

# RESPeCT Summer Institute Professional Development Leader Guide (PDLG)


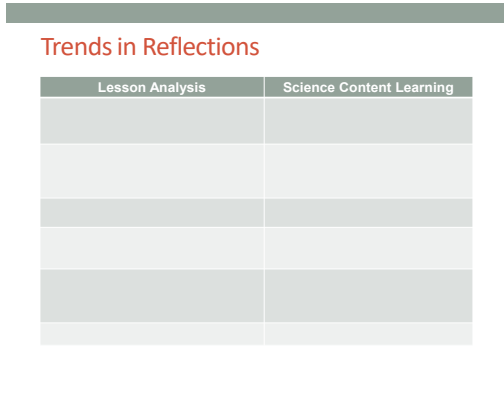
<b>Grade Level</b>	3	<b>Day</b>	2	<b>STeLLA Strategy</b>	STL Strategies 1, 2, 3: Elicit, Probe, and Challenge Questions	<b>Subject Matter Focus</b>	Variation in Traits (VIT)
<b>Focus Questions</b>	<ul style="list-style-type: none"> <li>• How can lesson analysis help us better understand how elicit, probe, and challenge questions can reveal and challenge student thinking?</li> <li>• How can variation in traits affect which individuals survive long enough in their environment to reproduce?</li> </ul>						
<b>Main Learning Goals</b>	<p>Participants will understand the following:</p> <ul style="list-style-type: none"> <li>• Student thinking can be made more visible in science classrooms when the teacher asks questions that elicit and probe student ideas and predictions and challenge student thinking.</li> <li>• Lesson analysis allows us to slow down teaching so we can clarify our understandings of the distinct purposes of elicit, probe, and challenge questions and how they can be used effectively in science lessons.</li> <li>• Within a species, trait variation affects which individuals survive long enough to produce young and which don't.</li> <li>• Natural selection is a nonrandom evolutionary process resulting from trait variation among individuals in a population, inheritance that produces trait variation among offspring, selection of offspring that are better equipped to compete for limited resources and are thus more likely to survive and reproduce, and adaptation as the frequencies of traits and the genes that code for them change within a population over time.</li> </ul>						
<b>Preparation</b>				<b>Materials</b>			<b>Videos</b>
<p><b>Daily Setup Tasks</b></p> <ul style="list-style-type: none"> <li>• Check that video clips are correctly linked to PowerPoint (PPT) slides.</li> <li>• Set up PowerPoint.</li> <li>• Make sure video clips play correctly with good sound.</li> <li>• Arrange furniture and food.</li> <li>• Arrange participant materials.</li> <li>• Put up posters and charts.</li> </ul> <p><b>Planning and Preparation Tasks</b></p> <ul style="list-style-type: none"> <li>• Study the PDLG, PowerPoint slides (PPTs), video clips, and handouts. Make changes to the PPTs, if needed.</li> <li>• Review the reflections from day 1 and create a summary slide.</li> <li>• Cut apart the elicit-question cards from the PD leader master to pass out for</li> </ul>				<p><b>Posters and Charts</b></p> <ul style="list-style-type: none"> <li>• STeLLA Framework and Strategies poster</li> <li>• Day-2 Agenda (chart)</li> <li>• Day-2 Focus Questions (chart)</li> <li>• Norms for Working Together (chart)</li> <li>• Effective Science Teaching chart (from day 1)</li> <li>• Strategy charts from day 1 (STL strategies 1–3)</li> <li>• Common Student Ideas chart</li> <li>• Parking Lot poster</li> </ul> <p><b>Handouts in RESPeCT PD Binder Front Pocket</b></p> <ul style="list-style-type: none"> <li>• Z-fold summary chart: Student Thinking Lens Strategies</li> </ul> <p><b>Handouts in RESPeCT PD Binder, Day 2</b></p> <ul style="list-style-type: none"> <li>• 2.1 Transcript for Video Clip 2.1</li> <li>• 2.2 Transcript for Video Clip 2.2</li> <li>• 2.3 Transcript for Video Clip 2.3</li> <li>• 2.4 Beetles in the Desert—Analogy Map (from VIT lesson 3b)</li> </ul>			<ul style="list-style-type: none"> <li>• <a href="#">Video Clip 2.1</a>: Marissa interview, Lathon classroom (elicit and probe questions); 2.1_mspcp_gr.3.variations.traits_lathon_pre.marissa_c1</li> <li>• <a href="#">Video Clip 2.2</a>: Lathon classroom (probe and challenge questions); 2.2_mspcp_gr.3.variations.traits_lathon_L1_c1</li> <li>• <a href="#">Video Clip 2.3</a>: Wilde classroom (probe and challenge questions); 2.3_mspcp_gr.3.variations.traits_wilde_L6_c1</li> </ul>

<p>practice interviews.</p> <ul style="list-style-type: none"> <li>• Watch video clips and anticipate participant responses.</li> <li>• Prepare charts for the day's agenda and focus questions.</li> <li>• Review the activities for Variation in Traits lessons 3a/b, 4a/b, and 5a (lesson plans binder).</li> <li>• On chart paper, create a Common Student Ideas chart (see resources section in lesson plans binder) and post it at the front of the class. Make sure to leave space in the left-hand margin to apply sticker dots. This chart will be used during lesson analysis (slide 19).</li> <li>• For content deepening: <ul style="list-style-type: none"> <li>• Review handout 3.1 (Using the Model) to prepare for the Beetles in the Desert investigations from VIT lessons 3a and 5a.</li> <li>• Create two data tables on chart paper using the table on handout 3.1 as a model. One table will be used to record data from the lesson-3 investigation, and the second table will be used to record data from the lesson-5 investigation (changed environment).</li> <li>• Gather the necessary materials for the desert model from the lesson kit.</li> <li>• Position the table near the area where the desert simulation will be conducted.</li> <li>• Post the rules of the game where participants can refer to them throughout the activity.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• 2.5 Calculating the Fraction of Beetles (from VIT lesson 4a)</li> <li>• 2.6 Daily Reflections—Day 2</li> </ul> <p><b>Handouts in RESPeCT Lesson Plans Binder</b></p> <ul style="list-style-type: none"> <li>• 3.1 Using the Model (from VIT lesson 3a)</li> <li>• 3.2 Beetles in the Desert (from VIT lesson 3a)</li> <li>• 3.4 Beetles in the Desert—Analogy-Map Answer Key (Teacher Master) (from VIT lesson 3b)</li> </ul> <p><b>PD Leader Masters, Days 1–4</b></p> <ul style="list-style-type: none"> <li>• PD Leader Master: Elicit Question Cards—Variation in Traits (for practice interviews)</li> </ul> <p><b>Supplies</b></p> <ul style="list-style-type: none"> <li>• Science notebooks</li> <li>• Chart paper and markers</li> <li>• Red and blue sticker dots (or pencils)</li> <li>• Sticky notes (for Parking Lot poster)</li> <li>• For content deepening (from lesson materials kit): <ul style="list-style-type: none"> <li>• Two pieces of fabric, approximately 22" × 28" (to simulate different desert environments, one green and one brown)</li> <li>• 45 colored pom-poms, 7mm or 10 mm in size (9 pom-poms of each color: red, yellow, brown, green, and black)</li> <li>• 5 cups, approximately 8 ounces each</li> </ul> </li> </ul> <p><b>PD Resources</b></p> <ul style="list-style-type: none"> <li>• STeLLA strategies booklet</li> <li>• RESPeCT PD program binder</li> <li>• RESPeCT lesson plans binder</li> </ul> <p><b>Resources in Lesson Plans Binder</b></p> <p><i>Resources section:</i></p> <ul style="list-style-type: none"> <li>• Variation in Plants and Animals and Variation in Traits: Content Background Document</li> <li>• Common Student Ideas about Variation in Traits</li> </ul> <p><i>Pretabs section:</i></p> <ul style="list-style-type: none"> <li>• Variation in Traits: Learning Goals for Students and Teachers</li> </ul>	
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## DAY 2 SESSION OUTLINE

Time	Activities	Purpose
8:00–8:30 30 min	<b>Getting Started: Housekeeping, Day-1 Reflections, Norms, Agenda, Focus Questions, Review STL Strategies</b>	<ul style="list-style-type: none"> <li>• Build community by sharing participants' reflections from day 1 and reviewing/revising the norms.</li> <li>• Set the stage for a day of learning by introducing the focus questions for day 2 and reviewing the purposes and key features of elicit, probe and challenge questions. (These strategies will be the focus of today's lesson analysis work.)</li> </ul>
8:30–9:20 50 min	<b>STL Lesson Analysis: Elicit and Probe Questions</b>	<ul style="list-style-type: none"> <li>• Begin to develop an understanding of the RESPeCT lesson analysis process.</li> <li>• Deepen understandings of elicit and probe questions (STL strategies 1 and 2) and how they reveal student thinking.</li> <li>• Deepen science-content knowledge of variation in traits through lesson analysis.</li> </ul>
9:20–11:30 130 min (Includes 10-min break)	<b>STL Lesson Analysis: Probe and Challenge Questions</b>	<ul style="list-style-type: none"> <li>• Develop a deeper understanding of the RESPeCT lesson analysis process.</li> <li>• Deepen understandings of probe and challenge questions (STL strategies 2 and 3), how they reveal student thinking, and how they move student thinking forward.</li> <li>• Deepen science-content knowledge of variation in traits through lesson analysis.</li> <li>• Understand that science-content knowledge is essential for using probe and challenge questions effectively in the classroom.</li> </ul>
11:30–12:00 30 min	<b>Practice Using Elicit and Probe Questions: Interviews</b>	<ul style="list-style-type: none"> <li>• Deepen understandings of elicit and probe questions.</li> <li>• Begin to develop the ability to ask elicit and probe questions effectively.</li> <li>• Appreciate that science-content knowledge is essential for using elicit and probe questions effectively in the classroom.</li> </ul>
12:00–12:45 45 min	<b>LUNCH</b>	
12:45–3:15 150 min (Includes 10-min break)	<b>Content Deepening: Variation in Traits</b>	<ul style="list-style-type: none"> <li>• Deepen participants' understandings of variation in traits by conducting investigations from VIT lessons 3a/b, 4a/b, and 5a.</li> </ul>
3:15–3:30 15 min	<b>Wrap-Up: Summary, Homework, and Reflections</b>	<ul style="list-style-type: none"> <li>• Summarize and reflect on the day's learning, including progress made in understanding variation in traits and the relationship between lesson analysis and asking effective elicit, probe, and challenge questions.</li> </ul>

**DAY 2**

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
<p>8:00–8:30 30 min</p> <p><b>Getting Started</b></p> <p>Slides 1–8</p>	<p><b>Purpose</b></p> <ul style="list-style-type: none"> <li>• Build community by sharing participants’ reflections from day 1 and reviewing/revising the norms.</li> <li>• Set the stage for a day of learning by introducing the focus questions for day 2 and reviewing the purposes and key features of elicit, probe, and challenge questions. (These strategies will be the focus of today’s lesson analysis work.)</li> </ul> <p><b>Content</b></p> <ul style="list-style-type: none"> <li>• Norms enable the group to build trust and productivity.</li> <li>• Probe questions seek to understand what students are saying/writing and encourage them to explain their ideas more clearly or fully (<b>not</b> to change their thinking).</li> <li>• Challenge questions seek to engage students in ways that will challenge them to think, reconsider their ideas, change</li> </ul>	 	<p><b>Display Slide 1.</b> RESPeCT PD Program (3 min)</p> <p>a. Take care of any housekeeping issues.</p> <p><b>Display Slide 2.</b> Trends in Reflections (5 min)</p> <p>a. Give participants time to review your summary of their reflections from day 1 and offer reactions and comments or ask follow-up questions.</p>

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	<p>their initial ideas, and move toward more-scientific understandings.</p> <p><b>What Participants Do</b></p> <ul style="list-style-type: none"> <li>• Discuss the reflections from day 1 and how the group is doing with the norms.</li> <li>• Study a short transcript example from the STeLLA strategies booklet to identify probe and challenge questions.</li> <li>• Review and contrast the purposes and key features of probe and challenge questions.</li> </ul> <p><b>Posters and Charts</b></p> <ul style="list-style-type: none"> <li>• STeLLA Framework and Strategies poster</li> <li>• Norms for Working Together (chart)</li> <li>• Day-2 agenda (chart)</li> <li>• Day-2 focus questions (chart)</li> </ul> <p><b>PD Resources</b></p> <ul style="list-style-type: none"> <li>• STeLLA strategies booklet</li> <li>• Half-page sheet of norms (pasted into science notebooks)</li> </ul>	<p><b>Norms for Working Together: The Basics</b></p> <p><b>Purpose:</b> Build trust and develop a productive study group for all participants.</p> <p><b>The Basics</b></p> <ul style="list-style-type: none"> <li>• Arrive prepared and on time; stay for the duration; return from breaks on time.</li> <li>• Remain attentive, thoughtful, and respectful; engage and be present.</li> <li>• Eliminate interruptions (turn off cell phones, email, and other electronic devices; avoid sidebar conversations).</li> <li>• Make room for everyone to participate (monitor your floor time).</li> </ul>	<p><b>Display Slide 3.</b> Norms for Working Together: The Basics (5 min)</p> <p>a. <b>Provide context:</b> “Since we’ll be working together throughout the Summer Institute and the academic year, we need norms that will enable us to build trust and productivity as a group. Today we’ll start our analysis of other teachers’ classroom videos. In the fall, we’ll analyze videos from each other’s classrooms. For this work to be meaningful, we’ll need to push and challenge each other. This will require mutual respect and a common understanding of our goals.”</p> <p>b. “Do you want to clarify or revise any of these norms?”</p> <p><b>Note:</b> Have participants locate the half-page sheet of norms they pasted into their science notebooks on day 1. Remind them to leave space for revising the norms.</p> <p>c. Encourage participants to ask clarifying questions regarding the meaning of any of the norms and jot notes in their science notebooks.</p> <p>d. Ask participants if they’re willing to live with these norms today, and let them know they’ll have an opportunity to revise them tomorrow. Remind them of this at the end of the session.</p>

