RESPeCT Summer Institute Professional Development Leader Guide (PDLG)

Grade Level	2	**Day**	1	**STeLLA Strategy**	The Two Lenses: Student Thinking Lens (STL) and Science Content Storyline Lens (SCSL) STL Strategies 1, 2, and 3: Elicit, Probe, and Challenge Questions	**Subject Matter Focus**	Properties of Matter

Focus Questions	• What is RESPeCT? • What are the STeLLA lenses and teaching strategies, and what is the evidence that they will make a difference in your science teaching? • If you could shrink small enough to fit inside a melting ice cube, what would you see? • How are water molecules arranged in an ice cube?
Main Learning Goals	Participants will understand the following: • The RESPeCT project originally included a professional development program, a leadership development program, and a research study. The district is sustaining the PD professional development program. • The goals of the RESPeCT PD program are to deepen teachers' science-content knowledge and knowledge of effective science teaching; to develop their analytical skills to improve lesson-plan development and the teaching of science; to support teachers in the practical use of new knowledge and analytical skills in their classrooms; to improve students' science learning; and to achieve sustainability by eventually reaching all K–6 teachers. • Research on teacher and student learning has shown that the STeLLA Student Thinking Lens and Science Content Storyline Lens are important analytical tools for effective teaching and are often neglected in science teaching. • Student thinking can be made more visible in science classrooms when teachers ask questions that elicit and probe student ideas and predictions, as well as challenge student thinking. Each type of question has a specific purpose. • The phenomena of matter can be explained by answering two central questions, *What is matter made of?* and *How can matter change?*

Preparation	Materials	Videos

Daily Setup Tasks
• Check that video clips are correctly linked to PowerPoint (PPT) slides.
• Set up PowerPoint.
• Make sure video clips play correctly with good sound.
• Arrange furniture and food.
• Arrange participant materials.
• Put up posters and charts.
Day-1 Setup Tasks
• Arrange participant materials on tables in grade-level meeting rooms:
   • Tabletop name cards
   • STeLLA strategies booklet
	Posters and Charts
	• STeLLA Framework and Strategies poster
	• Day-1 Agenda (chart)
	• Norms for Working Together (chart)
	• Day-1 Focus Questions (chart)
	• Effective Science Teaching chart (blank except for title)
	• Parking Lot poster
	Handouts in RESPeCT PD Binder Front Pocket
	• Half-page sheet of norms for participants to paste into their science notebooks
	• Z-fold summary chart: Student Thinking Lens Strategies (blank)
	Handouts in RESPeCT PD Binder, Day 1
		• Video Clip 1.1: TIMSS US Lesson 3; 1.1_TIMSS_US_lesson3_c1
		Video Clip 1.2: TIMSS Japan Lesson 1; 1.2_TIMSS_Japan_lesson1_c1_1
		• *Minds of Our Own Lessons From Thin Air* video, segments 3:30–5:40; 7:50–16:45

• RESPeCT PD program binder • RESPeCT lesson plans binder • Science notebooks • Materials kit (1 per topic) **Planning and Preparation Tasks** • Study the PDLG, PowerPoint slides (PPTs), video clips, and handouts. Make changes to PPTs, if needed. Modify text highlighted in light-blue font on slides and/or in PDLG to make it specific for your group. • Make sure you know how to find the *Minds of Our Own Lessons From Thin Air* video segments: 3:30–5:40; 7:50–16:45. • Assemble science notebooks and materials. • Prepare charts for the agenda, focus questions, and norms. • Review the Lego activity for Properties of Matter lesson 3b.	• 1.1 Norms for Working Together • 1.2 Transcript for Video Clip 1.1 • 1.3 Transcript for Video Clip 1.2 • 1.4 TIMSS *Educational Leadership* article • 1.5 “Synthesis of Research from *How Students Learn: Science in the Classroom*” (HSL) • 1.6 My Lego Model—Analogy Map (from Properties of Matter lesson 4a) • 1.7 Extended Homework: RESPeCT Lesson Plan Analysis • 1.8 Daily Reflections—Day 1 **Handouts in RESPeCT Lesson Plans Binder** • 3.1 Lego Model (from Properties of Matter lesson 3a) • 4.2 My Lego Model—Analogy Map (Teacher Master) (from Properties of Matter lesson 4a) **Supplies** • Science notebooks • Chart paper and markers • Lesson materials kit • Periodic Table of Elements • Ball-and-stick molecular model with magnets (1 set) • 6 Lego water molecules (per group) (6 red bricks, 2 × 4"; 12 white bricks, 2 × 2") • Small cardboard box (about 3 1/2" × 4 1/2") (1 per group) • Large ice-lattice model **PD Resources** • STeLLA strategies booklet • RESPeCT PD program binder • RESPeCT lesson plans binder • Setting Up Your Summer Institute Notebook (pretabs section in PD binder) **Resources in Lesson Plans Binder** *Resources section:* • Properties of Matter Content Background Document • Common Student Ideas about Properties of Matter *Pretabs section:* • Properties of Matter Learning Goals for Students and Teachers	

DAY 1 SESSION OUTLINE

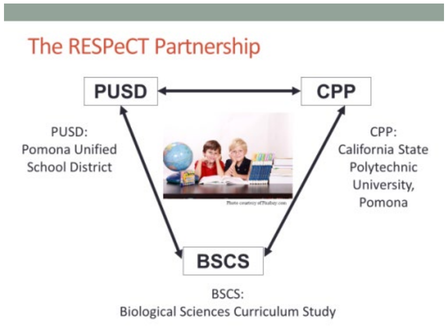
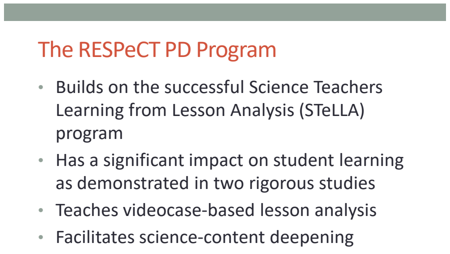
Time	Activities	Purpose
8:00–8:25 25 min	**Whole-Group Gathering: What Is RESPeCT?**	• Orient participants to the overall project. • Introduce participants to the main goals of the project. • Provide details about schedules and logistics that will address participants' immediate concerns.
8:25–8:30 5 min	**Transition to Grade-Level Study-Group Settings**	
8:30–9:20 50 min	**Getting Started: Introductions, Goals, Norms, Agenda, Focus Questions, Ideas about Effective Science Teaching**	• Build community within grade-level study groups. • Set the stage for a day of learning about the RESPeCT PD program (formerly the STeLLA PD program), the STeLLA conceptual framework, and tools for lesson analysis. • Access participants' prior knowledge/beliefs about science teaching and learning: What do participants include in their image of effective science teaching? What's missing?
9:20–10:10 50 min (Includes 10-min break)	**The Case for the Science Content Storyline Lens (SCSL)**	• Draw from the TIMSS video study to build the case for the Science Content Storyline Lens as a core analytical tool in the STeLLA conceptual framework.
10:10–10:40 30 min	**The Case for the Student Thinking Lens (STL)**	• Draw from research on science learning to build the case for the Student Thinking Lens as a core analytical tool in the STeLLA conceptual framework.
10:40–12:00 80 min	**Content Deepening: Properties of Matter**	• Deepen participants' science-content knowledge of matter and its properties by exploring two central questions: *What is matter made of?* and *How can matter change?*
12:00–12:45 45 min	**LUNCH**	
12:45–2:10 85 min (Includes 10-min break)	**Content Deepening (Continued)**	• Deepen participants' science-content knowledge of matter and its properties by exploring two central questions: *What is matter made of?* and *How can matter change?*
2:10–3:00 50 min	**STL Strategies: Elicit, Probe, and Challenge Questions**	• Begin to develop shared understandings of the Student Thinking Lens (STL) and STeLLA strategies 1, 2, and 3 (elicit, probe, and challenge questions).
3:00–3:30 30 min	**Wrap-Up: Summary, Homework, and Reflections**	• Summarize and reflect on key ideas from today's learning and foreshadow what will be addressed tomorrow and later in the week.

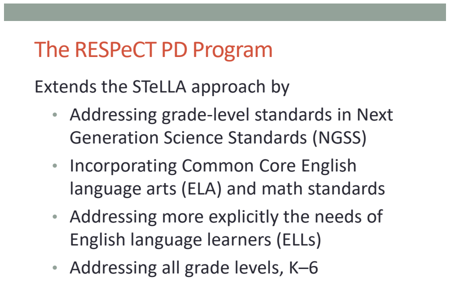
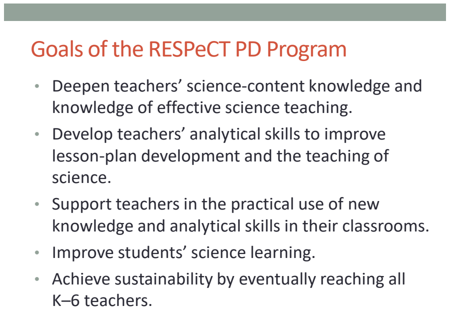
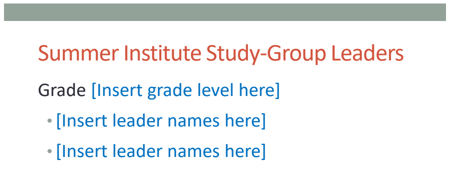
DAY 1

