematically collect and record it” (Schwarz, 2017). This experience will allow us to begin the practice of planning and carrying out investigations. Take a close look at the questions and jot down ideas for two to three in-class activities or investigations that could help answer some of the questions posted on the driving question board.</p> <p><i>Have participants share their ideas. Make sure to record these ideas for investigations to pursue next to the question on the driving question board.</i></p> <p><b>Facilitator Note:</b>  <i>The “Ideas for Investigation” is the joint action plan for the class. Many ideas that arise will connect to future lessons in the unit. Make sure to refer to the ideas often throughout the unit (and add new ideas that students suggest in future lessons to the board) to help support the navigation routine.</i></p> <p><i>Possible Ideas: use a camera to look down drain, search on google maps and images, blow up/knock down the wall and look at pipes, ask a plumber, using plumbing equipment, go to a water-filter building, practice filtering stuff in class (make the water dirty first).</i></p>	<p style="text-align: center;"><b>Slide 40</b></p> <p style="text-align: center;"><b>Your Ideas for Investigation</b> </p> <ul style="list-style-type: none"> <li>• Reflect back to session B.               <ul style="list-style-type: none"> <li>• Identify the anchoring phenomenon</li> <li>• Review the driving question</li> <li>• View the driving question board</li> </ul> </li> <li>• Jot down ideas for two to three in-class activities or investigations that could help answer some of the questions on the driving question board.</li> <li>• Share these ideas out and post them beside the questions they would address on the driving question board.</li> </ul> 
<p><b>Explain:</b>            We will now switch hats and return to the “teacher hat” as we examine how this experience aligns with the <i>Kentucky Academic Standards for Science</i>.</p>	<p style="text-align: center;"><b>Slide 41</b></p> <p style="text-align: center;"><b>Teacher Hat (2)</b></p> <p>While in <u>teacher hat</u>, we will:</p> <ul style="list-style-type: none"> <li>• Grow our understanding of phenomena;</li> <li>• Analyze <i>Kentucky Academic Standards for Science</i>; and</li> <li>• Reflect on our teaching and consider new shifts in our teaching practice.</li> </ul>  





Guidance	Accompanying Slide(s)
<p><b>Explain:</b>            This learning experience is targeting the grade 5 standards. Please navigate to <a href="http://kystandards.org">kystandards.org</a> to access the <i>Kentucky Academic Standards for Science</i>. As you examine the grade 5 standards, what standards do you think are addressed with this learning experience?</p> <p><b>Facilitator Note:</b>  <i>You may need to assist the participants in navigating the <a href="http://Kystandards.org">Kystandards.org</a> website if they are not familiar with the site. If teachers have a hard copy of the standards document, you may request participants bring it to this session to reference. You may also consider having them read through the grade 5 overview, which will give them a high-level overview for that grade.</i></p>	<p style="text-align: center;"><b>Slide 42</b></p> <p style="text-align: right;"></p> <p><i>Kentucky Academic Standards for Science</i></p> <p>When looking at the grade 5 standards, what standards do you think are addressed with this learning experience?</p> <p><a href="#">Kentucky Academic Standards for Science</a></p>  
<p><b>Explain:</b>            The standards on the slide are the Kentucky Academic Standards for Science that were identified by the writers of this learning experience. Compare these with the ones you identified.</p> <p><b>Facilitator Note:</b>  <i>If questions arise regarding a specific standard and how it fits into the learning, suggest that participants continue to learn more about the full storyline throughout this session. Participants may not see how each one of the standards align with the first questions on the DQB, remind them that the DQB is constantly evolving. As the students move throughout the storyline, their science ideas will grow and develop, naturally leading to more questions being added to the DQB.</i></p>	<p style="text-align: center;"><b>Slide 43</b></p> <p style="text-align: right;"></p> <p><i>Kentucky Academic Standards for Science</i>  <b>Addressed in this Resource (1)</b></p> <p>5-PS1-1: Develop a model to describe that matter is made of particles too small to be seen.        5-PS1-2: Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling or mixing substances, the total weight of matter is conserved.        5-PS1-3: Make observations and measurements to identify materials based on their properties.        5-PS1-4: Conduct an investigation to determine whether the mixing of two or more substances results in new substances.        5-ESS2-1: Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere and/or atmosphere interact.        5-ESS2-2: Describe and graph the amounts and percentages of salt water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.        5-ESS3-1: Obtain and combine information about solutions individual communities use to protect the Earth's resources and environment.*        3-5-ETS1-1: Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time or cost.*        3-5-ETS1-2: Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.*        3-5-ETS1-3: Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.*</p>  