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		<p><b>Norms for Working Together: The Heart</b></p> <p><b>Purpose:</b> Build trust and develop a productive study group for all participants.</p> <p><b>The Heart of RESPeCT Lesson Analysis and Content Deepening</b></p> <ul style="list-style-type: none"> <li>• Keep the goal in mind: analysis of teaching to improve student learning.</li> <li>• Share your ideas, uncertainties, confusion, disagreements, questions, and good humor. All points of view are welcome.</li> <li>• Expect and ask questions to deepen everyone’s learning; be constructively challenging.</li> <li>• Listen carefully; seek to understand other participants’ points of view.</li> </ul>	<p><b>Display Slide 4.</b> Norms for Working Together: The Heart (5 min)</p> <ol style="list-style-type: none"> <li>a. “Now let’s review the norms at the heart of the RESPeCT PD program.”</li> <li>b. “Do you want to clarify or revise any of these norms?”</li> <li>c. “Do you want to add any norms to this list?”</li> <li>d. Ask participants if they’re willing to live with these norms today, and announce that they’ll have an opportunity to revise them tomorrow.</li> </ol>
		<p><b>Agenda for Day 2</b></p> <ul style="list-style-type: none"> <li>• Day-1 reflections</li> <li>• Focus questions</li> <li>• Review of STL strategies 1–3</li> <li>• STL lesson analysis: elicit and probe questions</li> <li>• STL lesson analysis: probe and challenge questions</li> <li>• Practice using elicit and probe questions</li> <li>• Lunch</li> <li>• Content deepening: variation in traits</li> <li>• Summary, homework, and reflections</li> </ul>	<p><b>Display Slide 5.</b> Agenda for Day 2 (Less than 1 min)</p> <ol style="list-style-type: none"> <li>a. Talk through the agenda for the day.</li> </ol>


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		<p style="text-align: center;"><b>Today's Focus Questions</b></p> <table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> <p style="text-align: center;"><b>Lesson Analysis</b></p> <ul style="list-style-type: none"> <li>How can lesson analysis help us better understand how elicit, probe, and challenge questions can reveal and challenge student thinking?</li> </ul> </td> <td style="width: 50%; vertical-align: top;"> <p style="text-align: center;"><b>Content Deepening</b></p> <ul style="list-style-type: none"> <li>How can variation in traits affect which individuals survive long enough in their environment to reproduce?</li> </ul> </td> </tr> </table>	<p style="text-align: center;"><b>Lesson Analysis</b></p> <ul style="list-style-type: none"> <li>How can lesson analysis help us better understand how elicit, probe, and challenge questions can reveal and challenge student thinking?</li> </ul>	<p style="text-align: center;"><b>Content Deepening</b></p> <ul style="list-style-type: none"> <li>How can variation in traits affect which individuals survive long enough in their environment to reproduce?</li> </ul>	<p><b>Display Slide 6.</b> Today's Focus Questions (1 min)</p> <ol style="list-style-type: none"> <li>Introduce the focus questions that will guide today's session.</li> <li>"Each day we're going to have at least one lesson analysis focus question and one content deepening focus question."</li> <li>"Here are our focus questions for today's session."</li> </ol>
<p style="text-align: center;"><b>Lesson Analysis</b></p> <ul style="list-style-type: none"> <li>How can lesson analysis help us better understand how elicit, probe, and challenge questions can reveal and challenge student thinking?</li> </ul>	<p style="text-align: center;"><b>Content Deepening</b></p> <ul style="list-style-type: none"> <li>How can variation in traits affect which individuals survive long enough in their environment to reproduce?</li> </ul>				
		<p style="text-align: center;"><b>STeLLA Conceptual Framework</b></p> <p style="text-align: center;">Learning to analyze science teaching through two lenses:</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>Student Thinking</b></p> </div> <div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>Science Content Knowledge</b></p> </div> </div> <p style="text-align: center;">allows you to learn and use strategies for more effective science teaching.</p> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div style="width: 45%;"> <p style="text-align: center;"><b>STRATEGIES TO REVEAL, SUPPORT, AND CHALLENGE STUDENT THINKING</b></p> <ol style="list-style-type: none"> <li>Ask questions to elicit student ideas and predictions.</li> <li>Ask questions to probe student ideas and predictions.</li> <li>Ask questions to challenge student thinking.</li> <li>Engage students in analyzing and interpreting data and observations.</li> <li>Engage students in constructing explanations and arguments.</li> <li>Engage students in using and applying new science ideas in a variety of ways and contexts.</li> <li>Engage students in making connections by synthesizing and summarizing key science ideas.</li> <li>Engage students in communicating in scientific ways.</li> </ol> </div> <div style="width: 45%;"> <p style="text-align: center;"><b>STRATEGIES TO CREATE A COHERENT SCIENCE CURRICULUM</b></p> <ol style="list-style-type: none"> <li>Identify one main learning goal.</li> <li>Set the purpose with a focus question or goal statement.</li> <li>Select activities that are matched to the learning goal.</li> <li>Select content representations and models matched to the learning goal and engage students in their use.</li> <li>Sequence key science ideas and activities appropriately.</li> <li>Make explicit links between science ideas and activities.</li> <li>Link science ideas to other science ideas.</li> <li>Highlight key science ideas and focus question throughout.</li> <li>Summarize key science ideas.</li> </ol> </div> </div>	<p><b>Display Slide 7.</b> The STeLLA Conceptual Framework (1 min)</p> <ol style="list-style-type: none"> <li>Point out the strategies highlighted on the slide.</li> <li>"During today's session, we'll focus again on the first three Student Thinking Lens strategies: elicit, probe, and challenge questions."</li> </ol>		

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		<p style="text-align: center;"><b>Probe versus Challenge Questions</b></p> <ul style="list-style-type: none"> <li>• Read the dialogue example for STL strategy 3 in the STeLLA strategies booklet.</li> <li>• With an elbow partner, try to justify why each question is labeled probe or challenge.</li> <li>• For help, refer to the STL Z-fold summary chart and the explanations, examples, and general questions for strategy 3 in the strategies booklet.</li> <li>• Be ready to share your ideas.</li> </ul>	<p><b>Display Slide 8.</b> Probe versus Challenge Questions (10 min)</p> <ol style="list-style-type: none"> <li>a. Have participants look in the STeLLA strategies booklet at the dialogue example for STL strategy 3 that highlights probe and challenge questions.</li> <li>b. The purposes of this activity are as follows:             <ol style="list-style-type: none"> <li>1. To get participants' heads back into the questioning strategies discussed on day 1.</li> <li>2. To make sure participants understand the distinct purposes of probe and challenge questions:                 <ul style="list-style-type: none"> <li>• <b>Probe questions</b> seek to understand what students are saying/writing and encourage them to explain their ideas more clearly or fully (not to change their thinking).</li> <li>• <b>Challenge questions</b> seek to engage students in ways that will challenge them to think, reconsider their ideas, change their initial ideas, and move toward more-scientific understandings.</li> </ul> </li> </ol> </li> </ol>



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<p>8:30–9:20 50 min</p> <p><b>STL Lesson Analysis: Elicit and Probe Questions</b></p> <p>Slides 9–15</p>	<p><b>Purpose</b></p> <ul style="list-style-type: none"> <li>• Begin to develop an understanding of the RESPeCT lesson analysis process.</li> <li>• Deepen understandings of elicit and probe questions (STL strategies 1 and 2) and how they reveal student thinking.</li> <li>• Deepen science-content knowledge of variation in traits through lesson analysis.</li> </ul> <p><b>Content</b></p> <ul style="list-style-type: none"> <li>• Elicit questions are designed to reveal a variety of ideas, misconceptions, and experiences that students bring with them when learning new science content.</li> <li>• Probe questions follow up on student statements to find out more about what students are trying to say.</li> <li>• Lesson analysis involves a three-step protocol: (1) Identify the strategy, (2) analyze the use of the strategy in classroom videos, and (3) reflect on learning from the lesson analysis.</li> <li>• The lesson analysis protocol follows a five-step process: (1) Review the lesson content, (2)</li> </ul>	<p><b>Lesson Analysis Focus Question</b></p> <p>How can lesson analysis help us better understand how elicit, probe, and challenge questions can reveal and challenge student thinking?</p> <hr/> <p><b>RESPeCT Lesson Analysis Protocol</b></p> <ol style="list-style-type: none"> <li>1. <b>Identify the strategy</b> <ul style="list-style-type: none"> <li>• What STeLLA lens and strategy was the teacher using in the video clip?</li> </ul> </li> <li>2. <b>Analyze the video</b> <ul style="list-style-type: none"> <li>• What student thinking was made visible (or not)?</li> <li>• How did the use of the STeLLA strategy impact student thinking?</li> </ul> </li> <li>3. <b>Reflect and apply</b> <ul style="list-style-type: none"> <li>• What did you learn from identifying and analyzing the strategy in the video?</li> </ul> </li> </ol>	<p><b>Display Slide 9.</b> Lesson Analysis Focus Question (Less than 1 min)</p> <ol style="list-style-type: none"> <li>a. “Today we’ll explore this focus question: <i>How can lesson analysis help us better understand how elicit, probe, and challenge questions can reveal and challenge student thinking?</i>”</li> <li>b. “But first let’s discuss what lesson analysis involves.”</li> </ol> <hr/> <p><b>Display Slide 10.</b> RESPeCT Lesson Analysis Protocol (3 min)</p> <ol style="list-style-type: none"> <li>a. “This is the three-step protocol that will guide our video-based lesson analysis work. Although we’ll follow the protocol a bit more loosely during the Summer Institute, we’ll rely heavily on this explicit three-step format as we move into the fall study groups.”</li> <li>b. Review the steps on the slide; then tell participants, “Framing our analysis in this way and following specific steps will help us focus more holistically on the teaching and the impact of the STeLLA strategies on student thinking and learning and the storyline students are constructing (i.e., the Student Thinking Lens and the Science Content Storyline Lens).”</li> </ol>

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	<p>identify and discuss the STeLLA strategy in focus, (3) watch the video clip, (4) analyze the clip using the three-step protocol, and (5) reflect on the lesson analysis experience.</p> <ul style="list-style-type: none"> <li>The analysis phase of lesson analysis involves making claims related to the STeLLA framework and providing evidence and reasoning to support the claims.</li> </ul> <p><b>What Participants Do</b></p> <ul style="list-style-type: none"> <li>Review the lesson analysis video viewing basics.</li> <li>Use the five-step lesson analysis process to identify and analyze the use of elicit and probe questions in a student interview (video clip 1).</li> </ul> <p><b>Videos</b></p> <ul style="list-style-type: none"> <li>Video Clip 2.1, Marissa interview</li> </ul> <p><b>Handouts in PD Binder</b></p> <ul style="list-style-type: none"> <li>2.1 Transcript for Video Clip 2.1</li> </ul> <p><b>Supplies</b></p> <ul style="list-style-type: none"> <li>Science notebooks</li> </ul> <p><b>PD Resources</b></p> <ul style="list-style-type: none"> <li>STeLLA strategies booklet</li> <li>STL Z-fold summary chart</li> </ul>	<p><b>Lesson Analysis Process</b></p> <ol style="list-style-type: none"> <li><b>Review</b> the lesson context: <ul style="list-style-type: none"> <li>What is the ideal student response to the focus question?</li> <li>How is the clip situated in the content storyline?</li> </ul> </li> <li><b>Identify</b> and discuss the strategy that is the focus of analysis for each clip.</li> <li><b>Watch</b> video clip(s).</li> <li><b>Analyze</b> the lesson using the lesson analysis protocol.</li> <li><b>Reflect</b> on the lesson analysis experience: <ul style="list-style-type: none"> <li>As a reviewer</li> <li>As a teacher in the clip</li> </ul> </li> </ol> <hr/> <p><b>Lesson Analysis: Viewing Basics</b></p> <ul style="list-style-type: none"> <li><b>Viewing basic 1:</b> Look past the trivial, or little things, that bug you.</li> <li><b>Viewing basic 2:</b> Avoid the “This doesn’t look like my classroom!” trap.</li> <li><b>Viewing basic 3:</b> Avoid making snap judgments about the teaching or learning in the classroom you’re viewing.</li> </ul> <p><b>Note:</b> Find out more about the viewing basics on page 1 of in the STeLLA strategies booklet.</p>	<p><b>Display Slide 11.</b> Lesson Analysis Process (3 min)</p> <ol style="list-style-type: none"> <li>“The lesson analysis protocol includes this five-step process.”</li> <li>Review the steps on the slide and note that in the study groups, these steps will be followed more explicitly than they will be during the Summer Institute.</li> </ol> <hr/> <p><b>Display Slide 12.</b> Lesson Analysis: Viewing Basics (2 min)</p> <ol style="list-style-type: none"> <li><b>Ask:</b> “Why is each of these viewing basics important? Which will be hardest for you?”</li> <li>Tell participants they can find further details on the viewing basics in the STeLLA strategies booklet and refer to this information later.</li> <li><b>Highlight:</b> “The videos we’ll be viewing throughout the program aren’t necessarily exemplary, but rather they provide real-world examples of teachers implementing the STeLLA strategies. Examples like these deepen our thinking because we can see the sometimes unintended results of teacher decisions and consider missed opportunities.”</li> <li><b>Honor the videocase teachers!</b> All of these courageous teachers are not only working hard to improve their own teaching practice but are also willing to make their practice public so that others</li> </ol>