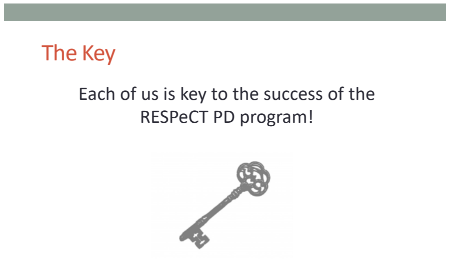
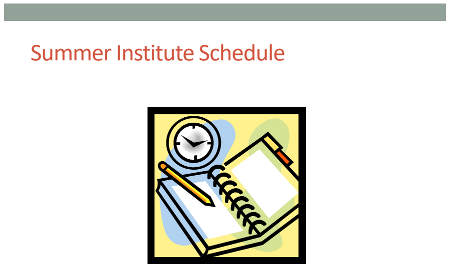
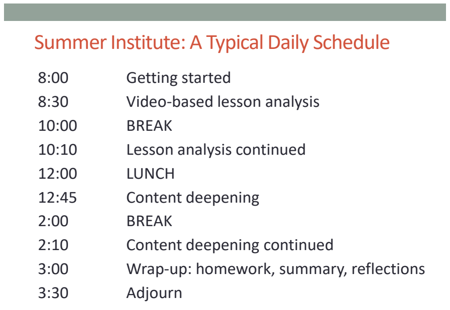
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process

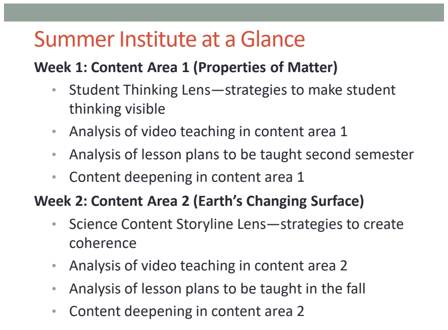
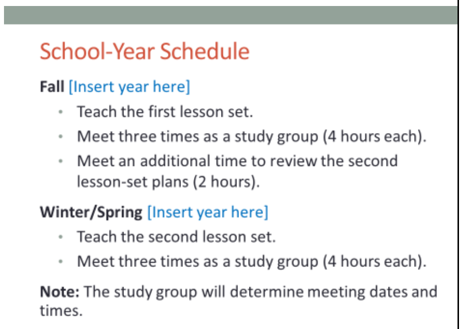
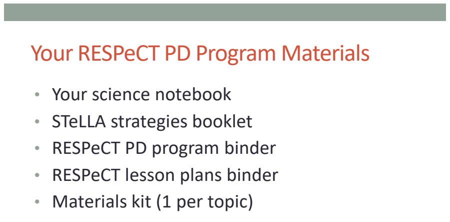
8:00–8:25
25 min
Whole-Group Gathering: What Is RESPeCT?
Slides 1–14
	Purpose
	• Orient participants to the overall project.
	• Introduce participants to the main goals of the project.
	• Provide details about schedules and logistics that will address participants' immediate concerns.
	Content
	• Discuss the following with participants:
	  • Essential logistics
	  • Components of the RESPeCT project
	  • Members of the RESPeCT partnership
	  • The RESPeCT PD program and goals
	  • Summer Institute schedule and overview
	  • School-year schedule and overview
	What Participants Do
	• Listen to a brief introduction to the program and how it began.
		
		RESPeCT PD PROGRAM
		Day 1
		RESPeCT Summer Institute
			Display Slide 1. RESPeCT PD Program (5 min)
			a. Greet participants as they enter the room.
			b. Help them find their notebooks and table tents.

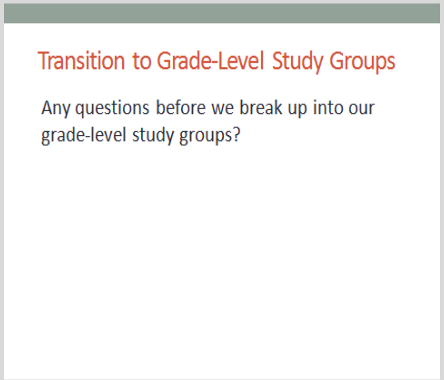
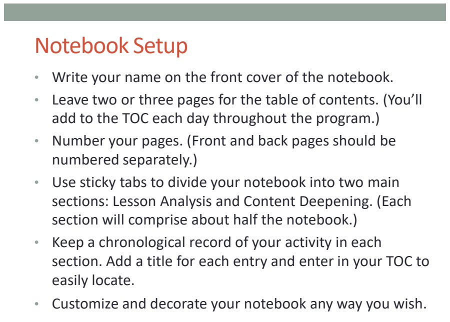
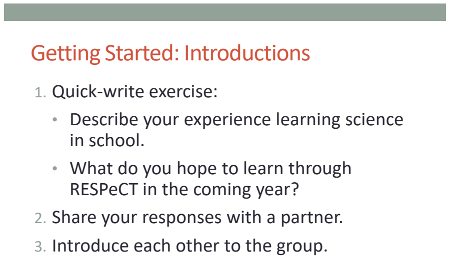
		 Before We Dig In: Essentials • On-time session starts and endings • Sign-in sheets • Restrooms • Sustenance (lunch and snack breaks) • Questions or special needs?	**Display Slide 2.** Before We Dig In: Essentials (20 min for slides 2–14, averaging approximately 1 min per slide) a. Give everyone a big welcome to the RESPeCT PD program! b. Fill participants in on the essential details listed on the slide.
		 What Is RESPeCT? **R**einvigorating **E**lementary **S**cience through a **P**artnership with **C**alifornia **T**eachers • A partnership built for long-term success! • A professional development program • A leadership development program • A research study	**Display Slide 3.** What Is RESPeCT? (Approximately 1 min) a. **Emphasize:** The RESPeCT project began with three main components: • A professional development program • A leadership development program • A research study b. The district now sustains RESPeCT as a professional development program.

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
		 The RESPeCT Partnership PUSD CPP PUSD: Pomona Unified School District CPP: California State Polytechnic University, Pomona BSCS BSCS: Biological Sciences Curriculum Study	**Display Slide 4.** The RESPeCT Partnership (Approximately 1 min) a. The original RESPeCT partners included the following: • **Cal Poly:** science, science education, and mathematics faculty, as well the Center for Excellence in Mathematics and Science Teaching (CEMaST) • **PUSD:** district central administrators, principals, teacher specialists, and teachers • **BSCS:** an additional partner located in Colorado that provides expertise on science curriculum development, science teacher professional development, and research on science teaching and learning. **Note:** Established in 1958, BSCS stands for Biological Sciences Curriculum Study, but the organization now deals with all sciences, not just biology. • **Students:** Emphasize that students are at the center of this partnership. Their learning is what the project is all about.
		 The RESPeCT PD Program • Builds on the successful Science Teachers Learning from Lesson Analysis (STeLLA) program • Has a significant impact on student learning as demonstrated in two rigorous studies • Teaches videocase-based lesson analysis • Facilitates science-content deepening	**Display Slide 5.** The RESPeCT PD Program (Approximately 1 min) a. Let participants know they'll be learning more about the RESPeCT PD program and STeLLA teaching strategies as they experience firsthand what it means to perform videocase-based lesson analysis.

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
		 The RESPeCT PD Program Extends the STeLLA approach by • Addressing grade-level standards in Next Generation Science Standards (NGSS) • Incorporating Common Core English language arts (ELA) and math standards • Addressing more explicitly the needs of English language learners (ELLs) • Addressing all grade levels, K–6	**Display Slide 6.** The RESPeCT PD Program (Approximately 1 min) a. Read the information on the slide. b. Emphasize the importance of these additions to the STeLLA approach. By integrating Common Core English language arts (ELA) and math standards into the science curriculum, the RESPeCT PD program enables teachers to invest more time in teaching science. The teaching strategies developed in the RESPeCT PD program are also valuable tools in other subject areas.
		 Goals of the RESPeCT PD Program • Deepen teachers' science-content knowledge and knowledge of effective science teaching. • Develop teachers' analytical skills to improve lesson-plan development and the teaching of science. • Support teachers in the practical use of new knowledge and analytical skills in their classrooms. • Improve students' science learning. • Achieve sustainability by eventually reaching all K–6 teachers.	**Display Slide 7.** Goals of the RESPeCT PD Program (Approximately 1 min) a. **The bottom line:** improving students' science learning—a goal that has been reached in two previous research studies of this approach.
		 Summer Institute Study-Group Leaders Grade [Insert grade level here] • [Insert leader names here] • [Insert leader names here]	**Display Slide 8.** Summer Institute Study-Group Leaders (Approximately 1 min) a. Modify this slide to include the grade level of your study group and the names of the Teacher Leaders who will be facilitating the study-group sessions. b. Formally introduce yourselves to the group.

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
		 The Key Each of us is key to the success of the RESPeCT PD program!	**Display Slide 9.** The Key (Approximately 1 min) a. Many people are involved in organizing, planning, and leading this program, but the teacher-participants are the key to its success.
		 Summer Institute Schedule	**Display Slide 10.** Summer Institute Schedule **Note:** This is a transition slide.
		 Summer Institute: A Typical Daily Schedule 8:00 Getting started 8:30 Video-based lesson analysis 10:00 BREAK 10:10 Lesson analysis continued 12:00 LUNCH 12:45 Content deepening 2:00 BREAK 2:10 Content deepening continued 3:00 Wrap-up: homework, summary, reflections 3:30 Adjourn	**Display Slide 11.** Summer Institute: A Typical Daily Schedule (Approximately 1 min) a. A typical daily schedule includes the following: • Time spent on videocase lesson analysis • Time focused on content deepening • Short homework assignments • A morning and an afternoon break, with a 45-minute lunch break.