Guidance	Accompanying Slide(s)						
<p><b>Explain:</b> Each one of the performance expectations are three-dimensional. This means that the performance expectations are made up of a science and engineering practice, cross cutting concept, and a disciplinary core idea.</p> <p>Science and Engineering Practices refers to what the students do and describes the way in which scientists and engineers engage in their work.</p> <p>Disciplinary Core Ideas refer to what the students know. Core ideas found in the Kentucky Academic Standards for Science are foundational understandings so that students may later acquire additional information on their own.</p> <p>Crosscutting Concepts are conceptual tools that are used as lenses for understanding the natural/designed world. They provide ways of thinking and reasoning about phenomena across disciplines, uniting core ideas throughout the fields of science and engineering.</p>	<p style="text-align: right;"><b>Slide 44</b></p> <p style="text-align: center;"><b>Three-Dimensional Standards (1)</b> </p>  <p style="text-align: right;"></p>						
<p><b>Explain:</b> 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; however, knowing and doing cannot be detached if our goal is 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 instruction. This table provides a summary of each science dimension.</p>	<p style="text-align: right;"><b>Slide 45</b></p> <p style="text-align: center;"><b>Three-Dimensional Standards (2)</b> </p>  <table border="1" data-bbox="1575 1104 1963 1356"> <thead> <tr> <th>Science and Engineering Practices</th> <th>Disciplinary Core Ideas</th> <th>Cross Cutting Concepts</th> </tr> </thead> <tbody> <tr> <td> <b>Asking questions or defining problems</b>  <b>Developing and using models</b>  <b>Planning and carrying out investigations</b>  <b>Analyzing and interpreting data</b>  <b>Using mathematics and computational thinking</b>  <b>Constructing explanations and designing solutions</b>  <b>Engaging in argument from evidence</b>  <b>Obtaining, evaluating and communicating information</b> </td> <td> <b>Physical Sciences:</b>                      (PS-1) Matter and Its Interactions                      (PS-2) Motion and Stability: Forces and Interactions                      (PS-3) Energy                      (PS-4) Waves    <b>Life Sciences:</b>                      (LS-1) From Molecules to Organisms: Structures and Processes                      (LS-2) Ecosystems                      (LS-3) Heredity                      (LS-4) Biological Evolution    <b>Earth and Space Sciences:</b>                      (ESS-1) Earth's Place in the Universe                      (ESS-2) Earth's Systems                      (ESS-3) Earth and Human Activity    <b>Engineering Design:</b>                      (ETS-1.A) Defining and Determining an Engineering Problem                      (ETS-1.B) Developing Possible Solutions                      (ETS-1.C) Optimizing the Design Solution                 </td> <td> <b>Patterns</b>                      Cause and effect mechanisms and explanation                      Scale, proportion and quantity                      Systems and system models                      Energy and matter flows, cycles and conservation                      Structure and function                      Stability and change                 </td> </tr> </tbody> </table>	Science and Engineering Practices	Disciplinary Core Ideas	Cross Cutting Concepts	<b>Asking questions or defining problems</b> <b>Developing and using models</b> <b>Planning and carrying out investigations</b> <b>Analyzing and interpreting data</b> <b>Using mathematics and computational thinking</b> <b>Constructing explanations and designing solutions</b> <b>Engaging in argument from evidence</b> <b>Obtaining, evaluating and communicating information</b>	<b>Physical Sciences:</b> (PS-1) Matter and Its Interactions (PS-2) Motion and Stability: Forces and Interactions (PS-3) Energy (PS-4) Waves  <b>Life Sciences:</b> (LS-1) From Molecules to Organisms: Structures and Processes (LS-2) Ecosystems (LS-3) Heredity (LS-4) Biological Evolution  <b>Earth and Space Sciences:</b> (ESS-1) Earth's Place in the Universe (ESS-2) Earth's Systems (ESS-3) Earth and Human Activity  <b>Engineering Design:</b> (ETS-1.A) Defining and Determining an Engineering Problem (ETS-1.B) Developing Possible Solutions (ETS-1.C) Optimizing the Design Solution	<b>Patterns</b> Cause and effect mechanisms and explanation Scale, proportion and quantity Systems and system models Energy and matter flows, cycles and conservation Structure and function Stability and change
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<b>Asking questions or defining problems</b> <b>Developing and using models</b> <b>Planning and carrying out investigations</b> <b>Analyzing and interpreting data</b> <b>Using mathematics and computational thinking</b> <b>Constructing explanations and designing solutions</b> <b>Engaging in argument from evidence</b> <b>Obtaining, evaluating and communicating information</b>	<b>Physical Sciences:</b> (PS-1) Matter and Its Interactions (PS-2) Motion and Stability: Forces and Interactions (PS-3) Energy (PS-4) Waves  <b>Life Sciences:</b> (LS-1) From Molecules to Organisms: Structures and Processes (LS-2) Ecosystems (LS-3) Heredity (LS-4) Biological Evolution  <b>Earth and Space Sciences:</b> (ESS-1) Earth's Place in the Universe (ESS-2) Earth's Systems (ESS-3) Earth and Human Activity  <b>Engineering Design:</b> (ETS-1.A) Defining and Determining an Engineering Problem (ETS-1.B) Developing Possible Solutions (ETS-1.C) Optimizing the Design Solution	<b>Patterns</b> Cause and effect mechanisms and explanation Scale, proportion and quantity Systems and system models Energy and matter flows, cycles and conservation Structure and function Stability and change					







Guidance	Accompanying Slide(s)
<p><b>Explain:</b>            We will now explore the performance expectations in a bit more detail. You will notice how each one of the performance expectations have a science and engineering practice in blue, a cross cutting concept in green, and the disciplinary core idea in orange. As we look at these standards, this coloration will help us to determine what our students need to be doing throughout this learning experience. It is through engaging the students in the science and engineering practices and having them look through the lens of the cross-cutting concepts that the students learn the disciplinary core ideas to make sense of the phenomena. Here, the first two are broken down into each of the three dimensions. Take some time and see if you can identify each of the three dimensions in the other standards addressed in this learning experience from slide 43.</p> <p><b>Facilitator Note:</b>  <i>Allow time for discussion. Remind participants of the learning experienced in this section, using information on the slide as guidance. You may also bring out any points or ideas that were brought out during any of the discussions.</i></p>	<p style="text-align: center;"><b>Slide 46</b></p> <p style="text-align: right;"></p> <p style="text-align: center;"><b>Kentucky Academic Standards for Science Addressed in this Resource (2)</b></p> <p>5-PS1-1: Develop a model to describe that matter is made of particles too small to be seen.</p> <ul style="list-style-type: none"> <li>• Science and Engineering Practice: Develop a model</li> <li>• Disciplinary Core Idea: Matter is made of particle</li> <li>• Cross Cutting Concept: too small to be seen (Scale, proportion, and quantity)</li> </ul> <p>5-PS1-2: Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling or mixing substances, the total weight of matter is conserved.</p> <ul style="list-style-type: none"> <li>• Science and Engineering Practice: Measure and graph quantities to provide evidence</li> <li>• Disciplinary Core Idea: type of change that occurs when heating, cooling or mixing substances, conservation of matter</li> <li>• Cross Cutting Concept: total weight of matter (Energy and Matter)</li> </ul> 
<p><b>Explain:</b>            Now that you have had some time to refer to the standards addressed within this experience, how do they compare with the investigations you identified? Turn to <u>Session C: Notes</u> section of your participant packet and answer the following question: What science and engineering practices, disciplinary core ideas and cross cutting concepts will students be engaged in to figure out the anchoring phenomenon through the investigations that were identified? Would you need to add any learning experiences to meet the intent of the standards? Would you need to think about setting some of the ideas aside?</p> <p><b>Facilitator Note:</b>  <i>Once participants have some independent thinking time, allow them to discuss with their small group. You may also want to encourage the groups to share their thoughts with the whole group. Monitor the discussions and if you hear an important idea arise, ask the group to share their thoughts with the whole group.</i></p>	<p style="text-align: center;"><b>Slide 47</b></p> <p style="text-align: right;"></p> <p style="text-align: center;"><b>Compare Your Investigations to the Performance Expectations</b></p> <p>Refer back to the investigations posted by our group on the driving question board. Record your ideas in the <u>Session C: Notes</u> section of the participant packet.</p> <ul style="list-style-type: none"> <li>❖ What science and engineering practices, disciplinary core ideas and cross cutting concepts will students be engaged in to figure out the anchoring phenomenon through the investigations identified?</li> </ul> 