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			can learn from it. None of them would claim to be exemplary science teachers.
		<div data-bbox="793 383 1293 415" style="background-color: #d3d3d3; padding: 2px;">Our First Video Clip</div> <div data-bbox="831 418 1041 444" style="color: #c00000;">Our First Video Clip</div> <div data-bbox="1213 418 1260 451" style="border: 1px solid #ccc; padding: 2px; font-size: 8px;">Video Clip 1</div> <p><b>Context:</b></p> <ul style="list-style-type: none"> <li>• A 3rd-grade student (Marissa) is interviewed before the teacher begins instruction on variation in traits.</li> <li>• The student shares ideas about how trait variations might affect the survival of a litter of rabbits living in a snowy environment.</li> </ul>  <p style="font-size: 8px; text-align: right;">Photo courtesy of Pinnac.com</p>	

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			<p>distinguish them from other types of teacher questions or statements.</p> <p><b>Examples of elicit questions:</b></p> <ul style="list-style-type: none"> <li>• <b>Video segment 00:00:06:</b> “How are they [the rabbits] different?”</li> <li>• <b>Segment 00:00:30:</b> “So if [the rabbits] were born in this habitat, or this area, and this was a predator, would any of them have a better chance of surviving than the others?”</li> </ul> <p><b>Note:</b> Although elicit questions are typically used in a classroom setting to elicit a variety of student ideas, this video clip shows an interview with a student conducted before the Variation in Traits unit began.</p> <p><b>Examples of probe questions:</b></p> <ul style="list-style-type: none"> <li>• <b>Video segment 00:00:13:</b> “OK, so tell me about their skin.”</li> <li>• <b>Segment 00:00:44:</b> “Ah. So how does blending in help them survive better?”</li> <li>• <b>Segment 00:00:51:</b> “So which ones out of ... out of that group might the predators see more easily?”</li> <li>• <b>Segment 00:01:00:</b> “How come the black ones?”</li> <li>• <b>Segment 00:01:53:</b> “How might they look different?”</li> </ul> <p><b>Note:</b> One question at video segment 00:01:33—“Knowing that these guys are harder to see, over years and years and year, what might these rabbits look like?”—might be interpreted as a challenge question in this interview because the interviewer is trying to guide Marissa toward make a connection she hasn’t mentioned between the predation she’s been talking about and its impact on future</p>

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
		<p data-bbox="831 451 1100 477"><b>Analyze Student Thinking</b></p> <p data-bbox="1220 451 1272 483">Video Clip 1</p> <p data-bbox="831 496 1100 516">Review the interview transcript.</p> <ul data-bbox="852 532 1268 721" style="list-style-type: none"> <li>• What student thinking was revealed through the interviewer’s elicit and probe questions?</li> <li>• What did Marissa think what might happen to rabbits with different fur color living in a snowy environment?</li> <li>• Were there places you wished the interviewer had probed Marissa’s thinking more? Why?</li> </ul>	<p data-bbox="1318 293 1944 380">generations of rabbits. This question is pushing Marissa to go beyond her current thinking (not simply probing what she knows now.)</p> <p data-bbox="1318 418 1934 477"><b>Display Slide 15. Analyze</b> Student Thinking, Video Clip 1 (20 min)</p> <ol data-bbox="1318 532 1934 1170" style="list-style-type: none"> <li>a. Give participants time to review the video transcript and develop an answer to one of the analysis questions on this slide. Encourage them to write down their answers in their science notebooks.</li> <li>b. For this first video analysis, do a round-robin and have each participant share. Ask probe and challenge questions to support participants in communicating their ideas clearly and completely: <ul data-bbox="1367 837 1906 984" style="list-style-type: none"> <li>• <b>Probe question:</b> “Can you say more about what you mean by ...?”</li> <li>• <b>Challenge question:</b> “Can you point to a specific place in the transcript that supports your idea?”</li> </ul> </li> <li>c. As participants share, encourage others to respond by asking questions like these: <ul data-bbox="1367 1081 1934 1170" style="list-style-type: none"> <li>• Do others have additional evidence to support (or challenge) this idea?</li> <li>• Do others have a different interpretation?</li> </ul> </li> </ol> <p data-bbox="1318 1203 1944 1409"><b>Example of missed opportunity:</b> At video segment 00:00:30, the interviewer asks whether any of the bunnies might have a better chance of surviving than others. Marissa talks about how well the white rabbits blend into their environment and avoid being eaten by a predator (segments 00:00:38; 00:00:48). Then she seems to indicate that the brown and black</p>

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			<p>bunnies would move to different habitats to avoid predators (00:01:22) and wouldn't stay in the snowy environment: "The ... the brown ones would live closer to, like, forests, and then the black bunnies would probably live close to dark places." It would be nice to know more about Marissa's thinking at this point. Students often believe that animals <i>choose</i> to live in an environment where they're camouflaged, and they don't understand that animals are camouflaged in their environment as the result of natural selection causing a change in populations over time.</p>
<p>9:20–11:30 130 min (Includes 10-min break)</p> <p><b>STL Lesson Analysis: Probe and Challenge Questions</b></p> <p>Slides 16–26</p>	<p><b>Purpose</b></p> <ul style="list-style-type: none"> <li>• Develop a deeper understanding of the RESPeCT lesson analysis process.</li> <li>• Deepen understandings of probe and challenge questions (STL strategies 2 and 3), how they reveal student thinking, and how they move student thinking forward.</li> <li>• Deepen science-content knowledge of variation in traits through lesson analysis.</li> <li>• Understand that science-content knowledge is essential for using probe and challenge questions effectively in the classroom.</li> </ul> <p><b>Content</b></p> <ul style="list-style-type: none"> <li>• Probe questions follow up on student statements to find out more about what students are trying to say.</li> </ul>	<p><b>Identify Probe and Challenge Questions</b> <small>Video Clip 2</small></p> <ul style="list-style-type: none"> <li>• Now we'll look at a classroom video and focus on identifying probe and challenge questions.</li> <li>• Read the context at the top of the video transcript (handout 2.2).</li> <li>• Identify probe (P) and challenge (C) questions and mark them on your transcript.</li> <li>• Mark "missed opportunity" (MO) next to places you would like to know more about student thinking.</li> </ul> <p><b>Remember:</b></p> <ol style="list-style-type: none"> <li>1. Not all questions will fall into these categories.</li> <li>2. <b>Probe questions</b> try to figure out what a student means or is thinking. <b>Challenge questions</b> try to move student thinking toward a more scientifically accurate idea.</li> </ol> <p><a href="#">Link to video clip 2: 2.2_mspcp_gr3.variations.traits.lathon_L1_c1</a></p>	<p><b>Display Slide 16. Identify</b> Probe and Challenge Questions, Video Clip 2 (20 min)</p> <ol style="list-style-type: none"> <li>a. Provide instructions for watching video clip 2 and using the transcript (handout 2.2) to identify questions that probe student ideas and predictions and challenge student thinking.</li> <li>b. Encourage participants to refer to the strategy charts from day 1 (STL strategies 1–3), their Z-fold summary charts, and the STeLLA strategies booklet for help differentiating probe and challenge questions. Remind them that other types of questions (such as elicit questions) may appear in this video clip.</li> <li>c. <b>Set the context:</b> Read the context for video clip 2 (at the top of the transcript).</li> <li>d. Emphasize that the students in this class haven't yet studied anything about variation in traits.</li> <li>e. Show the video clip and allow time for participants to study the transcript before advancing to the next slide.</li> </ol>

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
	<ul style="list-style-type: none"> <li>Challenge questions are designed to push students to think hard, make new connections, change their ideas, and move toward more-scientific understandings.</li> <li>The lesson analysis process involves making claims related to the STeLLA framework and providing evidence and reasoning to support those claims.</li> <li>Viewing basics and analysis basics guide the lesson analysis process.</li> </ul> <p><b>What Participants Do</b></p> <ul style="list-style-type: none"> <li>Identify probe and challenge questions in a classroom video (video clip 2).</li> <li>Review common student ideas about variation in traits.</li> <li>Analyze the use of probe and challenge questions in a classroom video (video clip 2).</li> <li>Identify and analyze the use of probe and challenge questions in another classroom video (video clip 3).</li> <li>Discuss the importance of science-content knowledge in using probe and challenge questions effectively in the classroom.</li> </ul> <p><b>Posters and Charts</b></p> <ul style="list-style-type: none"> <li>Strategy charts from day 1 (STL</li> </ul>	<div style="border: 1px solid gray; padding: 5px;"> <p style="margin: 0;"><b>Identify Probe and Challenge Questions</b> <span style="float: right; font-size: small;">Video Clip 2</span></p> <ul style="list-style-type: none"> <li>What are good examples of probe questions in the video transcript (if any)?</li> <li>What are good examples of challenge questions in the transcript (if any)?</li> </ul> </div>	<p><b>Display Slide 17. Identify</b> Probe and Challenge Questions, Video Clip 2 (5 min)</p> <p>a. After each suggested probe or challenge question, ask participants the following:</p> <ul style="list-style-type: none"> <li>“What makes this a probe/challenge question?”</li> <li>“Did others mark this as a probe/challenge question?”</li> <li>“Can you point to any of our resources (the Z-fold summary chart, our strategy charts from day 1, or the STeLLA strategies booklet) to support your answer?”</li> </ul> <p>b. Don’t worry about debate and lack of agreement on some questions. <b>The important thing</b> is that participants clearly understand the difference between the purposes of probe and challenge questions. Sometimes it’s hard to tell whether the teacher in the video intended to find out what a student meant (probe) or move student thinking toward more-scientific understandings (challenge). The teacher may also be asking elicit questions to reveal student ideas and misconceptions.</p> <p><b>Possible examples of probe questions:</b></p> <ul style="list-style-type: none"> <li><b>Video segment 00:00:10:</b> “OK, so talk to me about some of your differences, some of your variations. What did you find?” [<i>Justification:</i> This is a restated elicit question used to probe what the small group is thinking.]</li> <li><b>Segment 00:00:22:</b> “OK, so you said you can see dots on each paper ... on each ladybug.” [<i>Justification:</i> The teacher paraphrases what a student says.]</li> <li><b>Segment 00:01:19:</b> “What do you think are some</li> </ul>



PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
	<p>strategies 1–3)</p> <ul style="list-style-type: none"> <li>• Common Student Ideas chart</li> <li>• Parking Lot poster</li> </ul> <p><b>Videos</b></p> <ul style="list-style-type: none"> <li>• Video Clip 2.2, Lathon classroom</li> <li>• Video Clip 2.3, Wilde classroom</li> </ul> <p><b>Handouts in PD Binder</b></p> <ul style="list-style-type: none"> <li>• 2.2 Transcript for Video Clip 2.2</li> <li>• 2.3 Transcript for Video Clip 2.3</li> </ul> <p><b>Supplies</b></p> <ul style="list-style-type: none"> <li>• Red and blue sticker dots (or pencils)</li> <li>• Sticky notes</li> </ul> <p><b>PD Resources</b></p> <ul style="list-style-type: none"> <li>• STeLLA strategies booklet</li> <li>• STL Z-fold summary chart</li> </ul> <p><b>Resources in Lesson Plans Binder</b></p> <p><i>Resources section:</i></p> <ul style="list-style-type: none"> <li>• Common Student Ideas</li> </ul>		<p>reasons that that might take place?”</p> <ul style="list-style-type: none"> <li>• <b>Segments 00:01:41, 00:01:46:</b> “So are you ... are you saying that environment ... could possibly have a ... a reason for variation?”</li> <li>• <b>Segment 00:01:51:</b> “So tell me more about that. So environment. What other kind of big categories like that do you think might be a cause for variations in ladybugs?”</li> <li>• <b>Segment 00:02:09:</b> “OK, and tell me more about that. Why ... why ... why not purple? Why not pink?”</li> <li>• <b>Segment 00:02:32:</b> “OK. Can you think of any other ... Other than environment, why else do you think that there might be a difference in variations?”</li> <li>• <b>Segment 00:02:54:</b> “Yeah, but why the ... why the difference in spot ... number of spots?”</li> </ul> <p><b>Note:</b> Some participants may question why segments 00:01:51 and 00:02:32 are probe questions rather than elicit or challenge questions. Both questions could reasonably be interpreted as elicit questions, since Ms. Lathon is looking for other ideas to explain why variations might exist rather than looking for one correct answer. However, neither question can be interpreted as a challenge question because Ms. Lathon hasn’t yet introduced any new science ideas and isn’t trying to change student thinking. She is simply trying to learn more about what students currently think and is building on what students’ have already said about why variations exist. She is probing their thinking, not attempting to move student thinking toward more scientifically accurate ideas.</p>



PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
		<div style="border: 1px solid gray; padding: 5px;"> <p style="margin: 0;"><b>Analyze Student Thinking</b> <span style="float: right; font-size: small;">Video Clip 2</span></p> <ul style="list-style-type: none"> <li>• <b>Select</b> one of the following analysis questions:               <ol style="list-style-type: none"> <li>1. What student ideas about variation in traits did the teacher’s use of probe questions reveal?</li> <li>2. Did any probe questions lead students away from thinking about trait variation in ladybugs toward ideas that weren’t closely related?</li> </ol> </li> <li>• <b>Review</b> the video transcript and <b>develop</b> an answer to the question. <b>Write</b> your response in your science notebook.</li> <li>• Be prepared to share your ideas with the group and engage in scientific discussion.</li> </ul> </div>	<p><b>Display Slide 18.</b> Analyze Student Thinking, Video Clip 2 (10 min)</p> <p>a. Remind participants of the purposes of video analysis: to deepen understandings of STeLLA strategies; to develop their ability to analyze student thinking; and, ultimately, to improve student learning.</p> <p>b. <b>Individuals:</b> “Select one analysis question on the slide; then review the transcript and develop an answer to this question. Write your responses in your science notebooks.”</p> <p><b>Note:</b> Participants will likely choose to answer the first question. The second question is more difficult but is an interesting one you might want to model if no one addresses it. (See ideal response below.)</p> <p>c. <b>Whole group:</b> As participants share their responses to the questions, encourage discussion and ask the following questions:</p> <ul style="list-style-type: none"> <li>• <b>Probe:</b> “Can you say more about what you mean by ...”</li> <li>• <b>Challenge:</b> “Can you point to a specific place in the transcript that supports your idea?”</li> <li>• “Do others have additional evidence to support or challenge this idea?”</li> <li>• “Do others have a different interpretation?”</li> </ul> <p>d. Highlight these points as needed:</p> <ul style="list-style-type: none"> <li>• Ask probe questions when students make vague or abbreviated statements or when they simply name a vocabulary term. Do they really understand the concepts, or do they have misconceptions?</li> <li>• Don’t probe everything. Just probe responses</li> </ul>

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			<p>that might reveal interesting student thinking related to the main learning goal.</p> <p><b>Ideal responses:</b></p> <ul style="list-style-type: none"> <li>• <i>Question 1:</i> Probe questions revealed interesting student ideas related to trait variation. <ul style="list-style-type: none"> <li>• <b>Segment 00:01:51:</b> The teacher’s probe question—“What other kind of big categories like [environment] do you think might be a cause for variations in ladybugs?”—led to a student noticing that some ladybugs are red and some are orange.</li> <li>• <b>Segments 00:02:32 and 00:02:54:</b> After the teacher’s first probe question—“Other than environment, why else do you think there might be a difference in variations?”—students noticed a variation in the number of spots on the ladybugs, and the next question—“Yeah, but why the ...why the difference in spot ... number of spots?”—led to an interesting student idea that this variation might be related to the age of the ladybugs (the older the ladybug, the more spots).</li> </ul> </li> <li>• <i>Question 2:</i> The following probe questions weren’t related to the idea that ladybug traits vary and consequently led student thinking away from the key focus of the discussion: <ul style="list-style-type: none"> <li>• At segment 00:02:01, a student noticed a variation in ladybug traits: Some ladybugs are orange, and some are red. The teacher responded at segment 00:02:09 with a broad probe question: “Tell me more about that.” But then the teacher added, “Why not purple? Why not pink?” This led students away from thinking about trait variations (why some ladybugs are red and others are orange) to thinking about why ladybugs are never purple</li> </ul> </li> </ul>

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			<p>or pink. The question revealed interesting student ideas, such as “[Pink or purple] wouldn’t look good for a ladybug” (segment 00:02:13), but these ideas weren’t related to trait variation.</p>
<b>10-MINUTE BREAK</b>			
		<div style="border: 1px solid gray; padding: 5px;"> <p style="margin: 0;"><b>Common Student Ideas</b> <span style="float: right; font-size: small;">Video Clip 2</span></p> <ol style="list-style-type: none"> <li>1. Locate Common Student Ideas about Variation in Traits (in lesson plans binder).</li> <li>2. Read through the <b>left-hand column</b>. <ul style="list-style-type: none"> <li>• Have you observed any of these common ideas among your students? (Mark these ideas with a <b>red</b> dot.)</li> <li>• Have you ever held any of these ideas yourself? (Mark these ideas with a <b>blue</b> dot.)</li> <li>• Can you think of other misconceptions you’ve held or observed in students?</li> </ul> </li> <li>3. <b>Pairs:</b> Share your observations with a partner.</li> <li>4. <b>Whole group:</b> What patterns do you notice in the red and blue dots? What did this analysis make you think about?</li> </ol> </div>	<p><b>Display Slide 19.</b> Common Student Ideas, Video Clip 2 (15 min)</p> <ol style="list-style-type: none"> <li>a. “Now let’s consider some commonly held student ideas (misconceptions). Then we can analyze whether any of these ideas appear in our video clips.”</li> <li>b. Have participants locate the Common Student Ideas chart in the resources section of their lesson plans binders.</li> <li>c. “This Common Student Ideas chart shows some commonly held student ideas that are interesting but aren’t scientifically accurate.”</li> <li>d. <b>Individuals:</b> Have participants mark with a red sticker dot any ideas they’ve observed among their students, and mark with a blue sticker dot any ideas they’ve had themselves.</li> <li>e. <b>Pairs:</b> Have participants discuss their observations with a partner.</li> <li>f. <b>Whole group:</b> Ask participants to share which ideas they’ve observed in their students and themselves. During this share-out, apply sticker dots to the Common Student Ideas chart at the front of the room as participants to highlight patterns in the results. Then discuss the following</li> </ol>

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
		<div data-bbox="793 808 1293 831" style="background-color: #cccccc; border: 1px solid black; margin-bottom: 5px;"></div> <p data-bbox="837 841 1092 865"><b>Common Student Ideas</b></p> <div data-bbox="1220 841 1266 870" style="border: 1px solid black; padding: 2px; display: inline-block; font-size: 8px;">Video Clip 2</div> <p data-bbox="837 881 1266 954"><b>Individuals:</b> Read the scientific explanations for your assigned idea on the Common Student Ideas chart.</p> <p data-bbox="837 980 1266 1078"><b>Pairs:</b> Discuss these explanations briefly with a partner. What was new to you? Write on sticky notes any content questions you have and place them on the Parking Lot poster.</p>	<p data-bbox="1346 293 1470 318">questions:</p> <ul data-bbox="1346 337 1944 456" style="list-style-type: none"> <li>• “What conceptual patterns do you notice in the red and blue dots?”</li> <li>• “What reactions do you have to this analysis? What did it make you think about?”</li> </ul> <p data-bbox="1346 475 1944 532"><b>Note:</b> If time is short, skip this pattern analysis and discussion.</p> <p data-bbox="1314 552 1944 699">g. “We’ve recognized these common ideas in students or held them ourselves. It’s important to be aware of them when we’re analyzing student thinking in the video clips or planning and teaching lessons in the future.”</p> <p data-bbox="1314 719 1885 776">h. “Now let’s look for evidence of these common student ideas in a video clip.”</p> <p data-bbox="1314 813 1913 870"><b>Display Slide 20.</b> Common Student Ideas, Video Clip 2 (10 min)</p> <p data-bbox="1314 922 1944 1040">a. Have participants count off in ones and twos (1, 2, 1, 2). “Ones” will focus on the odd-numbered ideas on the Common Student Ideas chart, and “twos” will focus on the even-numbered ideas.</p> <p data-bbox="1314 1060 1944 1149">b. <b>Individuals:</b> “Read the scientific explanations for your assigned idea on the Common Student Ideas chart.”</p> <p data-bbox="1314 1169 1913 1287">c. <b>Pairs:</b> “Discuss these explanations briefly with a partner. What was new to you? Write on sticky notes any content questions you have and place the notes on the Parking Lot poster.”</p>

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
		<p><b>Lesson Analysis Basics</b></p> <ul style="list-style-type: none"> <li>• <b>Analysis basic 1:</b> Focus on student thinking and the science content storyline.</li> <li>• <b>Analysis basic 2:</b> Look for evidence to support any claims.</li> <li>• <b>Analysis basic 3:</b> Look more than once (in the video and transcript).</li> <li>• <b>Analysis basic 4:</b> Consider alternative explanations and teaching strategies.</li> </ul> <p><b>Note:</b> Find out more about the analysis basics on page 2 of the STeLLA strategies booklet.</p>	<p><b>Display Slide 21.</b> Lesson Analysis Basics (5 min)</p> <ol style="list-style-type: none"> <li>“Before we analyze the video clip, let’s think about our lesson analysis process.”</li> <li>Review the analysis basics on the slide. <ul style="list-style-type: none"> <li><b>Note:</b> Direct participants to page 2 in the strategies booklet if they have specific questions that require more information.</li> </ul> </li> <li><b>Why the analysis basics are important:</b> “The analysis basics will help us dig deeper and learn more from our videocase analyses while keeping us focused on the ultimate goal of improved student learning.” <ul style="list-style-type: none"> <li><b>Note:</b> This lesson analysis process is <b>not</b> about critiquing teachers but about improving student learning.</li> </ul> </li> <li>“We’ll use a more structured lesson analysis protocol when we begin reviewing each other’s videos in the fall study-group sessions.”</li> </ol>
		<p><b>Analyze Questions That Probe and Challenge Student Thinking</b> <span style="float: right;">Video Clip 2</span></p> <p><b>Analysis question:</b> What student thinking is made visible (or not) through the use of probe or challenge questions? Be specific. Consider whether you observed any of the common student ideas or correct scientific explanations in the video.</p> <p><b>Individuals:</b> Make notes or highlight questions/responses on the video transcript. Develop a claim to answer the question. Support the claim with</p> <ul style="list-style-type: none"> <li>• evidence from the transcript,</li> <li>• ideas from the Common Student Ideas chart, and/or</li> <li>• ideas from the STeLLA strategies booklet.</li> </ul> <p><b>Whole group:</b> Share claims and evidence.</p>	<p><b>Display Slide 22.</b> Analyze Questions That Probe and Challenge Student Thinking, Video Clip 2 (15 min)</p> <ol style="list-style-type: none"> <li>Remind participants of the purposes of video analysis: to deepen understandings of STeLLA strategies; to develop their ability to analyze student thinking; and, ultimately, to improve student learning.</li> <li><b>Tell participants:</b> “Remember to refer to your Common Student Ideas chart as you analyze the video clip.”</li> </ol>

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			<p>c. <b>Individuals:</b> Review the slide instructions before participants begin working independently on the tasks.</p> <p>d. <b>Whole group:</b></p> <ul style="list-style-type: none"> <li>• Have several participants share their claims and evidence.</li> <li>• <b>Ask:</b> “Did you recognize any of the common student ideas in the students’ responses?”</li> <li>• <b>Ask:</b> “What probe or challenge questions might you ask to better understand student thinking?”</li> </ul> <p><b>Note:</b> Remember to use probe and challenge questions as you interact with participants.</p>
		<p><b>Identify Probe, Challenge, and Leading Questions</b> <span style="float: right; font-size: small;">Video Clip 3</span></p> <p>Now we’ll look at another classroom video. Read the context in the video transcript (top of handout 2.3).</p> <p><b>Individuals:</b> Mark the transcript to identify probe (P), challenge (C), or leading (L) questions. Then mark any missed opportunities (MO).</p> <p><b>Remember:</b></p> <ol style="list-style-type: none"> <li>1. Not all questions (or statements) will fall into these three categories: P, C, or L.</li> <li>2. Review the viewing basics and analysis basics.</li> </ol> <p><b>Whole-group share-out:</b> Give reasons for marking the questions the way you did.</p> <p style="font-size: x-small; color: blue;"><a href="#">Link to video clip 3: 2.3_mscpc_gr.3.variations.traits_wilde_L6_c1</a></p>	<p><b>Display Slide 23. Identify</b> Probe, Challenge, and Leading Questions, Video Clip 3 (20 min)</p> <p>a. Read the context for this video clip at the top of the transcript (handout 2.3).</p> <p>b. Provide instructions for watching video clip 3 and using the transcript to identify questions that probe student ideas and predictions and challenge student thinking. <b>Participants should also be on the lookout for leading questions and missed opportunities. (Note:</b> Leading questions provide hints or make it easy for students to give the “right” answer.) Remind participants that other types of questions (such as elicit questions) may appear in this video clip.</p> <p>c. Show the video clip.</p> <p>d. <b>Individuals:</b> Review the slide instructions before participants begin working independently on the</p>