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
		 Summer Institute at a Glance **Week 1: Content Area 1 (Properties of Matter)** • Student Thinking Lens—strategies to make student thinking visible • Analysis of video teaching in content area 1 • Analysis of lesson plans to be taught second semester • Content deepening in content area 1 **Week 2: Content Area 2 (Earth's Changing Surface)** • Science Content Storyline Lens—strategies to create coherence • Analysis of video teaching in content area 2 • Analysis of lesson plans to be taught in the fall • Content deepening in content area 2	**Display Slide 12.** Summer Institute at a Glance (Approximately 1 min) a. During the Summer Institute, each grade level will focus on two content areas, with one week devoted to each area. Participants will their deepen their science-content knowledge, study lesson plans in each content area, and analyze videocases of teachers presenting this content.
		 School-Year Schedule **Fall** [Insert year here] • Teach the first lesson set. • Meet three times as a study group (4 hours each). • Meet an additional time to review the second lesson-set plans (2 hours). **Winter/Spring** [Insert year here] • Teach the second lesson set. • Meet three times as a study group (4 hours each). **Note:** The study group will determine meeting dates and times.	**Display Slide 13.** School-Year Schedule (Approximately 1 min) a. "The Summer Institute is just the beginning! During the school year, you'll continue meeting with your grade-level study group."
		 Your RESPeCT PD Program Materials • Your science notebook • STeLLA strategies booklet • RESPeCT PD program binder • RESPeCT lesson plans binder • Materials kit (1 per topic)	**Display Slide 14.** Your RESPeCT PD Program Materials (Approximately 1 min) a. **Transition slide:** "In a moment we'll break up into grade-level study groups and dig into the RESPeCT PD program! But first let's review this list of materials you'll receive in your designated meeting rooms."

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
8:25–8:30 5 min **Transition** Slide 15	**Transition to Grade-Level Study-Group Settings**	 Transition to Grade-Level Study Groups Any questions before we break up into our grade-level study groups?	**Display Slide 15.** Transition to Grade-Level Study Groups (5 min) a. "Any questions before we head to our grade-level study groups?" b. **Send-off:** "Have a great day and be sure to let us know if there is anything we can do to support you in getting the most out of this experience!"
8:30–9:20 50 min **Getting Started** Slides 16–24	**Purpose** • Build community within grade-level study groups. • Set the stage for a day of learning about the RESPeCT PD program (formerly the STeLLA PD program), the STeLLA conceptual framework, and tools for lesson analysis. • Access participants' prior knowledge/beliefs about science teaching and learning: What do participants include in their image of effective science teaching? What's missing? **Content** • RESPeCT PD is different from typical PD in a number of ways. • Agreed-upon norms for working together will support our learning. • Focus questions will guide our work in lesson analysis and content deepening activities. • We bring to this work a variety	 Notebook Setup • Write your name on the front cover of the notebook. • Leave two or three pages for the table of contents. (You'll add to the TOC each day throughout the program.) • Number your pages. (Front and back pages should be numbered separately.) • Use sticky tabs to divide your notebook into two main sections: Lesson Analysis and Content Deepening. (Each section will comprise about half the notebook.) • Keep a chronological record of your activity in each section. Add a title for each entry and enter in your TOC to easily locate. • Customize and decorate your notebook any way you wish.	**Display Slide 16.** Notebook Setup (8 min) a. Welcome participants to the study group and introduce yourself as they arrive. b. Help participants find their table tents and materials so they can get settled. c. Direct them to the instructions for setting up their notebooks (Setting Up Your Summer Institute Notebook in the pretabs section of their PD program binders) and get them started working on this task. Interact informally with them and allow them to chitchat as they work.
		 Getting Started: Introductions 1. Quick-write exercise: • Describe your experience learning science in school. • What do you hope to learn through RESPeCT in the coming year? 2. Share your responses with a partner. 3. Introduce each other to the group.	**Display Slide 17.** Getting Started: Introductions (15 min) a. **Individuals (3 min):** Have participants write their responses to the questions on the slide in their notebooks. Emphasize that this is an independent writing exercise. b. **Pairs (3 min):** Have participants pair up and share their responses to the questions. Encourage them to learn other things about their partners as well (e.g., school, years of teaching,

<table>
<tr><th>PD Model: Time/Phase</th><th>Purpose, Content, and What Participants Do</th><th>Slides</th><th>Process</th></tr>
<tr>
<td rowspan="3"></td>
<td rowspan="3">of ideas about effective science teaching.

What Participants Do
• Set up their Summer Institute notebooks.
• Quick-write about their school experiences in science and their hopes for learning in this program.
• Share their writing with a partner.
• Introduce their partners to the group.
• Discuss suggested norms for working together.
• Brainstorm and discuss ideas about effective science teaching.

Posters and Charts
• STeLLA Framework and Strategies poster
• Norms for Working Together (chart)
• Day-1 Agenda (chart)
• Day-1 Focus Questions (chart)
• Parking Lot poster

Handouts in PD Binder
• 1.1 Norms for Working Together

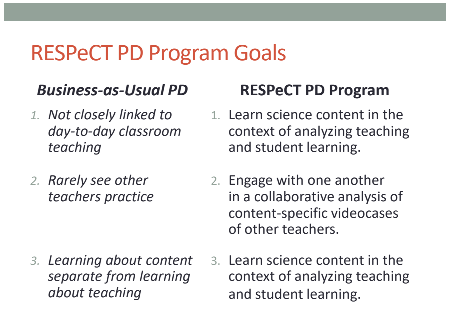
Supplies
• Table tents with names
• Science notebooks
• Chart paper and markers

PD Resources
• RESPeCT PD program binder
• RESPeCT lesson plans binder</td>
<td></td>
<td>favorite subjects to teach, hobbies).

Note: If the group has an odd number of participants, pair up with one of them.

c. Whole group (9 min): Have each participant introduce her or his partner, highlighting what that partner hopes to learn from the RESPeCT PD program. Model the first pair of introductions to demonstrate that they should be brief.

Note: If you weren’t able to pair up with someone, simply introduce yourself.

Monitor the time: Introductions should be longer than a sentence, but not the length of a full essay!</td>
</tr>
<tr>
<td>RESPeCT PD Program Goals
<table><tr><th><i>Business-as-Usual PD</i></th><th>RESPeCT PD Program</th></tr><tr><td>1. <i>Not closely linked to day-to-day classroom teaching</i></td><td>1. Learn science content in the context of analyzing teaching and student learning.</td></tr><tr><td>2. <i>Rarely see other teachers practice</i></td><td>2. Engage with one another in a collaborative analysis of content-specific videocases of other teachers.</td></tr><tr><td>3. <i>Learning about content separate from learning about teaching</i></td><td>3. Learn science content in the context of analyzing teaching and student learning.</td></tr></table></td>
<td>Display Slide 18. RESPeCT PD Program Goals (2 min)