Guidance	Accompanying Slide(s)
<p><b>Explain:</b> A storyline provides a coherent path toward building disciplinary core ideas and crosscutting concepts, piece by piece, anchored in students' own questions. The developers of this learning experience created the anticipated storyline. Navigate to the storyline found at the link provided or view the hard copy provided. In your small groups, compare your thinking to the developers' thinking of the three dimensions. Identify evidence of how the storyline connects back to our driving question board.</p> <p><b>Facilitator Note:</b> <i>Allow participants to discuss in small groups and share their thinking. Continuously prompt them to identify how it connects back to the driving question board.</i></p>	<p style="text-align: right;"><b>Slide 48</b></p> <p style="text-align: right;"></p> <p style="text-align: center;"><b>Storyline</b></p> <ul style="list-style-type: none"> <li>➤ Compare your thinking to the developers thinking of the three dimensions by examining the <a href="#">storyline</a> for this unit.</li> <li>➤ Identify evidence of how the storyline connects back to our driving question board.</li> </ul> <div style="text-align: right;">  </div> <div style="text-align: right;">  </div>
<p><b>Explain:</b> This article is a look into a classroom to see how the teacher supports three-dimensional learning from students' questions. This is the same learning experience we have been engaged in. This article gives you a good idea of how this entire learning experience plays out with students. As you are reading this article, turn to <a href="#">Session C: Notes</a> of your participant packet and record your thoughts to the following questions:</p> <ul style="list-style-type: none"> <li>• How was the driving question board used throughout this learning experience as described in the article?</li> <li>• As the students were navigating through the learning experience, what were the actions of both the teacher and the students?</li> </ul>	<p style="text-align: right;"><b>Slide 49</b></p> <p style="text-align: right;"></p> <p style="text-align: center;"><b>Article</b></p> <p><a href="#">Supporting Three-Dimensional Learning From Students' Questions About Water With a Storyline Unit</a></p> <p>As you read, jot your responses to the following questions in the <a href="#">Session C: Notes</a> section of your participant packet.</p> <ul style="list-style-type: none"> <li>• How was the driving question board used throughout this learning experience as described in the article?</li> <li>• As the students were navigating through the learning experience, what were the actions of both the teacher and the students?</li> </ul> <div style="text-align: right;">  </div> <div style="text-align: right;">  </div>