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			<p>tasks.</p> <p><b>e. Whole group:</b></p> <ul style="list-style-type: none"> <li>• Challenge participants to clearly state their reasons for identifying a question as probe, challenge, or leading.</li> <li>• Encourage participants to provide evidence from the STeLLA strategies booklet to support their claims.</li> </ul> <p><b>Examples of probe questions:</b></p> <ul style="list-style-type: none"> <li>• <b>Video segment 00:00:31:</b> “You think green. How come?”</li> <li>• <b>Segment 00:01:50:</b> “Why do you think green or light purple?”</li> </ul> <p><b>Example of a challenge question:</b></p> <ul style="list-style-type: none"> <li>• <b>Video segment 0:01:59.9:</b> “When all those beetles had babies, what do you think the next generation will look like?” [<i>Justification:</i> The teacher is trying to get students to transition from thinking about the offspring of two green beetles to making a new connection to the offspring of a whole generation of beetles in this population.]</li> </ul>

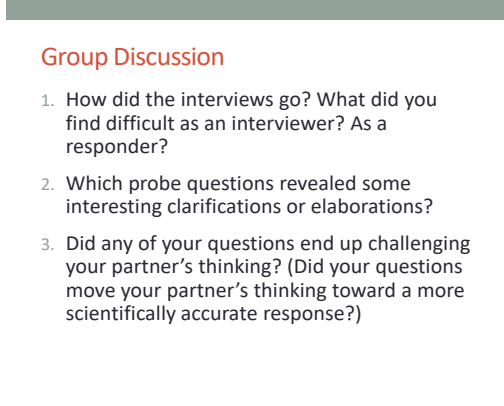
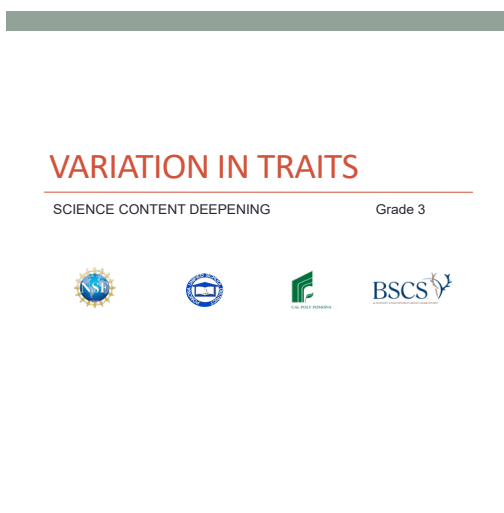




PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
		<p><b>Analyze Student Thinking</b> <span style="float: right; font-size: small;">Video Clip 3</span></p> <p><b>Analysis question:</b> What student thinking is made visible (or not) through the use of probe or challenge questions? Be specific.</p> <p><b>Individuals:</b> Develop a claim to answer the analysis question. Support the claim with</p> <ul style="list-style-type: none"> <li>- evidence from the video transcript,</li> <li>- ideas from the Common Student Ideas chart, and/or</li> <li>- ideas from the STeLLA strategies booklet.</li> </ul> <p><b>Whole group:</b> Share claims and evidence.</p>	<p><b>Display Slide 24. Analyze Student Thinking, Video Clip 3 (10 min)</b></p> <p>a. <b>Emphasize:</b> “Remember to refer to your Common Student Ideas chart as you analyze the video.”</p> <p>b. <b>Individuals:</b> Review the slide instructions before participants begin working independently on developing a claim to answer the analysis question.</p> <p>c. <b>Whole group:</b></p> <ul style="list-style-type: none"> <li>• Have several participants share their claims and evidence.</li> <li>• <b>Ask:</b> “Did you recognize any of the common student ideas in the students’ responses?”</li> <li>• <b>Ask:</b> “What probe or challenge questions might you ask to better understand student thinking?”</li> </ul> <p><b>Note:</b> Remember to use probe and challenge questions as you interact with participants.</p> <p><b>Common student idea in the video clip:</b> This clip relates to the common student idea that only the most common traits in a generation of living things will be passed on to the next generation, and less common traits will disappear. In other words, the dominant trait wins.</p> <p><b>Claim:</b> Students make predictions about the next generation of beetles based on the idea that the most-common trait in the population “wins” and takes over completely in the next generation. Students don’t consider that some beetles have a survival advantage over others or that beetles in the next generation will show variation in traits. They have an</p>




PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			<p>all-or-nothing perspective.</p> <p><b>Evidence:</b> All five students who made a prediction during the discussion (see video segments 00:01:46–00:01:53; 00:02:19–00:02:27; 00:02:48; 00:02:57; and 00:03:20–00:03:26) named just one or two colors (out of the five). Except for S2, they all picked green, light purple, or both because four of each of these two colors was more than blue (three), dark purple (three), and black (one). Their reasoning was that the most-dominant beetle colors from Round 7 would be the only colors in the next round. They didn't use reasoning related to natural selection to argue that the green beetles would have a better chance of surviving than all of the other beetles because they're better camouflaged against a green background. Students also didn't predict that there would still be a variety of colors in the next round.</p> <p><b>Reasoning:</b> The teacher's questioning helped lead students down this path. In segment 00:01:09, she originally posed the question, "When all those beetles had babies, what do you think the next generation will look like? So, with the baby beetles, what do we think that'll look like?" But then she immediately shifted the question to "Which one would have the most?" and continued to use this new version of the question for the remainder of the clip (segments 00:01:25; 00:03:13; and 00:03:29).</p> <p><b>Alternative:</b> It would be better to stick with the original question: "When all those beetles had babies, what do you think the next generation will look like?" The teacher could also encourage students to look at the patterns on their data table as they went from Hunt 1 to Hunt 2 to Hunt 3. For each color of beetle, the numbers slowly changed, although some colors changed faster than others.</p>

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			<p>But no color of beetle completely disappeared, even after seven hunt rounds (generations) in their green environment. The teacher could also ask challenge questions to focus students' attention on the idea that green beetles have a survival advantage because of the green environment.</p>
		<p><b>Summarize: Elicit, Probe, and Challenge Questions</b></p> <ol style="list-style-type: none"> <li>1. What makes a good elicit question? A good probe question? A good challenge question?</li> <li>2. What do you need to know to ask good elicit, probe, and challenge questions?</li> </ol> <p>To ask good questions that make student thinking visible, you need a clear understanding of</p> <ol style="list-style-type: none"> <li>a. the science concepts you are teaching, and</li> <li>b. alternative ideas that students may hold.</li> </ol>	<p><b>Display Slide 25.</b> Summarize: Elicit, Probe, and Challenge Questions (5 min)</p> <ol style="list-style-type: none"> <li>a. Pose the first question on the slide. If participants need support, point them to the descriptions of strategies 1, 2, and 3 in the STeLLA booklet (especially the Summary of STeLLA Student Thinking Lens Strategies).</li> <li>b. Pose the second question. Do participants come up with the idea that science-content knowledge is essential for asking good elicit, probe, and challenge questions?</li> <li>c. Use the rest of the time to highlight the importance of knowing science content and being aware of common student ideas.</li> </ol>
		<p><b>Reflect on Your Learning</b></p> <p>Respond to these questions in a quick write:</p> <ol style="list-style-type: none"> <li>1. What did you learn about student thinking from analyzing these videos?</li> <li>2. How did the analysis process help you better understand the questioning strategies?</li> </ol> <p>Be prepared to share your ideas.</p>	<p><b>Display Slide 26.</b> Reflect on Your Learning (5 min)</p> <ol style="list-style-type: none"> <li>a. Ideally, participants will first respond to the questions in a quick write and then share their ideas with the group. But if time is running short, you can have them simply think for a minute and then share their ideas. But be sure to give them time to think before opening up the discussion.</li> </ol>

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
<p>11:30–12:00 30 min</p> <p><b>Practice Using Elicit and Probe Questions: Interviews</b></p> <p>Slides 27–29</p>	<p><b>Purpose</b></p> <ul style="list-style-type: none"> <li>• Deepen understandings of elicit and probe questions.</li> <li>• Begin to develop the ability to ask elicit and probe questions effectively.</li> <li>• Appreciate that science-content knowledge is essential for using elicit and probe questions effectively in the classroom.</li> </ul> <p><b>Content</b></p> <ul style="list-style-type: none"> <li>• Understanding the purposes and key features of elicit and probe questions is essential for implementing the STeLLA questioning strategies effectively in the classroom.</li> </ul> <p><b>What Participants Do</b></p> <ul style="list-style-type: none"> <li>• Consider possible responses an elicit question (related to genetics) might produce, and plan probe questions to follow up on these responses.</li> <li>• Work in pairs, taking turns being the interviewer and asking each other an elicit question and then following up with only probe questions.</li> <li>• Participate in a group discussion afterward that focuses on the difficult aspects of the pairs work and the interesting thinking it</li> </ul>	<p><b>Practice Elicit and Probe Questions: Interview Planning</b></p> <ul style="list-style-type: none"> <li>• <b>The challenge:</b> Pair up and practice using elicit and probe questions. First ask your partner an elicit question and then ask <b>only</b> probe questions to find out what your partner thinks.</li> <li>• <b>To prepare:</b> <ol style="list-style-type: none"> <li>a. Read your elicit question.</li> <li>b. Read the common student ideas and scientific explanations that relate to your question.</li> <li>c. Plan probe questions to clarify ideas you think might emerge.</li> </ol> </li> </ul> <p><b>Practice Elicit and Probe Questions: Interview Process</b></p> <ol style="list-style-type: none"> <li>1. Ask your partner the elicit question.</li> <li>2. Probe your partner’s thinking without providing any new information. (Keep going for at least 2 minutes!)</li> <li>3. Debrief with your partner: <ul style="list-style-type: none"> <li>• What probe questions did you ask?</li> <li>• Did you ask questions that weren’t probe questions?</li> <li>• What did your probe questions reveal about your partner’s understanding of the concept?</li> </ul> </li> <li>4. Switch roles and repeat the interview process, with the other partner asking the questions.</li> </ol>	<p><b>Display Slide 27.</b> Practice Elicit and Probe Questions: Interview Planning (12 min)</p> <ol style="list-style-type: none"> <li>a. <b>Describe the challenge:</b> “Next, you and a partner will practice using elicit and probe questions by interviewing each other. The challenge is to ask your partner an elicit question and then follow up by asking <i>only</i> probe questions.”</li> <li>b. Give each participant a different elicit question (from the PD leader master cards).</li> <li>c. Direct participants to prepare for the interviews by following the slide instructions.</li> </ol> <p><b>Note:</b> Participants may refer to the Common Student Ideas chart as a resource for this activity.</p> <p><b>Display Slide 28.</b> Practice Elicit and Probe Questions: Interview Process (12 min)</p> <ol style="list-style-type: none"> <li>a. Review the instructions on the slide.</li> <li>b. “Each interviewer will have 5 minutes to ask questions. Try to keep going with your probe questions for at least 2 minutes.”</li> <li>c. <b>Interviewees:</b> “Don’t pretend to be an elementary student; be yourself. Help your partner by pushing yourself to explain things in more depth than you actually understand. Try to come up with possible explanations that go beyond the surface vocabulary. Don’t worry about being wrong; this will actually make the task more like what you might encounter in the classroom.”</li> </ol>

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
	<p>revealed.</p> <p><b>Posters and Charts</b></p> <ul style="list-style-type: none"> <li>• Common Student Ideas chart</li> </ul> <p><b>PD Leader Masters</b></p> <ul style="list-style-type: none"> <li>• PD Leader Master: Elicit Question Cards (cut apart)</li> </ul> <p><b>Resources in Lesson Plans Binder</b></p> <p><i>Resources section:</i></p> <ul style="list-style-type: none"> <li>• Common Student Ideas</li> </ul>	 <p><b>Group Discussion</b></p> <ol style="list-style-type: none"> <li>1. How did the interviews go? What did you find difficult as an interviewer? As a responder?</li> <li>2. Which probe questions revealed some interesting clarifications or elaborations?</li> <li>3. Did any of your questions end up challenging your partner's thinking? (Did your questions move your partner's thinking toward a more scientifically accurate response?)</li> </ol>	<p><b>Display Slide 29.</b> Group Discussion (6 min)</p> <p>a. <b>Whole group:</b> Discuss the questions on the slide.</p> <p>b. If there's time, ask participants, "How might it help your teaching to do more of this type of practice (with a partner or small group)?"</p>
<p>12:00–12:45 45 min</p>	<p><b>LUNCH</b></p>		
<p>12:45–3:15 150 min (Includes 10-min break)</p> <p><b>Content Deepening: Variation in Traits</b></p> <p>Slides 30–65</p>	<p><b>Purpose</b></p> <ul style="list-style-type: none"> <li>• Deepen participants' understandings of variation in traits by conducting investigations from VIT lessons 3a/b, 4a/b, and 5a.</li> </ul> <p><b>Content</b></p> <ul style="list-style-type: none"> <li>• Both color variations and the environment affect which beetles survive longer than others in their environment.</li> <li>• When the environment changed, different beetles were more likely to survive because their coloring blended into the new</li> </ul>	 <p><b>VARIATION IN TRAITS</b></p> <p>SCIENCE CONTENT DEEPENING <span style="float: right;">Grade 3</span></p> <p>     </p>	<p><b>Display Slide 30.</b> Content Deepening: Variation in Traits (Less than 1 min)</p> <p>a. "Now, let's begin our content deepening work for today."</p> <p><b>Note:</b> Throughout this content deepening phase, refer as needed to the content background document and Common Student Ideas about Variation in Traits.</p>


PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
	<p>environment better.</p> <p><b>What Participants Do</b></p> <ul style="list-style-type: none"> <li>Review key science ideas from the previous content deepening session.</li> <li>Engage in a teaching role-play for lesson 2a.</li> <li>Summarize key ideas about trait variation from the content background document.</li> <li>Investigate variation in the color trait among beetles and use a desert model to simulate how this variation affects their survival in different environments.</li> <li>Complete an analogy map explaining how parts of the desert model are similar to the real world.</li> <li>Compile and analyze data on the desert simulations using data tables, fraction calculations, and bar graphs.</li> </ul> <p><b>Posters and Charts</b></p> <ul style="list-style-type: none"> <li>Common Student Ideas chart</li> </ul>	<div data-bbox="793 305 1293 326" style="background-color: #d3d3d3; height: 13px; margin-bottom: 10px;"></div> <p style="color: #c00000;">Unit Central Question</p> <div data-bbox="844 407 1247 532" style="border: 1px solid black; padding: 10px; margin: 10px auto; width: fit-content;"> <p>Do all of the mice living in the same environment, such as a field or forest, have an equal chance of surviving?</p> </div> <div data-bbox="793 732 1293 753" style="background-color: #d3d3d3; height: 13px; margin-bottom: 10px;"></div> <p style="color: #c00000;">Review: Focus Questions from Day 1</p> <ol style="list-style-type: none"> <li>How do traits of living things help us understand how they're grouped and related?</li> <li>Why are trait variations important for the survival of living things?</li> <li>How can we represent patterns of trait variation among individuals of a species?</li> </ol>	<p><b>Display Slide 31.</b> Unit Central Question (Less than 1 min)</p> <ol style="list-style-type: none"> <li>Revisit the unit central question that students will think about during the Variation in Traits lesson sequence.</li> <li>"Today we'll continue exploring key science ideas about trait variation that will help us answer this question."</li> </ol> <p><b>Display Slide 32.</b> Review: Day 1 Focus Questions (2 min)</p> <ol style="list-style-type: none"> <li>Review the previous content deepening focus questions on the slide.</li> <li>"What key science ideas from our last session helped us answer these questions?"</li> </ol> <p><b>Note:</b> During this review, participants may refer to the answers and ideas they recorded in their science notebooks in the previous session.</p>


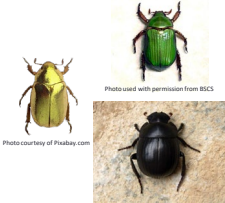
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
	<p><b>Supplies</b></p> <ul style="list-style-type: none"> <li>• Science notebooks</li> </ul> <p><b>Handouts in PD Binder</b></p> <ul style="list-style-type: none"> <li>• 2.4 Beetles in the Desert— Analogy Map (from VIT lesson 3b)</li> <li>• 2.5 Calculating the Fraction of Beetles (from VIT lesson 4a)</li> </ul> <p><b>Handouts in Lesson Plans Binder</b></p> <ul style="list-style-type: none"> <li>• 3.1 Using the Model (from VIT lesson 3a)</li> <li>• 3.2 Beetles in the Desert (from VIT lesson 3a)</li> <li>• 3.4 Beetles in the Desert— Analogy-Map Answer Key (Teacher Master) (from VIT lesson 3b)</li> </ul> <p><b>PD Resources</b></p> <ul style="list-style-type: none"> <li>• RESPeCT lesson plans binder</li> </ul> <p><b>Resources in Lesson Plans Binder</b></p> <p><i>Resources section:</i></p> <ul style="list-style-type: none"> <li>• Content background document</li> <li>• Common Student Ideas</li> </ul> <p><i>Pretabs section:</i></p> <ul style="list-style-type: none"> <li>• Variation in Traits: Learning Goals for Students and Teachers</li> </ul>	<p> <b>Key Science Ideas: Review</b></p> <ul style="list-style-type: none"> <li>• <b>Traits</b> are features or characteristics that help biologists identify related groups of organisms.</li> <li>• Organisms have physical traits, molecular traits, behavioral traits, chemical pathways, and developmental pathways.</li> <li>• Organisms in a group share certain traits.</li> <li>• One reason groups of organisms share so many features is common ancestry.</li> <li>• All of the organisms that evolved from a common ancestor inherit shared traits.</li> </ul> <p><b>Variation in Traits Lesson Role-Play</b></p> <ol style="list-style-type: none"> <li>1. <b>Review</b> lesson 2a in your lesson plans binder and assemble the materials listed on the overview page.</li> <li>2. <b>Pair up</b> and decide who will be the teacher and who will be the student for this role-play.</li> <li>3. <b>Select</b> a 10-minute segment of the lesson to enact.</li> <li>4. <b>Prepare for the role-play:</b> <ul style="list-style-type: none"> <li>• <b>Students:</b> Review the Common Student Ideas document (Resources section of binder) and be ready to use them! Also come up with two or three challenge questions the teacher might ask to move your thinking forward.</li> <li>• <b>Teachers:</b> Read anticipated student responses and teacher probe and challenge questions (columns 5 and 6 in the lesson plan). Be ready to use them!</li> </ul> </li> <li>5. <b>Practice</b> the role-play with your partner.</li> </ol>	<p><b>Display Slide 33.</b> Key Science Ideas: Review (Less than 1 min)</p> <p>a. Review the key science ideas on the slide.</p> <p><b>Display Slide 34.</b> Variation in Traits Lesson Role-Play (20 min)</p> <p>a. Ask participants to locate lesson 2a in their lesson plans binders. Note that in this lesson, students measure and record the lengths of different plants (carrots and leaves). Participants will reflect on the math connections later on as a group.</p> <p>b. <b>Pairs:</b> Review the steps on the slide and have participants pair up to complete the tasks, switching roles from last time. Make sure teachers and students know what tasks they should complete to prepare for the role-play.</p> <p>c. “The instructions for this role-play are basically the same as last time, except that students are asked to prepare two or three challenge questions the teacher might ask to move their thinking forward. It’s often difficult for teachers to come up with challenge questions spontaneously, so if you’re the student in this role-play, your job is to come up</p>


PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			<p>with challenge questions that relate to ideas you'd expect your students to struggle with. Make sure to share these questions with your partner before you begin the role-play.”</p> <p>d. Share any important lessons you may have learned from teaching the lesson.</p> <p>e. Give pairs adequate time to prepare for and act out their role-plays.</p>
		<p><b>Plants Show Trait Variation Too!</b></p> <p>Discuss your assigned question in your small group and develop an answer. Record your answers and ideas in your science notebook.</p> <ul style="list-style-type: none"> <li>• How well does lesson 2a (content and activities) align with the lesson focus question, <i>Do plants show variation in traits? How do we know?</i></li> <li>• How well does lesson 2a (content and activities) align with this content deepening focus question from last time: <i>How can we represent patterns of trait variation among individuals of a species?</i></li> </ul>	<p><b>Display Slide 35.</b> Plants Show Trait Variation Too! (7 min)</p> <p>a. Read the questions on the slide; then have participants split up into small groups.</p> <p>b. <b>Small groups:</b> Assign one of the questions on the slide to each group. Direct groups to discuss their assigned question, develop an answer, and record their answers and ideas in their notebooks.</p> <p>c. <b>Whole-group share-out:</b> Invite groups to share their ideas for answering their assigned question.</p>
	<p><b>Purpose</b></p> <ul style="list-style-type: none"> <li>• Highlight opportunities in the VIT lessons to emphasize Common Core Standards related to math.</li> </ul>	<p><b>Common Core Math Standards</b></p> <p><b>Grade 3: Measurement and Data</b></p> <p><b>3.MD.3:</b> Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how many more” and “how many less” problems using information presented in scaled bar graphs.</p> <p><b>3.MD.4:</b> Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units— whole numbers, halves, or quarters.</p>	<p><b>Display Slide 36.</b> Common Core Math Standards (1 min)</p> <p>a. Read the Common Core standards on the slide.</p> <p>b. Ask participants, “How might these math skills and concepts be emphasized during the science lesson? What about during a science-related math lesson?”</p> <p>c. As participants share their ideas, record them on chart paper.</p>


PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
		<p style="text-align: center;"><b>Variation in Traits: Summary Statements</b></p> <ul style="list-style-type: none"> <li>• Locate your content background document in your lesson plans binder (Resources section).</li> <li>• Read the section 3, "Variation in Traits."</li> <li>• Identify a sentence in the reading that summarizes the key ideas and write it in your notebook.</li> <li>• Be prepared to share your sentence with the group.</li> </ul>	<p><b>Display Slide 37.</b> Variation in Traits: Summary Statements (5 min)</p> <p>a. <b>Individuals:</b> Review the tasks on the slide and ask participants to complete them independently.</p> <p>b. <b>Whole group:</b> Invite two or three participants to share their sentences with the group.</p>
		<p style="text-align: center;"><b>Content Deepening Focus Question</b></p> <p>How can variation in traits affect which individuals survive long enough in their environment to reproduce?</p>	<p><b>Display Slide 38.</b> Content Deepening Focus Question (1 min)</p> <p>a. Read the focus question on the slide.</p> <p>b. "This focus question will guide our content deepening work for the rest of the session. To help us answer this question, we'll conduct investigations from lessons 3, 4, and 5 of the Variation in Traits unit."</p> <p>c. <b>Individuals:</b> Ask participants to write the question in their science notebooks.</p>



PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
		<p style="text-align: center;"><b>Lesson 3: Focus Question</b></p> <p style="text-align: center;">Why do trait variations among desert beetles matter?</p> <div style="display: flex; justify-content: space-around; align-items: center;">  </div> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p><b>Our content deepening focus question:</b> How can variation in traits affect which individuals survive long enough in their environment to reproduce?</p> </div>	<p><b>Display Slide 39.</b> Lesson 3: Focus Question (2 min)</p> <p><b>Note:</b> Initially show only the focus question for lesson 3 and the beetle images on the slide.</p> <ol style="list-style-type: none"> <li>a. Introduce the focus question for lesson 3 and ask participants to write it in their science notebooks. Then reveal the content deepening focus question at the bottom of the slide.</li> <li>b. Ask participants, “What similarities and differences do you notice when you compare the focus question for lesson 3 and today’s content deepening focus question?”</li> </ol> <p><b>Note:</b> A more specific focus question was chosen for lesson 3 because it’s likely to be more engaging and easier for students to answer than the more generic content deepening focus question.</p>
		<p style="text-align: center;"><b>Investigation 1: Beetles in the Desert</b></p> <ul style="list-style-type: none"> <li>• Locate handout 3.2 (Beetles in the Desert) in your lesson plans binder.</li> <li>• Think about these questions as we read the story : <ul style="list-style-type: none"> <li>• What living thing is this story about?</li> <li>• What are some of its traits?</li> <li>• Is there variation in the traits?</li> </ul> </li> </ul>	<p><b>Display Slide 40.</b> Investigation 1: Beetles in the Desert (6 min)</p> <ol style="list-style-type: none"> <li>a. “Next, we’ll read a story about beetles in the desert from lesson 3 of the Variation in Traits unit.”</li> <li>b. Have participants locate handout 3.2 (Beetles in the Desert) in their lesson plans binders.</li> <li>c. Highlight the questions on the slide that students will focus on during the lesson.</li> <li>d. Ask one or two participants to read the story on the handout aloud.</li> <li>e. Answer the questions on the slide as a group</li> </ol>

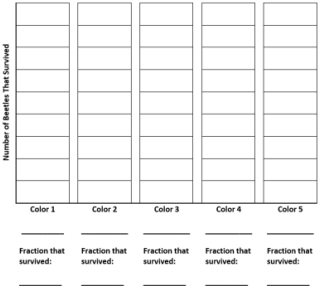
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
		<p data-bbox="835 386 1222 412"><b>Investigation 1: Beetles in the Desert</b></p> <ul data-bbox="835 428 1050 698" style="list-style-type: none"> <li>• The model represents what might happen to the beetles in nature.</li> <li>• Each colored pom-pom represents a beetle.</li> <li>• Pinching my index finger and my thumb together represents a lizard eating a beetle.</li> <li>• The fabric represents the desert environment where the beetles and lizards live.</li> </ul>  <p data-bbox="1167 646 1272 656"><small>Photo courtesy of Cal Poly Pomona</small></p>	<p data-bbox="1346 292 1604 318">based on the reading.</p> <p data-bbox="1318 354 1898 418"><b>Display Slide 41.</b> Investigation 1: Beetles in the Desert (6 min)</p> <ol data-bbox="1318 474 1940 837" style="list-style-type: none"> <li>Have participants locate handout 3.1 (Using the Model) in their lesson plans binders.</li> <li>Read the overview on the handout and discuss what the various parts of the model represent. Display the materials from the lesson kit as you describe them.</li> <li>Walk participants through rest of the instructions on the handout and explain the data table. Point out the data table you created on chart paper and make sure the rules are posted where participants can refer to them throughout the activity.</li> </ol>
		<p data-bbox="835 912 1222 938"><b>Investigation 1: Beetles in the Desert</b></p> <ul data-bbox="835 961 1037 1214" style="list-style-type: none"> <li>• Do you think some beetles will survive longer than other beetles in our desert environment?</li> <li>• List one or two reasons why you think a particular beetle might or might not survive longer than other beetles.</li> </ul>  <p data-bbox="1058 1110 1146 1120"><small>Photo courtesy of Pixabay.com</small></p> <p data-bbox="1159 1055 1272 1065"><small>Photo used with permission from BSCS</small></p> <p data-bbox="1184 1175 1281 1185"><small>Photo courtesy of Wikimedia.com</small></p>	<p data-bbox="1318 873 1898 938"><b>Display Slide 42.</b> Investigation 1: Beetles in the Desert (2 min)</p> <ol data-bbox="1318 993 1940 1221" style="list-style-type: none"> <li>“What do you think will happen to the beetles in our desert environment? Do you think some will survive longer than others? Which color beetles do you think will be eaten first, and which will be eaten last? Why do you think so?”</li> <li><b>Turn and Talk:</b> “Pair up with an elbow partner and briefly share your ideas and reasoning.”</li> </ol>


PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
		<p><b>Investigation 1: Beetles in the Desert</b></p> <p>Write your prediction and reasoning in your science notebook using this sentence starter:</p> <p><i>I predict that some beetles [will/won't] survive longer than others in our desert environment because _____.</i></p> <p>Communicate in scientific ways during the group share-out:</p> <ul style="list-style-type: none"> <li>• I agree/disagree with your idea because ...</li> <li>• I want to add ...</li> <li>• I have a question about ...</li> </ul> 	<p><b>Display Slide 43.</b> Investigation 1: Beetles in the Desert (3 min)</p> <p>a. <b>Individuals:</b> “Now write your predictions in your science notebooks using the sentence starter on the slide.”</p> <p>b. <b>Whole group share-out:</b> “Let’s hear your predictions and reasoning. As others share their ideas, be prepared to agree or disagree, add your own ideas to the discussion, or ask questions using the sentence starters at the bottom of the slide. Communicating in scientific ways is an important STeLLA strategy we’ll learn about later in the program.”</p>
		<p><b>Investigation 1: Beetles in the Desert</b></p> <p><b>Roles and Responsibilities</b></p> <ol style="list-style-type: none"> <li>1. <b>Lizards:</b> Your role is to hunt for pom-pom beetles. Keep your eyes closed when you aren’t hunting. <b>Do not peek!</b></li> <li>2. <b>Counters:</b> Your role is to count the number of pom-pom beetles <b>in your assigned color</b> on the fabric and report that number to the recorder.</li> <li>3. <b>Recorder:</b> Your role is to record the number of pom-pom beetles on the class data table as the counters report this information.</li> <li>4. <b>Observers:</b> Your role is to watch the simulation and record your observations in your notebooks.</li> </ol>	<p><b>Display Slide 44.</b> Investigation 1: Beetles in the Desert (12 min)</p> <p>a. Using the materials from the lesson kit, set up the desert model according to the instructions in the handout. Don’t scatter the pom-poms on the fabric until just before the hunt begins.</p> <p>b. Assign the roles on the handout and review the responsibilities for each role. Briefly review the rules before beginning the investigation.</p> <p>c. Ask participants to describe the beetles’ environment and have the recorder write a description at the top of the data table.</p> <p>d. Direct participants to get into their assigned positions and ask the lizards to close their eyes. Scatter the pom-poms on the fabric and have counters report the starting numbers of their assigned colors to the reporter. Then give lizards</p>

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			<p>the command to hunt.</p> <p>e. Make sure counters keep track of the number of beetles still on the fabric after each hunt. Then at the end of the round, ask them to count the remaining pom-pom beetles in their assigned colors on the fabric and report this data to the recorder to write on the table.</p> <p><b>Note:</b> Have lizards continue hunting for pom-pom beetles until only 15 are left on the fabric.</p>
		<p><b>Investigation 1: Beetles in the Desert</b></p> <p>Copy the data table into your notebook and answer these questions:</p> <ul style="list-style-type: none"> <li>• Did your prediction match the results of the investigation? What is your evidence?</li> </ul> 	<p><b>Display Slide 45.</b> Investigation 1: Beetles in the Desert (5 min)</p> <p>a. <b>Individuals:</b> Ask participants to copy the data table into their notebooks and answer the questions on the slide.</p> <p>b. <b>Whole-group share-out:</b> As time allows, invite a few participants to share their answers and evidence.</p> <p>c. Ask participants to summarize and interpret the results of the simulation. Ask elicit and probe questions to determine what they think the results mean.</p> <p>d. Share your advice for managing this activity in the classroom.</p>

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process																				
		<p style="text-align: center;"><b>Analogy Map</b></p> <table border="1" data-bbox="827 380 1266 644"> <thead> <tr> <th>Part of Our Model</th> <th>Is/Are Like</th> <th>Part of the Real World</th> <th>Because</th> </tr> </thead> <tbody> <tr> <td>Pom-poms</td> <td>are like</td> <td>different-colored beetles</td> <td>both the beetles and the pom-poms are black, brown, red, green, and yellow.</td> </tr> <tr> <td></td> <td>are like</td> <td>a lizard's mouth</td> <td></td> </tr> <tr> <td>Picking up a pom-pom</td> <td>is like</td> <td></td> <td></td> </tr> <tr> <td>Fabric</td> <td>is like</td> <td></td> <td></td> </tr> </tbody> </table>	Part of Our Model	Is/Are Like	Part of the Real World	Because	Pom-poms	are like	different-colored beetles	both the beetles and the pom-poms are black, brown, red, green, and yellow.		are like	a lizard's mouth		Picking up a pom-pom	is like			Fabric	is like			<p><b>Display Slide 46.</b> Analogy Map (7 min)</p> <ol style="list-style-type: none"> <li>“One of the STeLLA strategies we’ll be learning about later in this program is strategy D: Select content representations and models matched to the learning goal and engage students in their use.”</li> <li><b>Emphasize:</b> “It’s important that students link different aspects of a content representation or model to concrete aspects in the real world. An analogy map is one way we can help students make these connections.”</li> <li>“The analogy map on this slide explains how and why parts of the desert model relate to parts of the real world.”</li> <li>Distribute handout 2.4 (Beetles in the Desert—Analogy Map) and walk participants through the example on the first row.</li> <li><b>Pairs:</b> Have participants pair up and complete the rest of the analogy map.</li> <li><b>Whole group:</b> Invite pairs to share their answers for the remaining rows on the analogy map. Then display the answer key (handout 3.4, Beetles in the Desert—Analogy-Map Answer Key) on a document reader.</li> </ol>
Part of Our Model	Is/Are Like	Part of the Real World	Because																				
Pom-poms	are like	different-colored beetles	both the beetles and the pom-poms are black, brown, red, green, and yellow.																				
	are like	a lizard's mouth																					
Picking up a pom-pom	is like																						
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PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
		<p style="text-align: center;"><b>Analyzing the Desert Model</b></p> <ul style="list-style-type: none"> <li>• What are the strengths of the model? <b>Example:</b> The pom-poms are the same colors as the beetles in the story.</li> <li>• What are the limitations of the model? <b>Example:</b> Lizards in real life wouldn't eat only six beetles.</li> </ul>	<p><b>Display Slide 47.</b> Analyzing the Desert Model (4 min)</p> <ol style="list-style-type: none"> <li>a. "One of the major themes of the Next Generation Science Standards is using and analyzing models. Let's take a moment and analyze the strengths and limitations of our desert model."</li> <li>b. <b>Turn and Talk:</b> Have participants pair up and discuss the questions on the slide.</li> <li>c. <b>Whole-group discussion:</b> "So what do you think are the key strengths and limitations of the desert model?"</li> </ol>
<b>10-MINUTE BREAK</b>			
		<p style="text-align: center;"><b>Lesson 4: Focus Question</b></p> <p>How can data help us explain why trait variations among desert beetles matter?</p>	<p><b>Display Slide 48.</b> Lesson 4: Focus Question (Less than 1 min)</p> <ol style="list-style-type: none"> <li>a. Introduce the focus question on the slide and ask participants to write it in their science notebooks.</li> <li>b. "In our next investigation from lesson 4 of the Variation in Traits unit, we'll analyze the data we collected from our desert model and use it to help us explain why trait variations among desert beetles matter."</li> </ol>


PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process												
		<p><b>Investigation 2: Analyzing the Beetle Data</b></p> <ul style="list-style-type: none"> <li>Work with a partner to complete handout 2.5 (Calculating the Fraction of Beetles) using the data collected in the previous investigation.</li> <li>Keep this focus question in mind: <i>How can data help us explain why trait variations among desert beetles matter?</i></li> </ul> <table border="1" data-bbox="831 526 1274 641"> <thead> <tr> <th>Color of Beetle</th> <th>Beetles Eaten</th> <th>&gt;, &lt;, or =</th> <th>Beetles That Survived</th> </tr> </thead> <tbody> <tr> <td></td> <td>Number of the color eaten</td> <td></td> <td>Number of the color not eaten</td> </tr> <tr> <td></td> <td>Total number of the color _____</td> <td></td> <td>Total number of the color _____</td> </tr> </tbody> </table>	Color of Beetle	Beetles Eaten	>, <, or =	Beetles That Survived		Number of the color eaten		Number of the color not eaten		Total number of the color _____		Total number of the color _____	<p><b>Display Slide 49.</b> Investigation 2: Analyzing the Beetle Data (6 min)</p> <ol style="list-style-type: none"> <li>Distribute handout 2.5 (Calculating the Fraction of Beetles) and explain that participants will need to use the data from the previous investigation to complete the handout.</li> <li><b>Pairs:</b> Have participants work with an elbow partner to complete the handout. Encourage them to keep the focus question for lesson 4 in mind as they work on this task.</li> <li>Note that the timing of lesson 4 during the school year may create some teaching challenges if students haven't yet studied fractions in depth. Share with participants how you handled these kinds of challenges in your classroom. One way to handle this is to walk students through the activity without spending much time talking about fractions. After students have learned more about fractions in math, teachers can revisit the fraction worksheet and discuss the results in more detail.</li> </ol>
Color of Beetle	Beetles Eaten	>, <, or =	Beetles That Survived												
	Number of the color eaten		Number of the color not eaten												
	Total number of the color _____		Total number of the color _____												
		<p><b>Investigation 2: Analyzing the Beetle Data</b></p> 	<p><b>Display Slide 50.</b> Investigation 2: Analyzing the Beetle Data (4 min)</p> <ol style="list-style-type: none"> <li>"In a moment, you'll create a bar graph like the one on this slide to represent in a visual way the number of beetles of each color that survived in our desert simulation. Each rectangle on the graph represents one beetle. The total number of beetles that were alive before the hunt was 45. If the number of beetles that survived at the end of the hunt are shaded in on the graph, the fraction is also represented. For example, if five yellow pom-</li> </ol>												


PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			<p>pom beetles survived, then five rectangles on that bar of the graph would be shaded to represent the five surviving beetles out of the original nine. We could also represent this as the fraction <math>5/9</math>.”</p> <p>b. Have participants create a bar graph in their notebooks like the one on the slide and use their fraction data to shade in the graph for each color of beetle that survived.</p>
		<p><b>Comparing Methods</b></p> <p><i>Which method makes it easier for you to understand the data from our desert model? Why?</i></p> <p><b>Sentence starter:</b></p> <p><i>[Fractions/bar graphs] make it easier for me to understand the data from our desert model because _____.</i></p>	<p><b>Display Slide 51.</b> Comparing Methods (1 min)</p> <p>a. Read the questions on the slide and ask participants how their students are likely to complete the sentence starter.</p>
		<p><b>Constructing a Scientific Explanation</b></p> <p>Do differences in the color of desert beetles affect whether they get eaten?</p>  <p><small>Photo courtesy of Pixabay.com      Photo used with permission from BSCS      Photo courtesy of Wikimedia.com</small></p>	<p><b>Display Slide 52.</b> Constructing a Scientific Explanation (Less than 1 min)</p> <p>a. “Now let’s talk about how we might help students construct scientific explanations that will answer the question on the slide.”</p>

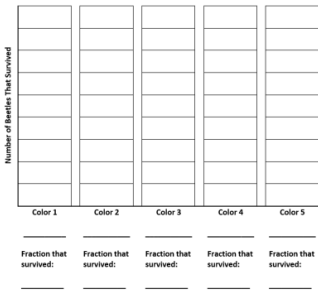


PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
		<p><b>Make a Claim</b></p> <p><i>Do differences in the color of desert beetles affect whether they get eaten?</i></p> <ol style="list-style-type: none"> <li>1. Make a claim and support it with evidence from our desert simulation (data table, fraction data, bar graph).</li> <li>2. Link the evidence to the claim using logical reasoning and/or science ideas (traits, variation, natural selection, survival, the environment).</li> </ol> <p><b>Sentence starters:</b></p> <p><i>Differences in the color of desert beetles <b>do</b> affect whether they get eaten because _____.</i></p> <p><i>Differences in the color of desert beetles <b>do not</b> affect whether they get eaten because _____.</i></p>	<p><b>Display Slide 53.</b> Make a Claim (10 min)</p> <ol style="list-style-type: none"> <li>a. “Constructing a scientific explanation or claim and supporting it with evidence and reasoning is a key activity for students in science, mathematics, and English language arts. Using this CERA or claim-evidence-reasoning-alternative strategy makes each step of this process more explicit and gives students an opportunity to practice these essential skills.”</li> <li>b. Read the question and instructions on the slide.</li> <li>c. <b>Individuals:</b> Ask participants to make a claim that answers the question and write it in their science notebooks. The claim should include supporting evidence and reasoning as well. Participants may want to use the sentence starters on the slide to formulate their claims.</li> <li>d. <b>Pairs:</b> Ask participants to share their claims and evidence with a partner and practice giving each other feedback.</li> <li>e. <b>Whole group:</b> Invite a few participants to share their claims, evidence, and reasoning. Then discuss the kind of claim they’d expect their students to make and the evidence and reasoning they might use.</li> </ol> <p><b>Sample student claim with evidence and reasoning:</b> Differences in the color of desert beetles do affect whether they get eaten because the bar graph shows that more brown beetles survived than green beetles. I think that green beetles stood out more in the beige-colored desert environment and were easier for predators to see and catch. Beetles with the brown trait were harder for predators to see</p>


PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			because they blended into their environment better. So variations in color make a difference in the desert beetles' survival.
		<p style="text-align: center;"><b>Unit Central Question</b></p> <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;"> <p>Do all of the mice living in the same environment, such as a field or forest, have an equal chance of surviving?</p> </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;">   </div>	<p><b>Display Slide 54.</b> Unit Central Question (1 min)</p> <p>a. Revisit the unit central question on the slide.</p> <p>b. Ask participants, “What have we learned so far from our content deepening investigations that can help us answer this question?”</p>
		<p style="text-align: center;"><b>Survival in a Changing Environment</b></p> <ul style="list-style-type: none"> <li>• Turn to the content background document in your lesson plans binder and read “Variation in Traits and the Environment” (section 4).</li> <li>• Summarize three main points from the reading.</li> <li>• Highlight two statements you disagree with or have questions about.</li> <li>• Write one idea for how the desert model could be used to illustrate the main points from the reading.</li> </ul>	<p><b>Display Slide 55.</b> Survival in a Changing Environment (4 min)</p> <p>a. “What do you think happens to living things with different trait variations when the environment changes? Let’s find out!”</p> <p>b. <b>Individuals:</b> Direct participants to locate the content background document in their lesson plans binders and complete the tasks on the slide.</p> <p>c. <b>Whole group:</b> Invite participants to share three main points from the reading and two statements they disagree with or have questions about.</p> <p>d. “How do you think the desert model could be used to illustrate the main points from the reading?”</p>

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
		<p data-bbox="835 347 1104 373"><b>Lesson 5: Focus Question</b></p> <p data-bbox="835 396 1218 444">What happens if the beetles' environment changes?</p>	<p data-bbox="1318 308 1860 370"><b>Display Slide 56.</b> Lesson 5: Focus Question (4 min)</p> <ol data-bbox="1318 425 1923 958" style="list-style-type: none"> <li>“What do you think will happen to the beetles in our desert model if their environment changes? That’s what we’ll explore in our final investigation from lesson 5a.”</li> <li>Ask participants to write the focus question on the slide in their science notebooks.</li> <li>Emphasize that to better understand biological diversity, students need to realize that both traits and the environment play important roles in the survival of organisms. Traits by themselves are neither intrinsically good nor bad but largely depend on the environment.</li> <li>To orient participants to the next investigation, have them locate lesson 5a in their lesson plans binders and quickly read through the overview page, outline, and lesson plan.</li> </ol>
		<p data-bbox="835 1036 1255 1062"><b>Investigation 3: Changing Environments</b></p> 	<p data-bbox="1318 997 1852 1058"><b>Display Slide 57.</b> Investigation 3: Changing Environments (1 min)</p> <ol data-bbox="1318 1114 1940 1414" style="list-style-type: none"> <li>Discuss the various ways environments can change, including changes that occur because of droughts, flooding, and natural disasters.</li> <li>Note that when environments change, it can affect which organisms survive and which don’t. Organisms that had a better chance of surviving in the original environment might not have an advantage in the changed environment.</li> <li>“In this investigation, we’ll think about what might</li> </ol>

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			happen if the beetles' environment becomes drier and even more desert-like.”
		<p><b>Investigation 3: Changing Environments</b></p> <ul style="list-style-type: none"> <li>• What do you predict will happen to the beetles when their environment changes?</li> <li>• Which colors of beetles do you think will be eaten more often, and which will survive more often?</li> </ul>	<p><b>Display Slide 58.</b> Investigation 3: Changing Environments (1 min)</p> <ol style="list-style-type: none"> <li>Introduce the questions on the slide.</li> <li>Invite participants to share their predictions and reasoning.</li> <li>As participants share, record their predictions on chart paper.</li> </ol>
		<p><b>Investigation 3: Changing Environments</b></p> <p>This new fabric represents a <b>change</b> in the beetles' environment.</p>  <p><small>Photo courtesy of Cal Poly Pomona</small></p>	<p><b>Display Slide 59.</b> Investigation 3: Changing Environments (2 min)</p> <ol style="list-style-type: none"> <li>“To test your predictions, we'll perform our desert simulation again, but this time, we'll use a new piece of fabric that represents a change in the beetles' environment.”</li> <li>Set up the desert model using the new fabric and make sure the new data table is positioned next to the original data table for comparison.</li> <li>Briefly review the rules of the simulation.</li> </ol>

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
		<p><b>Investigation 3: Changing Environments</b></p> <ol style="list-style-type: none"> <li><b>Lizards:</b> Your role is to hunt for pom-pom beetles. Keep your eyes closed when you aren't hunting. <b>Do not peek!</b></li> <li><b>Counters:</b> Your role is to count the number of pom-pom beetles <b>in your assigned color</b> on the fabric and report that number to the recorder.</li> <li><b>Recorder:</b> Your role is to record the number of pom-pom beetles on the class data table as the counters report this information.</li> <li><b>Observers:</b> Your role is to watch the simulation and record your observations in your notebooks.</li> </ol>	<p><b>Display Slide 60.</b> Investigation 3: Changing Environments (10 min)</p> <ol style="list-style-type: none"> <li>Assign new roles to participants and review the responsibilities for each role.</li> <li>Ask participants to describe the beetles' changed environment and have the recorder write the description at the top of the new data table.</li> <li>Direct participants to get into their assigned positions and ask lizards to close their eyes. Scatter the pom-poms on the new fabric and have counters report the starting numbers of their assigned colors to the reporter. Then give lizards the command to hunt.</li> <li>Make sure counters keep track of the number of beetles still on the fabric after each hunt. Then at the end of the round (six hunts), ask them to count the remaining pom-pom beetles in their assigned colors on the fabric and report this data to the recorder to write on the table.</li> </ol>
		<p><b>Investigation 3: Changing Environments</b></p> 	<p><b>Display Slide 61.</b> Investigation 3: Changing Environments (5 min)</p> <ol style="list-style-type: none"> <li>Ask participants to calculate the fractions of beetles that survived in the changed environment and record this data in their science notebooks. <p><b>Note:</b> Participants will need to copy the table from handout 2.5 (Calculating the Fraction of Beetles) into their notebooks to record this set of data.</p> </li> <li>Have participants create a new bar graph in their notebooks like the one on the slide, using their</li> </ol>

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			fraction data to shade in the graph for each color of beetle that survived.
		<p><b>Data Comparisons</b></p> <ol style="list-style-type: none"> <li>1. Compare the data tables from both investigations and examine the results.</li> <li>2. Compare the bar graphs from both investigations and examine the results.</li> <li>3. Which comparison is more likely to help students understand the main points from the lesson and answer the focus question, <i>What happens if the beetles' environment changes?</i></li> </ol>	<p><b>Display Slide 62.</b> Data Comparisons (2 min)</p> <p><b>Note:</b> Make sure the data tables are positioned side by side for this comparison.</p> <ol style="list-style-type: none"> <li>a. "Let's compare the results of our two investigations. First, compare the data tables and examine the results. Then compare the bar graphs and examine the results."</li> <li>b. "Which comparison is more likely to help students understand the main points from the lesson and answer the focus question, <i>What happens if the beetles' environment changes?</i>"</li> </ol>
		<p><b>Reflect: Lesson-5 Focus Question</b></p> <p><i>What happens if the beetles' environment changes?</i></p> <p>Let's work as a group to develop an ideal student response to this question.</p> <p><b>Sentence starters:</b></p> <ul style="list-style-type: none"> <li>• <i>Some beetles survive longer than others in their environment because ...</i></li> <li>• <i>If the environment changes, it will affect which beetles survive because ...</i></li> </ul>	<p><b>Display Slide 63.</b> Reflect: Lesson-5 Focus Question (2 min)</p> <p><b>Note:</b> If time is limited, this activity may be skipped.</p> <ol style="list-style-type: none"> <li>a. Revisit the focus question for lesson 5 and work as a group to develop an ideal student response. Encourage participants to use the sentence starters on the slide.</li> </ol>

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
		<p> <b>Key Science Ideas</b></p> <ul style="list-style-type: none"> <li>• Both variations in the color trait of beetles <b>and</b> their environment affected which beetles survived longer.</li> <li>• Some beetles survived longer in the first environment because of their color trait.</li> <li>• When the environment changed, other beetles were more likely to survive because their color blended into the environment better.</li> </ul>	<p><b>Display Slide 64.</b> Key Science Ideas (Less than 1 min)</p> <p>a. Review the key science ideas on the slide that summarize the results of today's investigations.</p>
		<p><b>Reflect: Content Deepening Focus Question</b></p> <p>How can variation in traits affect which individuals survive long enough in their environment to reproduce?</p>	<p><b>Display Slide 65.</b> Reflect: Content Deepening Focus Question (3 min)</p> <p>a. Revisit the content deepening focus question on the slide.</p> <p>b. <b>Individuals:</b> Ask participants to answer the question in their science notebooks, using evidence from today's investigations to support their ideas.</p> <p>c. <b>Whole group:</b> If time allows, invite one or two participants to share their responses. Then ask participants to review the learning goals document and discuss which goals were addressed in this session.</p>

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
<p>3:15–3:30 15 min</p> <p><b>Wrap-Up: Summary, Homework, and Reflections</b></p> <p>Slides 66–68</p>	<p><b>Purpose</b></p> <ul style="list-style-type: none"> <li>Summarize and reflect on the day’s learning, including progress made in understanding variation in traits and the relationship between lesson analysis and asking effective elicit, probe, and challenge questions.</li> </ul> <p><b>What Participants Do</b></p> <ul style="list-style-type: none"> <li>Synthesize key ideas about the science content, questioning strategies, and lesson analysis.</li> <li>Copy down the homework assignment for day 3.</li> <li>Write reflections on STeLLA strategies 1, 2, and 3, and the science content.</li> </ul> <p><b>Handouts in PD Binder</b></p> <ul style="list-style-type: none"> <li>2.6 Daily Reflections—Day 2</li> </ul> <p><b>Supplies</b></p> <ul style="list-style-type: none"> <li>Science notebooks</li> </ul>	<p><b>Summary: Today’s Focus Questions</b></p> <p>What progress have we made in addressing today’s focus questions?</p> <ol style="list-style-type: none"> <li>How can lesson analysis help us better understand how elicit, probe, and challenge questions can reveal and challenge student thinking?</li> <li>How can variation in traits affect which individuals survive long enough in their environment to reproduce?</li> </ol> <hr/> <p><b>Homework</b></p> <ol style="list-style-type: none"> <li>For tomorrow, read the STeLLA strategies booklet and complete the Z-fold summary chart for these two Student Thinking Lens strategies: <ul style="list-style-type: none"> <li><b>Strategy 4:</b> Engage students in analyzing and interpreting data and observations.</li> <li><b>Strategy 5:</b> Engage students in constructing explanations and arguments.</li> </ul> </li> <li>Don’t forget about the lesson-plan reading-and-reporting assignment due on day 4.</li> </ol>	<p><b>Display Slide 66.</b> Summary: Today’s Focus Questions (8 min)</p> <ol style="list-style-type: none"> <li>Divide participants into two groups. Have Group 1 come up with some conclusions/key ideas related to focus question 1. Have Group 2 come up with conclusions/key ideas for focus question 2.</li> <li>Give each group 3 minutes to come up with ideas and conclusions.</li> <li>Allow a 2-minute share-out for each group.</li> </ol> <hr/> <p><b>Display Slide 67.</b> Homework (1 min)</p> <ol style="list-style-type: none"> <li>Forecast that tomorrow you’ll tackle two new, closely interconnected Student Thinking Lens strategies.</li> <li>Have participants copy the homework assignment into their science notebooks.</li> <li>Remind participants about their homework for Friday (becoming experts on the lesson plans assigned to them).</li> </ol>



PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
		<p><b>Reflections on Today's Session</b></p> <p>Complete the Daily Reflections sheet (handout 2.6 in PD program binder).</p> <ol style="list-style-type: none"> <li>1. What value do you see in analyzing student thinking and practicing questions that elicit, probe, and challenge student thinking? What concerns do you have about enacting these practices?</li> <li>2. Did you identify any science ideas that you are unclear about? If so, what helped you identify this uncertainty?</li> <li>3. What questions do you have about the purposes and goals of the RESPeCT PD program?</li> <li>4. Which norms are we successfully implementing? Which norms need more work?</li> </ol>	<p><b>Display Slide 68.</b> Reflections on Today's Session (6 min)</p> <p>a. Make sure participants have <b>at least 5 minutes</b> to think about the questions on the reflections sheet (handout 2.6 in the PD program binder) and write down their reflections.</p>