a. Talk through this slide, emphasizing how RESPeCT PD is different from many other professional development opportunities.</td>
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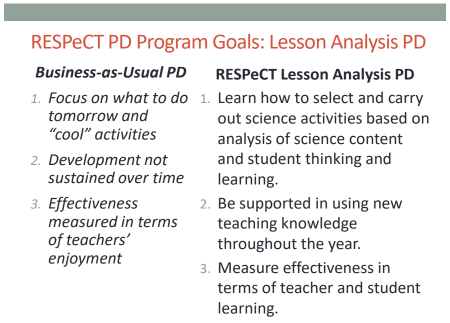
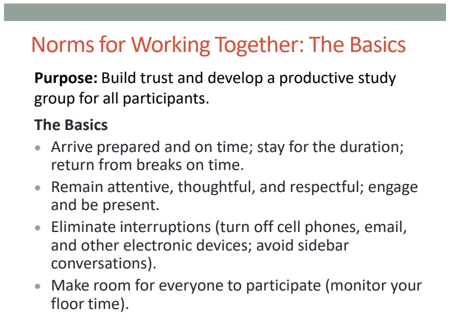
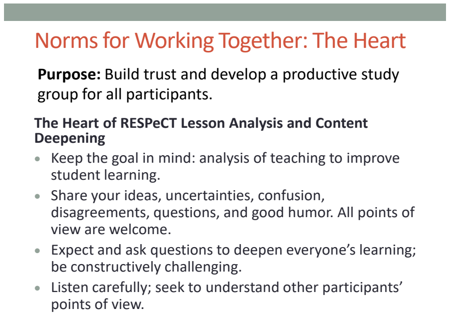
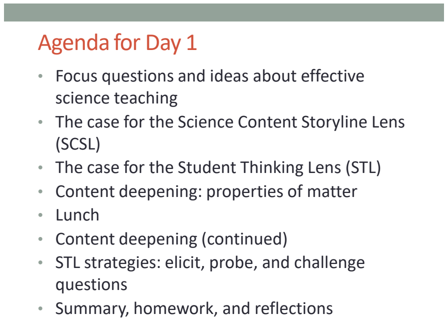
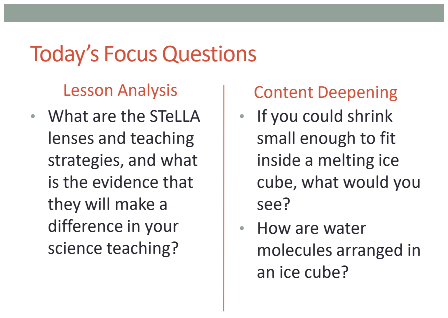
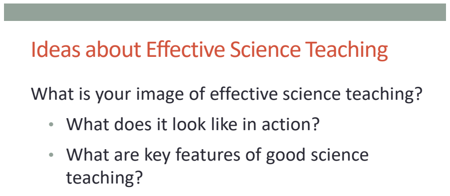
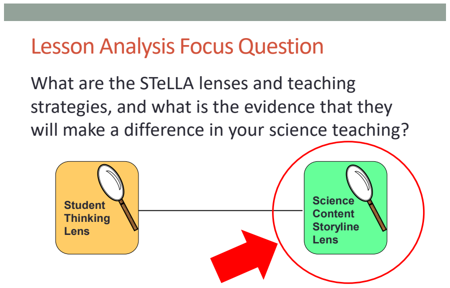
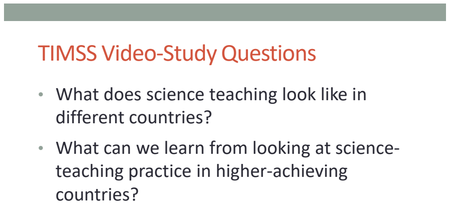
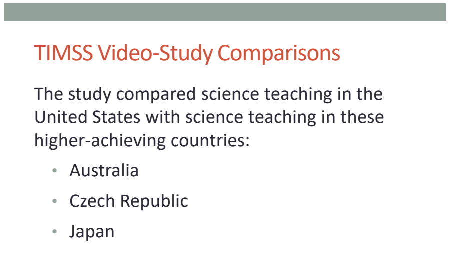
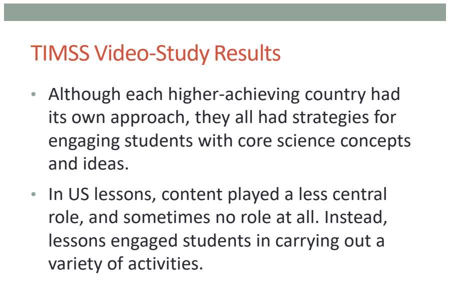
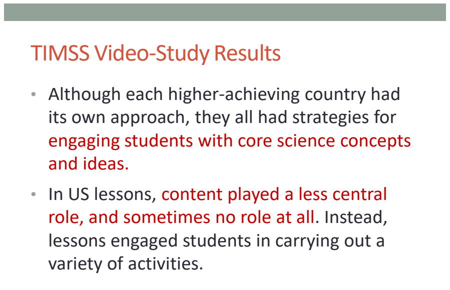
<tr>
<td>RESPeCT PD Program Goals: Lesson Analysis PD
<table><tr><th><i>Business-as-Usual PD</i></th><th>RESPeCT Lesson Analysis PD</th></tr><tr><td>1. <i>Focus on what to do tomorrow and “cool” activities</i></td><td>1. Learn how to select and carry out science activities based on analysis of science content and student thinking and learning.</td></tr><tr><td>2. <i>Development not sustained over time</i></td><td>2. Be supported in using new teaching knowledge throughout the year.</td></tr><tr><td>3. <i>Effectiveness measured in terms of teachers’ enjoyment</i></td><td>3. Measure effectiveness in terms of teacher and student learning.</td></tr></table></td>
<td>Display Slide 19. RESPeCT PD Program Goals: Lesson Analysis PD (1 min)

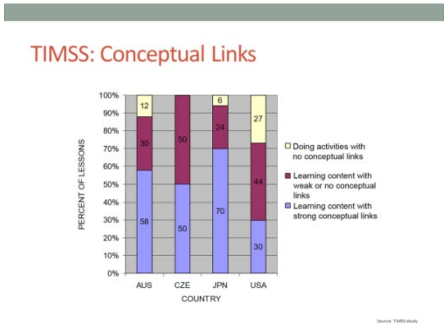
a. Highlight the goals of RESPeCT lesson analysis PD and how it differs from other professional development opportunities.</td>
</tr>
</table>

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
	• STeLLA strategies booklet • Setting Up Your Summer Institute Notebook (pretabs section in PD binder) • Half-page copy of the norms (front pocket of PD binder)	 Norms for Working Together: The Basics **Purpose:** Build trust and develop a productive study group for all participants. **The Basics** • Arrive prepared and on time; stay for the duration; return from breaks on time. • Remain attentive, thoughtful, and respectful; engage and be present. • Eliminate interruptions (turn off cell phones, email, and other electronic devices; avoid sidebar conversations). • Make room for everyone to participate (monitor your floor time).	**Display Slide 20.** Norms for Working Together: The Basics (3 min) a. "To do this kind of work together, we need to develop a strong study group where everyone feels safe sharing their ideas, questions, confusion, successes, and stumbles. Having a set of agreed-upon norms will help us build such a learning community." b. Read over these basic norms. c. "What do you think? Are there any changes or additions you'd like to suggest?"
		 Norms for Working Together: The Heart **Purpose:** Build trust and develop a productive study group for all participants. **The Heart of RESPeCT Lesson Analysis and Content Deepening** • Keep the goal in mind: analysis of teaching to improve student learning. • Share your ideas, uncertainties, confusion, disagreements, questions, and good humor. All points of view are welcome. • Expect and ask questions to deepen everyone's learning; be constructively challenging. • Listen carefully; seek to understand other participants' points of view.	**Display Slide 21.** Norms for Working Together: The Heart (5 min) a. "This set of norms moves beyond the basics and targets the heart of RESPeCT PD program goals." b. Read the list. c. "Is anything unclear? Do you have any changes or additions you'd like to suggest? Do you have any concerns about these norms?" d. Direct participants to handout 1.1 (Norms for Working Together) and pass out the half-page copy of the norms for them to paste on the inside front cover of their notebooks. e. Ask participants if they're willing to live with these norms today; then tell them they'll have an opportunity to revise them tomorrow.

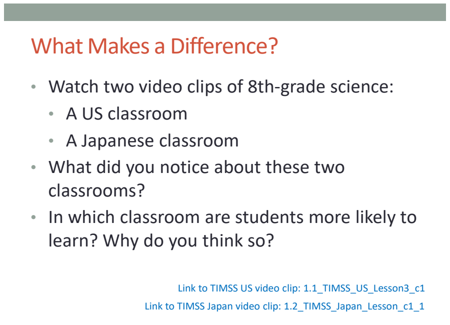
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
		 Agenda for Day 1 - Focus questions and ideas about effective science teaching - The case for the Science Content Storyline Lens (SCSL) - The case for the Student Thinking Lens (STL) - Content deepening: properties of matter - Lunch - Content deepening (continued) - STL strategies: elicit, probe, and challenge questions - Summary, homework, and reflections	**Display Slide 22.** Agenda for Day 1 (Less than 1 min) a. Talk through the agenda for the day.
		 Today's Focus Questions Lesson Analysis - What are the STeLLA lenses and teaching strategies, and what is the evidence that they will make a difference in your science teaching? Content Deepening - If you could shrink small enough to fit inside a melting ice cube, what would you see? - How are water molecules arranged in an ice cube?	**Display Slide 23.** Today's Focus Questions (1 min) a. "Each day we're going to have at least one lesson analysis focus question and one content deepening focus question. These are today's focus questions." b. Read the focus questions on the slide.
		 Ideas about Effective Science Teaching What is your image of effective science teaching? - What does it look like in action? - What are key features of good science teaching?	**Display Slide 24.** Ideas about Effective Science Teaching (15 min) a. "Before we explore these questions, let's create a list of ideas about effective science teaching." b. **Individuals (3 min):** "Take a few minutes to think and write about the questions on the slide." c. **Whole group (10 min):** Go around the group (round-robin) asking everyone to contribute an idea. Write the ideas on chart paper and title the chart "Effective Science Teaching." d. "Throughout the sessions, we'll revisit this list to

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			add new ideas, clarify our thinking, and make other modifications.”
9:20–10:10 50 min (Includes 10-min break) **The Case for the Science Content Storyline Lens (SCSL)** Slides 25–34	**Purpose** • Draw from the TIMSS video study to build the case for the Science Content Storyline Lens as a core analytical tool in the STeLLA conceptual framework. **Content** • The TIMSS video study showed the importance of connecting lesson activities to science ideas to form a coherent science content storyline in science lessons. **What Participants Do** • Analyze a results graph from the TIMSS video study. • Watch video clips from US and Japanese classrooms and discuss observed differences. • Discuss key findings from the TIMSS video study and how they relate to the idea of a science content storyline. • Review the chart of participant ideas about effective science teaching in light of the TIMSS video study.	Lesson Analysis Focus Question What are the STeLLA lenses and teaching strategies, and what is the evidence that they will make a difference in your science teaching? 	**Display Slide 25.** Lesson Analysis Focus Question (2 min) a. “This PD program will focus on two lenses as analytical tools to guide our learning: the Student Thinking Lens and the Science Content Storyline Lens.” b. “Today we’re going to examine why these two lenses were chosen for our focus.” c. “Let’s begin with the Science Content Storyline Lens.”
		TIMSS Video-Study Questions • What does science teaching look like in different countries? • What can we learn from looking at science-teaching practice in higher-achieving countries?	**Display Slide 26.** TIMSS Video-Study Questions (2 min) a. “A large video study of science teaching in different countries revealed the importance of the Science Content Storyline Lens.” b. “The TIMSS video study explored the research questions on this slide.” **Background info:** • TIMSS stands for Trends in Mathematics and Science Study. • TIMSS is known for its achievement studies comparing student performance in math and science internationally.