Guidance	Accompanying Slide(s)				
<p><u>Ideas to listen/look for:</u></p> <table border="1" data-bbox="107 396 1377 883"> <thead> <tr> <th data-bbox="107 396 764 431">Teacher</th> <th data-bbox="764 396 1377 431">Students</th> </tr> </thead> <tbody> <tr> <td data-bbox="107 431 764 883"> <ul style="list-style-type: none"> <li>• Supports students in asking questions</li> <li>• Collects thoughts, observations and wonderings in a visual way</li> <li>• Asks questions</li> <li>• Celebrates all ideas</li> <li>• Develops the storyline while anticipating students' ideas and connections to the phenomenon</li> <li>• Invites students to consider investigations needed</li> <li>• Directs students back to the DQB often throughout the storyline</li> </ul> </td> <td data-bbox="764 431 1377 883"> <ul style="list-style-type: none"> <li>• Create questions around an anchoring phenomenon and organize their questions into clusters</li> <li>• Explain their observations and thinking</li> <li>• Share related initial ideas</li> <li>• Know and care why they are doing what they are doing</li> <li>• Develop models</li> <li>• Listen to one another and engage in discourse</li> <li>• Do the “figuring out”</li> </ul> </td> </tr> </tbody> </table> <p><b>Facilitator Note:</b>  <i>Since this article is a progression of the learning taking place in the classroom, it does not lend well to a jigsaw read. If you want to divide up the task, you can consider using partners. Each partner can read with a different focus in mind. One person reads and attends to the first question while the other partner focuses on the actions of the teacher and the students. You may encourage the participants to use a t-chart when examining the roles of the teacher and students.</i></p>	Teacher	Students	<ul style="list-style-type: none"> <li>• Supports students in asking questions</li> <li>• Collects thoughts, observations and wonderings in a visual way</li> <li>• Asks questions</li> <li>• Celebrates all ideas</li> <li>• Develops the storyline while anticipating students' ideas and connections to the phenomenon</li> <li>• Invites students to consider investigations needed</li> <li>• Directs students back to the DQB often throughout the storyline</li> </ul>	<ul style="list-style-type: none"> <li>• Create questions around an anchoring phenomenon and organize their questions into clusters</li> <li>• Explain their observations and thinking</li> <li>• Share related initial ideas</li> <li>• Know and care why they are doing what they are doing</li> <li>• Develop models</li> <li>• Listen to one another and engage in discourse</li> <li>• Do the “figuring out”</li> </ul>	<p style="text-align: right;"><b>Slide 50</b></p> <p><b>Session C Stop and Think</b> </p> <p>In the <b>Session C: Notes</b> section of the participant packet, respond to the prompt on the right and be ready to share out with your colleague or table group.</p> <div data-bbox="1669 1185 1974 1404" style="border: 1px solid black; border-radius: 50%; padding: 10px; width: fit-content; margin-left: auto; margin-right: auto;"> <p>How can the driving question board anchored in a phenomenon be used to build a cohesive storyline?</p> </div>  <p style="text-align: right;"><small>Kentucky Department of <b>EDUCATION</b></small></p>
Teacher	Students				
<ul style="list-style-type: none"> <li>• Supports students in asking questions</li> <li>• Collects thoughts, observations and wonderings in a visual way</li> <li>• Asks questions</li> <li>• Celebrates all ideas</li> <li>• Develops the storyline while anticipating students' ideas and connections to the phenomenon</li> <li>• Invites students to consider investigations needed</li> <li>• Directs students back to the DQB often throughout the storyline</li> </ul>	<ul style="list-style-type: none"> <li>• Create questions around an anchoring phenomenon and organize their questions into clusters</li> <li>• Explain their observations and thinking</li> <li>• Share related initial ideas</li> <li>• Know and care why they are doing what they are doing</li> <li>• Develop models</li> <li>• Listen to one another and engage in discourse</li> <li>• Do the “figuring out”</li> </ul>				
<p><b>Explain:</b>            Take a moment to reflect on your experience by responding to the following question in the Session C: Notes section:</p> <ul style="list-style-type: none"> <li>• How can the driving question board anchored in a phenomenon be used to build a cohesive storyline?</li> </ul> <p><b>Facilitator Note:</b>  <i>Allow time for the participants to respond to the prompt in their participant packet. You may want to allow them time to discuss their responses as a small group, then as a whole group.</i></p>					

Guidance	Accompanying Slide(s)
<p><b>Explain:</b>            In summary, a driving question board... (read the understandings on the screen). All of these aspects of the driving question board demonstrate how, when the DQB is anchored in a phenomenon, can be used to build a cohesive storyline.</p> <p><i>Facilitator Note:</i>            Read aloud or allow participants to read as you advance through these shared understandings the group should have regarding how the DQB anchored in a phenomenon is used to build a cohesive storyline.</p>	<p style="text-align: center;"><b>Slide 51</b></p> <p style="text-align: center;"><b>Session C Shared Understandings</b></p> <ul style="list-style-type: none"> <li>➤ Allows students to see the science work they are doing as addressing questions and problems their class has identified as they explore phenomenon.</li> <li>➤ Lays out pre-planned sequence of questions, investigations and prompted discussion designed to support a progression that builds targeted three-dimensional learning.</li> <li>➤ Involves students as partners in identifying questions and problems, figuring out how to address them, and making sense of what they find.</li> <li>➤ Provides real world connections and opportunities for students to observe, wonder and identify problems that they want to figure out how to solve.</li> </ul>  
<p><b>Explain:</b>            Share that as we are completing session C, you should be able to answer the following questions:</p> <ul style="list-style-type: none"> <li>• How can the anchoring phenomenon kick off the investigations and help to navigate the learning sequence?</li> <li>• How can the driving question board elicit student ideas that connect to investigations students will engage in to make sense of the phenomenon?</li> <li>• How can the driving question board be used to build a cohesive storyline?</li> </ul> <p><i>Facilitator Note:</i>            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 the Parking Lot to see if any questions have been posted.</p>	<p style="text-align: center;"><b>Slide 52</b></p> <p style="text-align: center;"><b>Session C Shared Understandings</b></p> <ul style="list-style-type: none"> <li>➤ Allows students to see the science work they are doing as addressing questions and problems their class has identified as they explore phenomenon.</li> <li>➤ Lays out pre-planned sequence of questions, investigations and prompted discussion designed to support a progression that builds targeted three-dimensional learning.</li> <li>➤ Involves students as partners in identifying questions and problems, figuring out how to address them, and making sense of what they find.</li> <li>➤ Provides real world connections and opportunities for students to observe, wonder and identify problems that they want to figure out how to solve.</li> </ul>  



Guidance	Accompanying Slide(s)
<p><b>Explain:</b> At this time, take a moment to reflect on your learning by recording your thoughts from today’s session by responding to the prompts on the screen. You can record this in <u>Session C: Overall Reflection</u> of the participant packet.</p> <p><b>Facilitator Note:</b> <i>Allow time for the participants to respond to the prompt for the reflection. Provide some time if they would like to share with their partner or table group.</i></p>	<p style="text-align: center;"><b>Slide 53</b></p> <p style="text-align: center;"><b>Session C Overall Reflection</b></p>  <p>Take some time to record your thoughts from today’s session by responding to the following prompts in <u>Session C: Overall Reflection</u> of the participant packet.</p> <ul style="list-style-type: none"> <li> What might be one thing you <b>STOP</b> based on today’s session?</li> <li> What might be one thing you will <b>CONTINUE</b> based on today’s session?</li> <li> What might be one thing you <b>START</b> based on today’s session?</li> </ul> 
<p><b>Explain:</b> Each session we will continue to take small actionable steps to implement the driving question board in your classroom. Refer back to the DQB you planned in session B. Use that plan to implement the DQB with your students. To prepare for the implementation, there are some things to consider on the screen and in your <u>Session C: Next Steps- Considerations for Implementation</u> section of your participant packet. Think through how you can attend to each of those considerations. When you leave today, you will be ready to implement your first DQB with students. Remember this quote from Robert Orben, “If at first you don’t succeed, try-try again. Don’t think of it as failure. Think of it as timed-release success.”</p>	<p style="text-align: center;"><b>Slide 54</b></p> <p style="text-align: center;"><b>Session C Next Steps - Considerations for Implementation</b></p> <p>Use the driving question board you planned for the last session with your students. Record your ideas in <u>Session C: Next Steps- Considerations for Implementation</u> section of your participant packet.</p> <p><u>Consider how you might:</u></p> <ul style="list-style-type: none"> <li>• Facilitate the grouping of questions during the development of the driving question board.</li> <li>• Have students identify some investigations that may help them answer their questions.</li> <li>• Consider other investigations needed to answer their questions.</li> <li>• Organize questions/investigations in a logical order (Storyline) to help students make sense of the phenomenon.</li> </ul> 


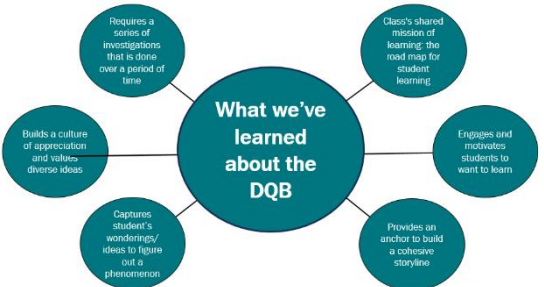

## Preparation for Session D





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

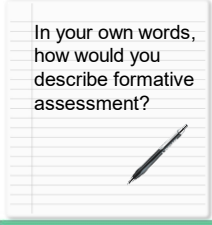


**Agenda:** 1 hour 30 minutes

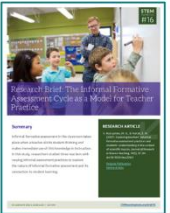



<b>Time</b>	<b>Slides #'s</b>	<b>Outline</b>	<b>Materials Needed</b>
10 minutes	55-56	Introduction <ul style="list-style-type: none"> <li>• Focus Question</li> <li>• Revising Norms</li> <li>• Revisit Parking Lot</li> <li>• Revisit What Was Learned</li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">Driving Question Board Participant Packet</a> (Used throughout the session.)</li> <li>• Norms Poster</li> <li>• Parking Lot Poster</li> </ul>
20 minutes	57-58	Developing an Equitable Learning Community	<ul style="list-style-type: none"> <li>• <a href="#">STEM Teaching Tool #47- How Can I Promote Equitable Sensemaking by Setting Expectations for Multiple Perspectives?</a></li> <li>• <a href="#">STEM Teaching Tool #54- How to Build an Equitable Learning Community in your Science Classroom</a></li> </ul>
25 minutes	58-64	Formative Assessment	<ul style="list-style-type: none"> <li>• <a href="#">STEM Teaching Tool #16- Research Brief: The Informal Formative Assessment Cycle as a Model for Teacher Practice</a></li> <li>• <a href="#">Driving Question Board poster</a></li> </ul>
30 minutes	65-69	<ul style="list-style-type: none"> <li>• Barriers</li> <li>• Shared Understandings</li> <li>• Next Steps - Considerations for Implementation and Reflection</li> </ul>	
5 minutes	70-71	Closing	





## 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)
<p><b>Explain:</b> We will begin session D. Our focus question for this section of the module is: How can the driving question board be used as a formative assessment tool to foster an equitable learning community?</p> <p><b>Facilitator Note:</b> <i>Utilizes slides 1-4 to begin this session. Check to make sure participants have their copy of the participant packet as a digital file or printed. They will continue recording their thoughts throughout this session. Allow participants a moment to reflect and add any questions they may have to the “Parking Lot” as they prepare to continue deepening their understanding of a DQB. Review the norms the group agreed upon in previous sessions. Allow participants to reflect and offer any changes they want to propose to the group for them to consider. Make those adjustments the group decided on in a visual way where the norms are posted. Each Session is bookmarked on slide four and will take you directly to the session you selected.</i></p>	<p style="text-align: center;"><b>Slide 55</b></p> <div style="background-color: #e0e0e0; text-align: center; padding: 5px;"><b>Session D</b></div> <p><b>Focus Question:</b> How can the driving question board be used as a formative assessment tool to foster an equitable learning community?</p> 
<p><b>Explain:</b> Take a moment and glance back through your notes from the first three sessions to remind yourself of all we have learned so far. What are some ideas that have resonated with you throughout this learning journey?</p> <p><i>Allow participants to review their packets and share out. Let’s examine the concept map on the screen.</i></p> <p><b>Facilitator Note:</b> <i>Briefly review learning and experiences from the previous sessions, using information on this slide for guidance. You may also bring out any discussions that came out in the previous session.</i></p>	<p style="text-align: center;"><b>Slide 56</b></p> <div style="text-align: center;">  </div> 