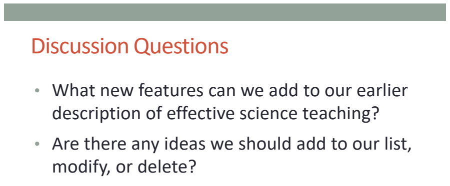
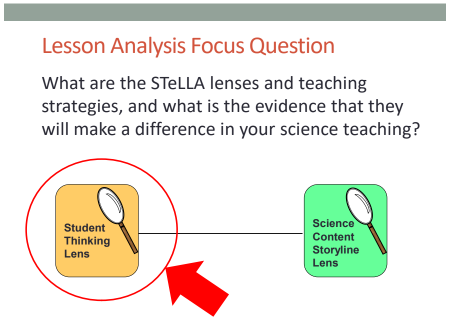
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
	Posters and Charts • Effective Science Teaching chart **Videos** • Video Clip 1.1, TIMSS US Lesson 3 • Video Clip 1.2, TIMSS Japan Lesson 1 **Handouts in PD Binder** • 1.2 Transcript for Video Clip 1.1 • 1.3 Transcript for Video Clip 1.2 • 1.4 TIMSS *Educational Leadership* article	 TIMSS Video-Study Comparisons The study compared science teaching in the United States with science teaching in these higher-achieving countries: • Australia • Czech Republic • Japan	**Display Slide 27.** TIMSS Video-Study Comparisons (2 min) a. "Australia, the Czech Republic, and Japan are higher-achieving countries in science compared to the United States." b. "In these countries, 100 eighth-grade lessons were randomly video recorded. The goal was to describe typical science teaching in each country."
		 TIMSS Video-Study Results • Although each higher-achieving country had its own approach, they all had strategies for engaging students with core science concepts and ideas. • In US lessons, content played a less central role, and sometimes no role at all. Instead, lessons engaged students in carrying out a variety of activities.	**Display Slide 28.** TIMSS Video-Study Results (2 min) a. "The TIMSS video study showed these results."
		 TIMSS Video-Study Results • Although each higher-achieving country had its own approach, they all had strategies for engaging students with core science concepts and ideas. • In US lessons, content played a less central role, and sometimes no role at all. Instead, lessons engaged students in carrying out a variety of activities.	**Display Slide 29.** TIMSS Video-Study Results (2 min) a. Call attention to the text highlighted in red to emphasize the difference between US science lessons and science lessons in higher-achieving countries.

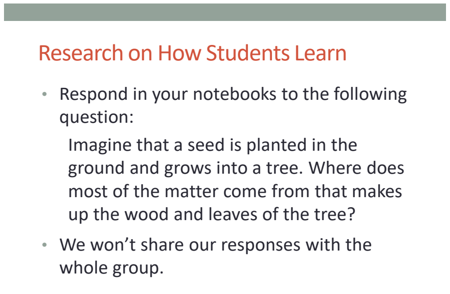
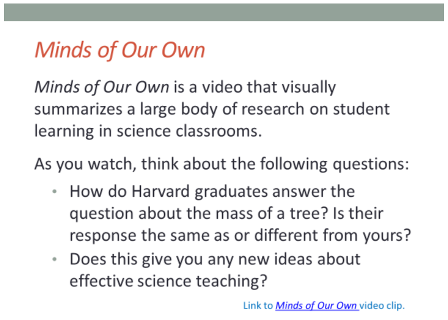
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
		 TIMSS: Conceptual Links Source: TIMSS study	**Display Slide 30.** TIMSS: Conceptual Links (3 min) a. **Ask:** "What do you notice from this graph? What do you make of this data?" b. **Emphasize:** "In the US, more than a quarter of the lessons had no science content; whereas in the other countries, the majority of the randomly selected lessons (or typical lessons) had content with strong conceptual links." c. **Example of a lesson with no science content:** "What's a science lesson with no content? In this research, a lesson with at least one complete statement of a science idea was scored as 'learning content.' Lessons with 'no content' had **only** topic-level mentions of science concepts. For example, one teacher started a lesson by telling students to take out their rockets and get to work. They had directions to follow, but the teacher's only focus in his interactions with students was on how to build the rockets. At the end of the lesson, he told students to clean up and then dismissed them. This is a lesson with no science content!" **Other key ideas to highlight:** • Each higher-achieving country engaged students with core science concepts and ideas (more consistently than the US). • All the higher-achieving countries linked ideas and activities (more consistently than the US). • In US lessons, the focus was on performing activities with less attention to content and even less attention to linking activities and science ideas.

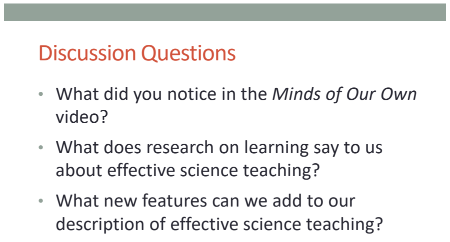
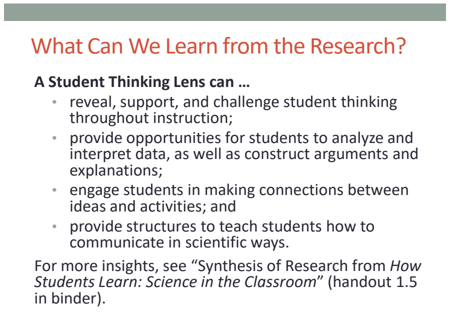
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process

		
		What Makes a Difference?
		• Watch two video clips of 8th-grade science:
		  • A US classroom
		  • A Japanese classroom
		• What did you notice about these two classrooms?
		• In which classroom are students more likely to learn? Why do you think so?
		Link to TIMSS US video clip: 1.1_TIMSS_US_Lesson3_c1
		Link to TIMSS Japan video clip: 1.2_TIMSS_Japan_Lesson_c1_1
			Display Slide 31. What Makes a Difference? (20 min)
			a. Direct participants to the transcripts for Video Clips 1.1 and 1.2 (handouts 1.2 and 1.3) before showing each clip.
			b. **Show US classroom video:** Ask participants to focus on what is going on with the science content and storyline.
			c. **Discuss:** “What did you notice?”
			Key ideas to emphasize and link back to the results include the following:
			• The teacher focuses on the activity and the procedure needed to complete the activity.
			• The teacher and students place no real focus on important science ideas.
			• There’s only a topic-level mention of science ideas (“pulleys,” “effort distance,” “resistance force”).
			d. **Show Japanese classroom video:** Ask participants to focus on what is going on with the science content.
			e. **Discuss:** “What did you notice?”
			Key ideas to emphasize and link back to the results include the following:
			• Content ideas are made clear to students (focus question, pairs talk) before doing any activity.
			• Students are asked to talk about science ideas, not just procedures.
			• The lesson purpose is made clear to students.
			f. **Ending discussion:** “In which classroom are students more likely to learn science concepts?

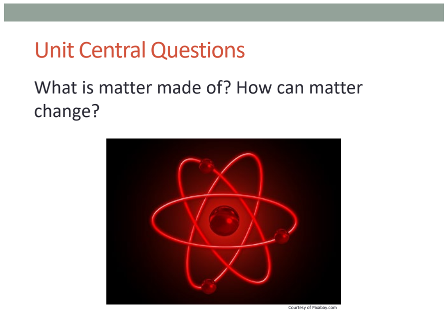
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			Why?” **Note:** Participants may be critical of both classrooms because student thinking isn’t made visible. This is true, but bring their focus back to the science content and storyline. They should see a clear distinction between the science content storylines in the Japanese and US lessons. Students in the Japanese classroom are more likely to learn because science-content ideas are made visible, and students are engaged in thinking about these ideas, not just science activities.
		 The TIMSS Findings Show … • Each higher-achieving country engaged students with core science concepts and ideas. • All the higher-achieving countries linked ideas and activities. • In US lessons, the focus was on performing activities with less attention to content and even less attention to linking activities and science ideas.	**Display Slide 32.** The TIMSS Findings Show … (1 min) a. Use this slide and the next to summarize key ideas from the TIMSS video study.
		 What Can We Learn from the Research? **A coherent science content storyline can …** • make science ideas more prominent in science lessons, • strengthen connections among science-content ideas, • strengthen connections between science-content ideas and activities, and • improve lesson coherence by shaping science lessons as stories that make sense to students. For more insights, see TIMSS *Educational Leadership* article, “What Science Teaching Looks Like: An International Perspective” (handout 1.4 in binder).	**Display Slide 33.** What Can We Learn from the Research? (1 min) a. After reading this slide, share with participants that the Science Content Storyline Lens addresses the need uncovered in the TIMSS video study: to strengthen the links between science ideas and lesson activities. b. Encourage participants to read handout 1.4 (TIMSS *Educational Leadership* article) for further insight.