Guidance	Accompanying Slide(s)
<p><b>Explain:</b> The DQB shifts the classroom culture to focus more on the learning community of “we” and positions every student as a “knower” while allowing them to take ownership of their learning. The two STEM Teaching Tools on the screen will allow us to understand more about the collectivist approach and positioning the student as the “knower” in the science classroom. Let’s read these one-pagers from STEM tools to examine these ideas more closely.</p> <p><b>Facilitator Note:</b> <i>You may wish to divide these articles up for a partner group. One partner will read STEM Tool #47 and the other partner will read STEM Tool #54. The partners can read and discuss their article.</i></p>	<p style="text-align: center;"><b>Slide 57</b></p> <p style="text-align: center;"><b>Shifting to a collectivist approach and positioning every student as a “knower” in the science classroom.</b></p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>STEM Tool #47</p> </div> <div style="text-align: center;">  <p>STEM Tool #54</p> </div> </div> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>“Turns out our brains are wired to favor a communal view of the world. Humans have always sought to be in community with each other...Collectivist societies emphasize relationships, interdependence within a community, and cooperative learning.” <small>(Zaretta Hammond, <i>Culturally Responsive Teaching and the Brain</i>)</small></p> </div> <div style="text-align: right; margin-top: 10px;">  </div>
<p><b>Explain:</b> As you read the one-pagers from the previous slide, make note of your responses to the following questions in your <b>Session D: Notes</b> section of your participant packet and be ready to discuss these in a small group then with the whole group.</p> <ul style="list-style-type: none"> <li>• How might the driving question board help ensure all student ideas/questions/perspectives are shared, heard and considered?</li> <li>• Why is an equitable classroom community essential while using a driving question board?</li> <li>• How might you use the driving question board as an opportunity to build areas of agreement and disagreement?</li> <li>• How might you differentiate the driving question board to meet the needs of all students in your classroom?</li> </ul> <p><b>Facilitator Note:</b> <i>Allow time for partners to share if you choose the partner read. Then in small groups, participants discuss the questions provided. Be sure to monitor the room so that you can listen for great ideas that you want brought up in the whole group discussion. Open the floor up for groups to share during a whole group discussion.</i></p>	<p style="text-align: center;"><b>Slide 58</b></p> <p style="text-align: center;"><b>Equitable Learning Community Discussion</b></p> <p>As you read, consider jotting your thinking on these questions in the <b>Session D: Notes</b> section of the participant packet.</p> <ul style="list-style-type: none"> <li>➤ How might the driving question board help ensure all student ideas/questions/perspectives are shared, heard and considered?</li> <li>➤ Why is an equitable classroom community essential while using a driving question board?</li> <li>➤ How might you use the driving question board as an opportunity to build areas of agreement and disagreement?</li> <li>➤ How might you differentiate the driving question board to meet the needs of all students in your classroom?</li> </ul> <div style="text-align: right; margin-top: 10px;">  </div>

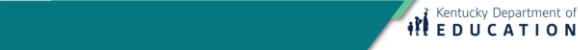

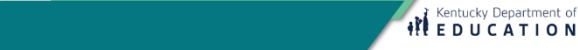
Guidance	Accompanying Slide(s)
<p><b>Explain:</b> At this time, we are going to think about how the driving question board may be utilized in the formative assessment process. Think for a moment about how you would describe formative assessment. Turn to the <b>Session D: Notes</b> section of your participant packet and jot down your initial ideas about how you would describe formative assessment.</p> <p><b>Facilitator Note:</b> <i>Take some time to share these with the whole group. You may want to create a poster that has formative assessment is... at the top. This will make the thinking of the participants visible in the room and will allow you to return to it later in this session.</i></p>	<p style="text-align: center;"><b>Slide 59</b></p> <p style="text-align: center;"><b>What is formative assessment?</b></p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;">  </div> <div style="width: 45%;"> <ul style="list-style-type: none"> <li>❖ Take a moment and jot your initial ideas in the <b>Session D: Notes</b> section of your participant packet.</li> <li>❖ Share out in whole group</li> </ul> </div> </div> 
<p><b>Explain:</b> The Council of Chief State School Officers has defined formative assessment as a “planned ongoing process used by all students and teachers during learning and teaching to elicit and use evidence of student learning to improve student understanding of intended disciplinary learning outcomes and support students to become self-directed learners.” Take some time to read the definition closely several times.</p> <p>Questions:</p> <ul style="list-style-type: none"> <li>• What key words jump out at you in this definition?</li> <li>• Does anything in the definition surprise you?</li> <li>• How does this definition align to your current schema for formative assessment?</li> </ul> <p><b>Facilitator Note:</b> <i>Lead a whole group discussion as you think through these questions. This could be a great opportunity to refer back to the poster with their initial ideas to see how they align to this definition.</i></p> <p><i>For more information on this definition, including the reasoning behind it, refer to this document:</i> <a href="https://ccsso.org/resource-library/revising-definition-formative-assessment">https://ccsso.org/resource-library/revising-definition-formative-assessment</a></p>	<p style="text-align: center;"><b>Slide 60</b></p> <p style="text-align: center;"><b>Shared Understanding of Formative Assessment</b></p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%; border: 1px solid #00728f; border-radius: 15px; padding: 10px; background-color: #e6f2f8;"> <p><small>"Formative assessment is a planned, ongoing process used by all students and teachers during learning and teaching to elicit and use evidence of student learning to improve student understanding of intended disciplinary learning outcomes and support students to become self-directed learners." <small>(Council of Chief State School Officers (CCSSO), 2018)</small></small></p> </div> <div style="width: 45%;"> <p><u>Questions to Consider:</u></p> <ul style="list-style-type: none"> <li>• What key words jump out at you in this definition?</li> <li>• Does anything in the definition surprise you?</li> <li>• How does this definition align to your current schema for formative assessment?</li> </ul> </div> </div> 

Guidance	Accompanying Slide(s)
<p><b>Explain:</b> Formative assessment refers to assessment for learning rather than assessment of learning, allowing teachers to use knowledge of student understandings to inform their ongoing instruction (Black, 1993). Ruiz Primo and Furtak claim that formative assessments can be seen as falling on a continuum from formal to informal. They define informal formative assessments as ongoing strategies that help teachers acquire information from students that can immediately be used in instruction. We are going to take some time to read this research brief: The Informal Formative Assessment Cycle as a Model for Teacher Practice. As you read, respond to the following questions in <u>Session D: Notes</u> of your participant packet.</p> <ul style="list-style-type: none"> <li>• How might the driving question board be used to give voice to all students in an informal assessment?</li> <li>• What support do teachers need to enact robust informal formative assessment in their classrooms?</li> </ul> <p><b>Facilitator Note:</b> <i>Allow participants to discuss their findings with their small groups before sharing them out in whole group.</i></p>	<p style="text-align: center;"><b>Slide 61</b></p> <p style="text-align: center;"><b>Informal Formative Assessment Cycle</b></p> <p>As you read, jot your responses to the following questions in the <u>Session D: Notes</u> section of your participant packet.</p> <p style="text-align: center;"><a href="#">STEM Teaching Tool #16</a></p> <ul style="list-style-type: none"> <li>➤ How might the driving question board be used to give voice to all students in an informal assessment?</li> <li>➤ What supports do teachers need to enact robust informal formative assessment in their classrooms?</li> </ul>  <p style="text-align: right;"></p>
<p><b>Explain:</b></p> <ul style="list-style-type: none"> <li>• On the screen you will see a graphic developed by the Kentucky Department of Education on the formative assessment process. As you examine this graphic, respond to the prompt in your <u>Session D: Notes</u> section of your participant packet. How might the driving question board support the formative assessment process as described in the graphic?</li> </ul> <p><b>Facilitator Note:</b> <i>Allow participants to share their thinking, first in small groups, then as a whole group.</i></p>	<p style="text-align: center;"><b>Slide 62</b></p> <p style="text-align: center;"><b>The Formative Assessment Process</b></p> <p>As you examine this formative assessment graphic, respond to the prompt in the <u>Session D: Notes</u> section of your participant packet.</p> <ul style="list-style-type: none"> <li>• How might the driving question board support the formative assessment process as described in the graphic?</li> </ul>  <p style="text-align: right;"><small>Graphic is from the Kentucky Department of Education Balanced Assessment Professional Learning Module.</small></p> <p style="text-align: right;"></p>

Guidance	Accompanying Slide(s)
<p><b>Explain:</b> This graphic shows the process and components of the driving question board. Based on this DQB poster, in what ways could the driving question board be used as a formative assessment?</p> <p><b>Facilitator Note:</b> <i>Take a moment for the participants to look over this graphic carefully as they discuss the question in small groups, then allow them to share it out in whole group. You can print these out and supply each participant with one to hang in their classroom.</i></p>	<p style="text-align: center;"><b>Slide 63</b></p>  <div style="border: 1px solid black; padding: 10px; margin-top: 10px;"> <p>Based on this DQB poster, in what ways could the driving question board be used as a formative assessment?</p> </div> <p style="text-align: right;"></p>
<p><b>Explain:</b> Take a moment to think about your experience by responding to the following question in the <u>Session D: Notes</u> section.</p> <ul style="list-style-type: none"> <li>How can the driving question board be used as a formative assessment tool to foster an equitable learning community?</li> </ul> <p><b>Facilitator Note:</b> <i>Allow time for the participants to respond to the prompt in their participant packet. You may want to allow them to discuss their responses as a small group, then as a whole group once they have time to write down their individual thoughts.</i></p>	<p style="text-align: center;"><b>Slide 64</b></p> <p><b>Stop &amp; Think</b></p> <p>In the <u>Session D: Notes</u> section of the participant packet, respond to the prompt to the right and be ready to share out with your colleague or table group.</p> <div style="border: 1px solid black; border-radius: 50%; padding: 20px; width: fit-content; margin-left: auto; margin-right: auto;"> <p>How can the driving question board be used as a formative assessment tool to foster an equitable learning community?</p> </div> <p style="text-align: right;"></p>
<p><b>Explain:</b> As with anything new, the temptation to give up is a common one, and nobody is exempt. Thomas Edison said, “Many of life’s failures are people who did not realize how close they were to success when they gave up.” On the screen you will see some common barriers to implementing a driving question board in the classroom. Since the DQB can be such a positive instructional move in the classroom, it is important to think about how you might overcome those barriers, rather than giving up on it. Along with the barrier, you will see some ideas to combat that barrier. In addition to these, find other teachers that have been using a DQB and talk to them for ideas and solutions to barriers.</p>	<p style="text-align: center;"><b>Slide 65</b></p> <p style="text-align: center;"><b>Barriers and Ways to Overcome (1)</b></p> <div style="display: flex; align-items: center;"> <div style="background-color: #00728f; color: white; padding: 10px; border-radius: 5px; margin-right: 10px;">Management of time</div> <ul style="list-style-type: none"> <li>• Complete your grouping of questions within the class with students.</li> <li>• Be intentional with times you revisit the DQB to complete a quick check of student learning.</li> <li>• Capture science ideas throughout the storyline as students gain understanding.</li> </ul> </div> <div style="display: flex; align-items: center; margin-top: 10px;"> <div style="background-color: #00728f; color: white; padding: 10px; border-radius: 5px; margin-right: 10px;">Management of space</div> <ul style="list-style-type: none"> <li>• Use one driving question board that includes ideas and questions from all class periods. Use different color post-its for each class.</li> <li>• Use technology to create a digital driving question board.</li> <li>• Use a tri-fold board for each class.</li> <li>• Use a flip chart stand and flip page for each class.</li> </ul> </div> <p style="text-align: right;"></p>