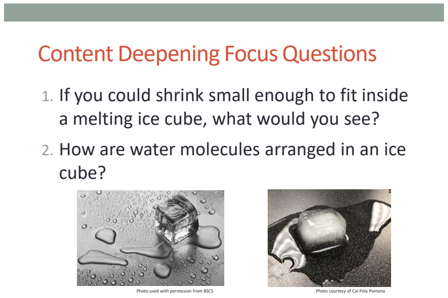
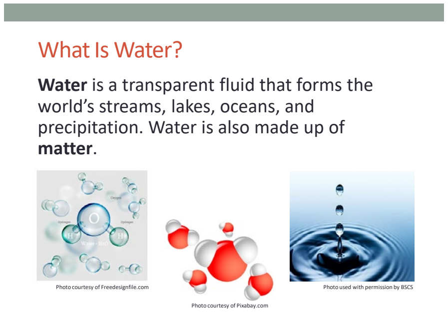
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
		 Discussion Questions • What new features can we add to our earlier description of effective science teaching? • Are there any ideas we should add to our list, modify, or delete?	**Display Slide 34.** Discussion Questions (5 min) a. "What features on our list of ideas about effective science teaching are consistent with the TIMSS video-study findings?" b. "Are there any ideas you'd like to add to our list, delete, or modify?" **Note: Use a different color** to add/delete/modify ideas. Encourage participants to keep an open mind about changing their ideas. Provide opportunities for them to reflect on any changes and the reasons for those changes. c. **Transition:** "During week 2 of the Summer Institute, we'll focus on strategies for creating a strong, coherent science content storyline. This week, we'll focus on the Student Thinking Lens. Right now, let's consider the reasons for this focus."
10:00–10:10 10 min	**BREAK**		
10:10–10:40 30 min **The Case for the Student Thinking Lens (STL)** Slides 35–39	**Purpose** • Draw from research on science learning to build the case for the Student Thinking Lens as a core analytical tool in the STeLLA conceptual framework. **Content** • Research on science teaching and learning shows that learners cling to important	 Lesson Analysis Focus Question What are the STeLLA lenses and teaching strategies, and what is the evidence that they will make a difference in your science teaching? 	**Display Slide 35.** Lesson Analysis Focus Question (Less than 1 min) a. "At this point, we'll transition from a focus on the Science Content Storyline Lens (SCSL) to the Student Thinking Lens (STL)." b. "We'll be focusing on the Student Thinking Lens the rest of the day and throughout this week."

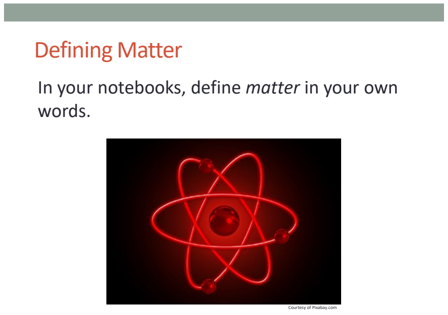
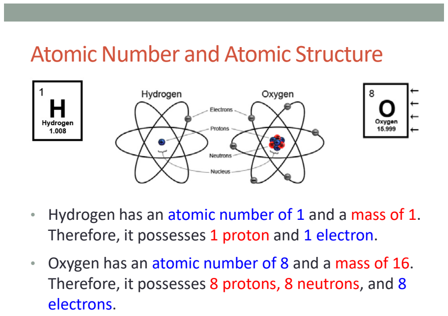
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
	misconceptions even after what we usually consider to be good hands-on science instruction. • To help students change their ideas and truly understand science concepts, we need to engage them in more thinking and sensemaking. • Making students' ideas and misconceptions visible is essential to effective science teaching. • For teachers, knowledge of students' ideas can guide them in designing instruction to provide evidence and support that will help students change their ideas and find science ideas meaningful. • For students, making their thinking visible engages them actively in the learning process. **What Participants Do** • Write about where the added mass comes from when a tiny seed becomes a full-grown tree. • Watch *Minds of Our Own Lessons From Thin Air* video clips in which Harvard graduates and an 8th-grade student answer the same	 Research on How Students Learn • Respond in your notebooks to the following question: Imagine that a seed is planted in the ground and grows into a tree. Where does most of the matter come from that makes up the wood and leaves of the tree? • We won't share our responses with the whole group.	**Display Slide 36.** Research on How Students Learn (3 min) a. **Individuals:** Have participants answer the question on the slide in their science notebooks. **Background for PD leaders:** Participants will likely have the same misconceptions revealed in the video, but they may not yet be comfortable sharing their confusion. At this point, don't ask them to share their ideas with the group. It will be interesting to see if some of them voluntarily share their "wrong" ideas after they see the video.
		 *Minds of Our Own* *Minds of Our Own* is a video that visually summarizes a large body of research on student learning in science classrooms. As you watch, think about the following questions: • How do Harvard graduates answer the question about the mass of a tree? Is their response the same as or different from yours? • Does this give you any new ideas about effective science teaching? Link to *Minds of Our Own* video clip.	**Display Slide 37.** *Minds of Our Own* (10 min) a. Read the information and instructions on the slide. b. Watch the *Minds of Our Own Lessons From Thin Air* video. Total viewing time is approximately 10 minutes. (https://www.learner.org/series/minds-of-our-own/2-lessons-from-thin-air/?jwsource=cl) • MIT/Harvard interview—start at segment 3:30 and end at 5:40. • John preinterview, class, and postinterview—start at segment 7:50 and end at 16:45. **Note:** If time is short, stop after Phil Sadler. If you have enough time, you can show the entire segment from 3:30 to 16:45.

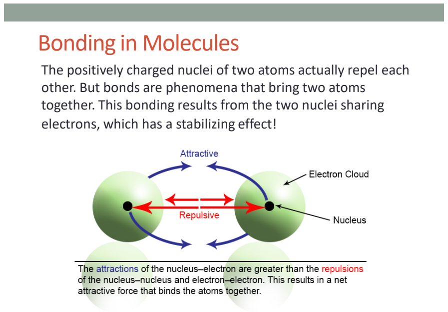
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
	question. • Discuss ideas about research on student thinking addressed in the video. • Review a chart of participant ideas about effective science teaching in light of this research. **Posters and Charts** • Effective Science Teaching chart **Videos** • *Minds of Our Own* **Handouts in PD Binder** • 1.5 "Synthesis of Research from *How Students Learn: Science in the Classroom*" **Supplies** • Science notebooks	Discussion Questions • What did you notice in the *Minds of Our Own* video? • What does research on learning say to us about effective science teaching? • What new features can we add to our description of effective science teaching?	**Display Slide 38.** Discussion Questions (15 min) a. There's a lot to talk about in this video! Here are some additional questions you might pose: • Did John's ideas about photosynthesis change through instruction? • What did the teacher say about his instruction? • What did the experts say? • How do the Harvard students' responses compare with your own? What ideas does this give you about your own science learning experiences? **Key ideas to emphasize:** Research shows that we not only need to engage students in more thinking and sensemaking, but we also need to listen to their ideas—*especially when they're wrong*—and use them to guide our instruction. b. Modify the chart of ideas about effective science teaching as participants share features from the research.
		What Can We Learn from the Research? **A Student Thinking Lens can …** • reveal, support, and challenge student thinking throughout instruction; • provide opportunities for students to analyze and interpret data, as well as construct arguments and explanations; • engage students in making connections between ideas and activities; and • provide structures to teach students how to communicate in scientific ways. For more insights, see "Synthesis of Research from *How Students Learn: Science in the Classroom*" (handout 1.5 in binder).	**Display Slide 39.** What Can We Learn from the Research? (2 min) a. "This slide nicely summarizes some of the ways we get students thinking and make their thinking visible." **Note:** Encourage participants to read handout 1.5 ("Synthesis of Research from *How Students Learn: Science in the Classroom*") for further insight. b. **Transition:** "Today we'll start learning some particular strategies for making student thinking more prominent in science lessons." **Background for PD leaders:** The STeLLA

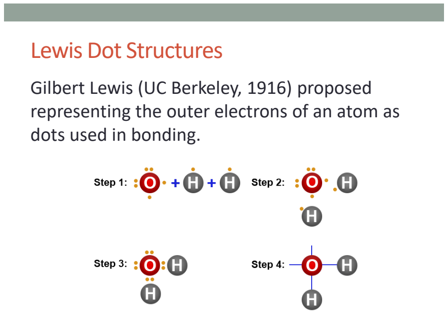
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			conceptual framework addresses the need uncovered in this and other studies on how people learn and, more specifically, how students learn science. 1. If students' initial knowledge is not engaged, they may fail to grasp the new concepts and information that are taught and may distort the new information to make it fit their prior experience. 2. This idea of learning with understanding has two parts: (1) factual knowledge *must* be placed in a conceptual framework (a big idea or a set of big ideas) organized in ways that enable students to use and apply that knowledge to make predictions, solve problems, explain new situations, and so forth; and (2) multiple representations that are rich in science ideas and details give concepts meaning. 3. This idea helps students monitor their developing understandings, engaging them in reflecting on their learning experiences, their changing ideas, and their remaining questions and musings.
10:40–12:00 80 min **Content Deepening: Properties of Matter** Slides 40–52	**Purpose** • Deepen participants' science-content knowledge of matter and its properties by exploring two central questions: *What is matter made of?* and *How can matter change?* **Content** • The key to understanding matter is exploring the arrangement and movement of	 PROPERTIES OF MATTER CONTENT DEEPENING Grade 2 BSCS	**Display Slide 40.** Content Deepening: Properties of Matter (Less than 1 min) a. "Now let's begin our content deepening work on properties of matter." **Note:** Throughout this content deepening phase, refer as needed to Properties of Matter Learning Goals for Students and Teachers, the Properties of Matter Content Background Document, and Common Student Ideas about Properties of Matter.

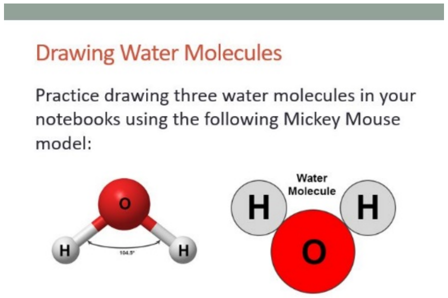
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
	water molecules in various states or phases (i.e., solid, liquid, gas). **What Participants Do** • List properties and characteristics of water. • Develop a working definition of *matter*. • Draw a picture to illustrate why two atoms bond or have an attraction to one another. • Build a water molecule using a ball-and-stick model. • Practice drawing Mickey Mouse water molecules. • Identify characteristics of ice as a solid. • Complete an analogy map to test their understandings of the Lego model. **Handouts in PD Binder** • 1.6 My Lego Model—Analogy Map (from lesson 4a) **Handouts in Lesson Plans Binder** • 3.1 Lego Model (from lesson 3a) • 4.2 My Lego Model—Analogy Map (Teacher Master) (from lesson 4a) **Supplies** • Science notebooks • Chart paper and markers • Periodic Table of Elements • Ball-and-stick molecular model with magnets (1 set)	 Unit Central Questions What is matter made of? How can matter change? Courtesy of Pixabay.com	**Display Slide 41.** Unit Central Questions (10 min) a. Read the unit central questions on the slide and emphasize that these questions will guide student learning throughout the Properties of Matter lesson sequence. The first question will be addressed in lessons 1–3, and the second question will be addressed in lessons 4–7. b. “By the end of this week, we’ll be able to answer these two central questions. You may have some insights now, but our content deepening sessions will expand your understandings and equip you to use the STeLLA strategies more effectively to make student thinking and misconceptions about matter visible.” c. “Let’s begin by reviewing some common student ideas about matter.” d. Have participants locate Common Student Ideas about Properties of Matter in the resources section of their lesson plans binders. e. **Individuals:** “Take 5 minutes to read this document and jot down in your science notebooks any misconceptions about these ideas that your students may have expressed in past lessons.” f. **Whole-group share-out:** Invite participants to share with the group the main student misconceptions they identified in the document. Sharing their observations is important for building community. Some participants may be apprehensive about teaching this content and may be concerned with their students’ ability to learn it. Assure them that this is OK.

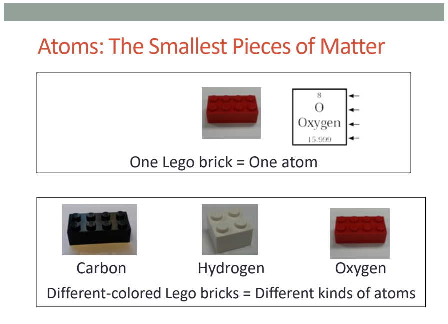
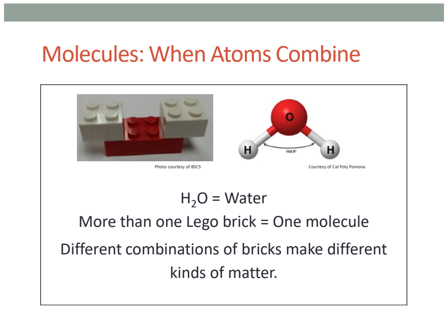
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
	- 6 red-and-white Lego water molecules (per group) **PD Resources** - RESPeCT lesson plans binder **Resources in Lesson Plans Binder** *Resources section:* - Content background document - Common Student Ideas *Pretabs section:* - Properties of Matter Learning Goals for Students and Teachers		
		 Content Deepening Focus Questions 1. If you could shrink small enough to fit inside a melting ice cube, what would you see? 2. How are water molecules arranged in an ice cube? Photo used with permission from BSCS Photo courtesy of Cal Poly Pomona	**Display Slide 42.** Content Deepening Focus Questions (5 min) a. Read the focus questions on the slide. b. **Individuals:** “Let’s talk about the first question. Think about what you’d see if you were small enough to fit inside a melting ice cube. Try to recall as many properties and characteristics of water as you can and jot them down in a 30-second quick write. See if you can describe the chemical formula, physical properties, chemical properties, and states or phases of water.” c. **Whole-group share-out:** Invite participants to share what they know about the properties of water. Don’t offer feedback at this point; simply encourage participants to share their knowledge and identify similarities as ideas become visible. d. “I noticed that several of you mentioned the words *atoms* and *bonds* in your descriptions of water. We’ll explore these concepts next.”
		 What Is Water? **Water** is a transparent fluid that forms the world’s streams, lakes, oceans, and precipitation. Water is also made up of **matter**. Photo courtesy of Freedesignfile.com Photo courtesy of Pixabay.com Photo used with permission by BSCS	**Display Slide 43.** What Is Water? (Less than 1 min) a. Read the definition on the slide. b. “How would you define *matter*? Let’s develop a working definition.”

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
		 Defining Matter In your notebooks, define *matter* in your own words. Courtesy of Pixabay.com	**Display Slide 44.** Defining Matter (8 min) a. **Individuals:** “First, I’d like you to write your own definition of *matter* in your science notebooks.” b. **Whole group:** Invite participants to share their definitions with the group. c. Record participants’ ideas on chart paper during this discussion. Then work together to reach a consensus on a final working definition. Record this definition on chart paper and have participants write it in their science notebooks.
		 Atomic Number and Atomic Structure - Hydrogen has an atomic number of 1 and a mass of 1. Therefore, it possesses 1 proton and 1 electron. - Oxygen has an atomic number of 8 and a mass of 16. Therefore, it possesses 8 protons, 8 neutrons, and 8 electrons.	**Display Slide 45.** Atomic Number and Atomic Structure (10 min) **Note:** Initially, show only the atomic model on the slide. a. “As we discussed earlier, water is made up of hydrogen and oxygen atoms. This slide shows the chemical symbols for hydrogen and oxygen from the Periodic Table of Elements. The diagram in the center is an atomic model developed by a scientist named Ernest Rutherford to describe how atomic number relates to atomic structure. See if you can unlock the code for hydrogen.” b. Give participants 1 or 2 minutes to figure out the code. Then chart any patterns participants are able to identify and reveal the information about hydrogen at the bottom of the slide. c. “So atomic number indicates how many electrons are in an atom. Hydrogen has 1 electron to match its atomic number of 1. Hydrogen also has a mass of about 1 atomic mass units (amu), which indicates the nucleus of hydrogen has 1 proton. In the end, the number of protons and electrons

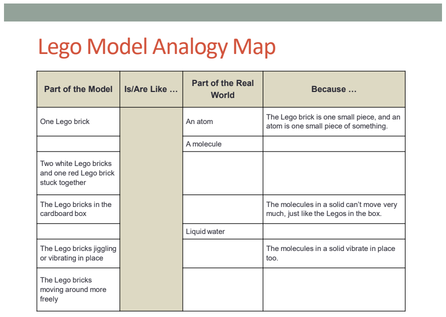
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			balance each other.” d. Someone in the group may wonder why the mass of hydrogen is 1.008 instead of exactly 1.00. Explain that this is a *weighted average* that also accounts for hydrogen isotopes that can have various numbers of neutrons in the nucleus. But since this is rare, it should *not* be emphasized. e. Next, have participants try to unlock the code for oxygen. Then reveal and discuss the information about oxygen at the bottom of the slide.
		 Bonding in Molecules The positively charged nuclei of two atoms actually repel each other. But bonds are phenomena that bring two atoms together. This bonding results from the two nuclei sharing electrons, which has a stabilizing effect! The attractions of the nucleus–electron are greater than the repulsions of the nucleus–nucleus and electron–electron. This results in a net attractive force that binds the atoms together.	**Display Slide 46.** Bonding in Molecules (10 min) **Note:** Initially hide the diagram on the slide. a. “Water molecules are made up of hydrogen and oxygen atoms. Each atom consists of a nucleus that contains protons (+) and neutrons (-). Protons are positively charged, and neutrons are neither positively nor negatively charged. The presence of negatively charged electrons balances the positive charge of the nucleus.” b. “Imagine atoms with a positively charged nucleus and negatively charged electrons surrounding the nucleus. Draw a picture or model in your notebooks to illustrate why two atoms might bond with each other or be attracted to each other.” c. As participants work on their drawings, circulate around the room and remind them to include a nucleus in their models. d. After participants have completed their drawings, invite one or two volunteers to share them with the group. Then reveal the diagram of two atoms on the PowerPoint slide. e. “Notice that the positively charged nuclei of the two atoms in our diagram actually repel each other. This makes sense because two friends with

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			tempers can't usually coexist. But in all relationships, bond formation is a phenomenon that brings two atoms or two people together. In life, even when it's difficult to get along with spouses, partners, other staff members, or teammates, we find a way to make things work because there is strength in numbers. In atoms bonding results from two nuclei sharing electrons. The attraction of the nuclei to the negatively charged electrons overcomes the repulsion mentioned earlier. Sharing electrons has a stabilizing effect and explains why bonds form between atoms. Likewise, sharing our resources as teachers has a stabilizing effect on our jobs from day to day." f. Following this discussion, have participants revise their drawings based on these ideas.
		 Lewis Dot Structures Gilbert Lewis (UC Berkeley, 1916) proposed representing the outer electrons of an atom as dots used in bonding. 	**Display Slide 47.** Lewis Dot Structures (10 min) a. "Gilbert Lewis, a professor from UC Berkeley, was the first scientist to propose the dot-structure model to illustrate electrons in 1916. Lewis displayed only the outermost electrons in the outermost shell because bonds are made using the outermost surface of an atom. Electrons in the inner core are unaffected. Likewise, humans typically form initial bonds and attractions based on outward appearances. We don't form close friendships until we really get to know what others are like at the core. Atoms are the same." b. "Let's use this Lewis dot-structure model to show how hydrogen and oxygen atoms share electrons by forming bonds: "**Step 1:** A water molecule has 1 oxygen atom with 6 outer-shell electrons and 2 hydrogen atoms with 1 outer-shell electron. "**Step 2:** Each hydrogen atom needs to share 1