Guidance	Accompanying Slide(s)
<p><b>Facilitator Note:</b> Continue to provide participants time to discuss through these barriers and ways to overcome implementing a DQB within their science classroom.</p>	<p style="text-align: center;"><b>Slide 66</b></p> <p style="text-align: center;"><b>Barriers and Ways to Overcome (2)</b></p> <div style="display: flex; flex-direction: column; align-items: center;"> <div style="display: flex; align-items: center; margin-bottom: 10px;"> <div style="background-color: #00728f; color: white; padding: 5px; border-radius: 5px; margin-right: 10px;">Questions not addressed</div> <div style="background-color: #00728f; color: white; padding: 5px; border-radius: 5px; margin-right: 10px;"> <ul style="list-style-type: none"> <li>• Allow students to research or investigate those in free time</li> <li>• Encourage students to capture these questions in their notebooks.</li> <li>• Encourage students to take questions home and discuss with their families.</li> <li>• Collaborate with other colleagues such as a librarian.</li> <li>• Consider other learning opportunities the question may fit in.</li> </ul> </div> </div> <div style="display: flex; align-items: center; margin-bottom: 10px;"> <div style="background-color: #00728f; color: white; padding: 5px; border-radius: 5px; margin-right: 10px;">Questions not grade appropriate</div> <div style="background-color: #00728f; color: white; padding: 5px; border-radius: 5px; margin-right: 10px;"> <ul style="list-style-type: none"> <li>• Help students reformulate questions so they can lead to grade-appropriate investigations of important science ideas.</li> <li>• Think about ways to use these questions to differentiate instruction to meet the diverse needs of all learners.</li> </ul> </div> </div> </div> 
<p><b>Explain:</b> The driving question board can be used as a formative assessment tool to foster an equitable learning community. In summary a driving question board can ...</p> <p><b>Facilitator Note:</b> Read aloud or allow participants to read as you advance through these shared understandings the group should have on the purpose of the driving question.</p>	<p style="text-align: center;"><b>Slide 67</b></p> <p style="text-align: center;"><b>Session D Shared Understandings</b></p> <p>The driving question board can...</p> <ul style="list-style-type: none"> <li>➤ Serve as an informal formative assessment in the classroom when a teacher elicits student thinking and makes immediate use.</li> <li>➤ Provide students an opportunity to get meaningful feedback in a low-stakes environment, which supports their learning and helps them develop confidence in their ability to express their understanding.</li> <li>➤ Give voice to all students in order to fully engage students in inquiry-based lessons and effectively implement informal formative assessment practices with them.</li> <li>➤ Promote deep and equitable learning when planned purposefully to ensure the various perspectives that students bring to making sense of phenomenon are solicited, clarified and considered.</li> </ul> 
<p><b>Explain:</b> Share that as we are completing session D, you should be able to answer the following questions:</p> <ul style="list-style-type: none"> <li>• How can the driving question board be used as a formative assessment tool?</li> <li>• How can the driving question board be used to foster an equitable learning community?</li> </ul> <p><b>Facilitator Note:</b> 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.</p>	<p style="text-align: center;"><b>Slide 68</b></p> <p style="text-align: center;"><b>After completing session D, you should be able to answer the following questions.</b></p> <ul style="list-style-type: none"> <li>✓ How can the driving question board be used as a formative assessment tool?</li> <li>✓ How can the driving question board be used to foster an equitable learning community?</li> </ul> 



Guidance	Accompanying Slide(s)
<p><b>Explain:</b> Hopefully you have implemented your driving question board with your students and are ready to reflect on that experience. As you look at the DQB created by your students, can you think of any science ideas or lack of ideas that the DQB revealed? Consider how you might use the DQB all throughout the unit for formative assessment and eliciting student evidence of sensemaking. Record your ideas in <u>Session D: Next Steps-Considerations for Implementation</u>.</p> <p><b>Facilitator Note:</b> <i>You may request that participants bring a picture of the DQB they implemented with their students to share with the group. Allow time for the participants to review the DQB created by students and plan for how they may continue to use it in their learning progressions.</i></p>	<p style="text-align: center;"><b>Slide 69</b></p> <p style="text-align: center;"><b>Session D Next Steps - Considerations for Implementation</b></p> <p>Use the driving question board you planned for the last session with your students. Record your ideas in <u>Session D: Next Steps-Considerations for Implementation</u> section of your participant packet.</p> <p>Use the driving question board you planned for the last session with your students.</p> <p><b>Consider how you might:</b></p> <ul style="list-style-type: none"> <li>• Identify the science ideas or lack of ideas the driving question board revealed.</li> <li>• Revisit the driving question board throughout the unit.</li> <li>• Formatively assess the students using the driving question board process.</li> <li>• Elicit evidence that students were engaged in "making sense" of the science in the unit.</li> </ul> 
<p><b>Explain:</b> <i>After participants have engaged with all sessions within this module, they will develop a social media post consisting of a summary and their take aways. Consider sharing it on social media along with the link to the resource.</i></p> <p><i>As time permits, you may wish to have participants share their ideas with one another.</i></p>	<p style="text-align: center;"><b>Slide 70</b></p> <p style="text-align: center;"><b>Reflect on Your Experience</b></p> <p style="text-align: center;">It's all in a Social Media Post!</p> <p>Think about the learning from this module. Compose a social media post consisting of a summary and your take aways to share. Consider sharing it on social media along with the link to the resource!</p>  

Guidance	Accompanying Slide(s)
<p><b>Explain:</b> The KDE needs your feedback on the effectiveness of this module, the learning platform and how the consultants may best support you as you take the next steps. We are going to complete a short survey to share our thinking and provide them with feedback on how the KDE can best meet our needs. Feedback from our surveys will be used by the KDE to plan and prepare future professional learning.</p> <p><i>Provide participants with the survey links:</i> <a href="#">Kentucky Department of Education Professional Learning Modules Feedback Survey</a></p> <p><i>Be sure to thank participants for their work throughout this module as it has provided a foundation for future knowledge.</i></p> <p><i>To you, the facilitator, thank you for providing participants with knowledge and support throughout this process. The KDE greatly values your role in leading the “Improving Student Engagement in the Science Classroom Using a Driving Question Board” Module. We appreciate your time and effort in leading your school and district in the successful implementation of a driving question board within science classrooms. Thank you!</i></p>	<p style="text-align: center;"><b>Slide 71</b></p> <p style="text-align: center;"><b>Certificate of Completion</b></p> <p>Thank you for completing this module provided by the KDE.</p> <p>Please use the link below to obtain your certificate of completion.</p> <p><a href="#">Kentucky Department of Education Professional Learning Modules</a></p> <p><small>Educators can use the FLEED to find learning sessions, and it is the local school district who determines if they are acceptable for credit based on their district policies. See 704 KAR 0100 for more details.</small></p> 