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			electron from the oxygen atom (and vice versa) to gain stability. So the atoms arrange themselves to make this a reality. “**Step 3:** Once the atoms are close enough, the electrons are shared, and two bonds are formed. “**Step 4:** A single line between these bonds indicates that the electrons of each atom are being shared.” c. Explain that the additional electrons surrounding the oxygen atom are fundamental to the behavior of water in a solid, liquid, or gaseous state, but this isn’t essential information for 2nd graders.
		 Drawing Water Molecules Practice drawing three water molecules in your notebooks using the following Mickey Mouse model: 	**Display Slide 48.** Drawing Water Molecules (7 min) a. “The Lewis dot-structure theory has been awarded four Nobel Prizes in chemistry and physics over the years. Our students won’t need to know the theory itself, but they’ll need to recognize water as a molecule with one oxygen and two hydrogen atoms and be able to draw a Mickey Mouse model. As teachers, we need to develop deeper understandings of these ideas than our students so we can challenge their thinking appropriately.” b. Build a water molecule using a ball-and-stick model in which the wooden pegs represent a bond. Then have participants take 5 minutes to draw three Mickey Mouse water molecules in their notebooks. c. “The hydrogen atoms are drawn as smaller circles because hydrogen has a smaller mass and fewer electron shells. This explains why the hydrogen atoms are shown as the ears on Mickey’s head, while the larger oxygen atom represents his head.”

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
		 Atoms: The Smallest Pieces of Matter One Lego brick = One atom Carbon Hydrogen Oxygen Different-colored Lego bricks = Different kinds of atoms	**Display Slide 49.** Atoms: The Smallest Pieces of Matter (5 min) a. "In the lessons on matter, we'll use a Lego model to help our students understand water from a molecular perspective." b. Have participants locate handout 3.1 (Lego Model) in their lesson plans binders; then walk them through the information on the Lego model. c. "One Lego brick in our model represents one atom, the smallest piece of matter students will need to be familiar with. Lego bricks of different colors represent different kinds of atoms, such as carbon, hydrogen, and oxygen."
		 Molecules: When Atoms Combine Photo courtesy of BSCS Courtesy of Cal Poly Pomona H_2O = Water More than one Lego brick = One molecule Different combinations of bricks make different kinds of matter.	**Display Slide 50.** Molecules: When Atoms Combine (1 min) a. "Our students will also need to know about molecules. A molecule forms when two or more atoms join together in a bond. Different combinations of atoms form different kinds of matter. A water molecule is made up of two hydrogen atoms and one oxygen atom, or two white Lego bricks and one red Lego brick like the Lego model on the slide. This model has the same arrangement or configuration of atoms as the Mickey Mouse or ball-and-stick model."

<table>
<tr><th>PD Model: Time/Phase</th><th>Purpose, Content, and What Participants Do</th><th>Slides</th><th>Process</th></tr>
<tr><td rowspan="2"></td><td rowspan="2"></td><td>



Lego Model Analogy Map

<table>
<tr><th>Part of the Model</th><th>Is/Are Like …</th><th>Part of the Real World</th><th>Because …</th></tr>
<tr><td>One Lego brick</td><td></td><td>An atom</td><td>The Lego brick is one small piece, and an atom is one small piece of something.</td></tr>
<tr><td></td><td></td><td>A molecule</td><td></td></tr>
<tr><td>Two white Lego bricks and one red Lego brick stuck together</td><td></td><td></td><td></td></tr>
<tr><td>The Lego bricks in the cardboard box</td><td></td><td></td><td>The molecules in a solid can't move very much, just like the Legos in the box.</td></tr>
<tr><td></td><td></td><td>Liquid water</td><td></td></tr>
<tr><td>The Lego bricks jiggling or vibrating in place</td><td></td><td></td><td>The molecules in a solid vibrate in place too.</td></tr>
<tr><td>The Lego bricks moving around more freely</td><td></td><td></td><td></td></tr>
</table>

</td><td>

Display Slide 51. Lego Model Analogy Map (5 min)

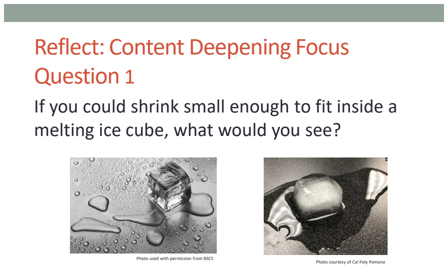
a. Distribute handout 1.6 (My Lego Model—Analogy Map).

b. **Individuals/pairs:** “To test your understandings of the Lego model, I’d like you to complete this analogy map and then share your answers with an elbow partner.”

c. Walk participants through the first sentence on the slide to make sure they understand how to complete the handout.

d. **Whole group:** Invite participants to share their answers from the analogy map. Then display and discuss the answer key from lesson handout 4.2 (My Lego Model—Analogy Map [Teacher Master]).

</td></tr>
<tr><td>



Reflect: Content Deepening Focus Question 1

If you could shrink small enough to fit inside a melting ice cube, what would you see?

Photo used with permission from BSCS

Photo courtesy of Cal Poly Pomona

</td><td>

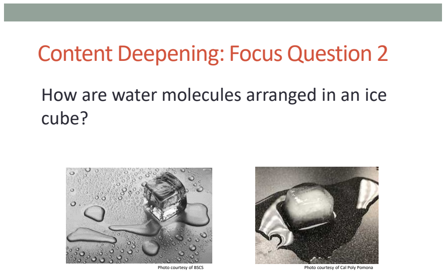
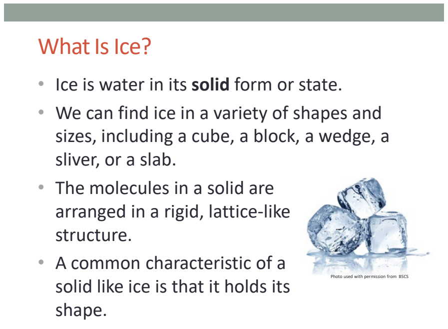
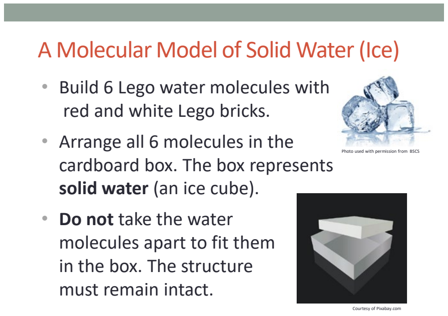
Display Slide 52. Reflect: Content Deepening Focus Question 1 (7 min)

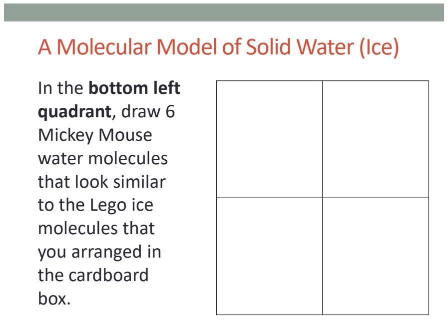
a. Review the focus question on the slide.

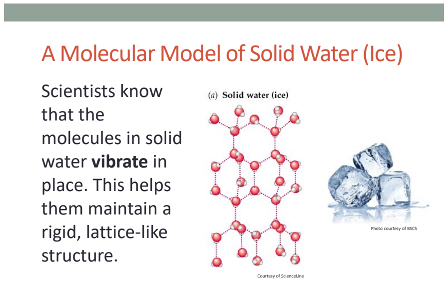
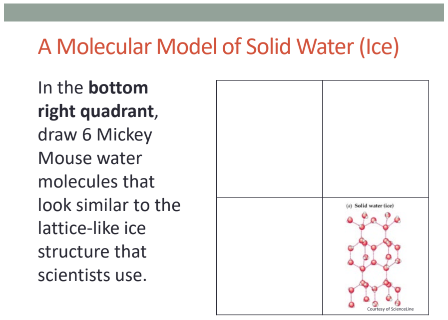
b. **Individuals:** “Reflect on this question for a moment. Then answer it in your science notebooks using ideas about the molecular structure of water from our investigations.”

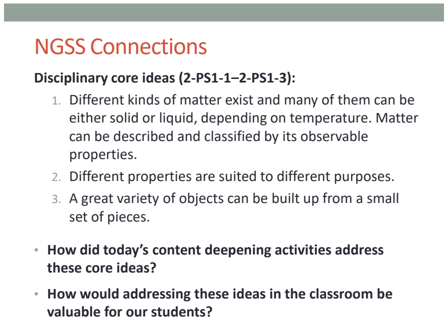
c. **Whole group:** Discuss participants’ answers to the focus question and record key ideas on chart paper.

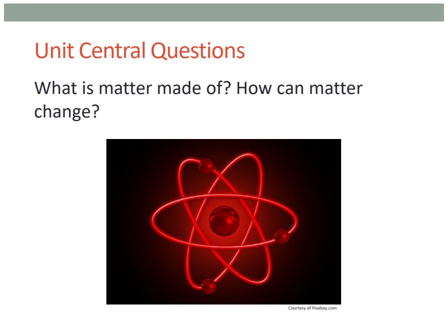
</td></tr>
<tr><td>12:00–12:45
45 min</td><td colspan="3">**LUNCH**</td></tr>
</table>

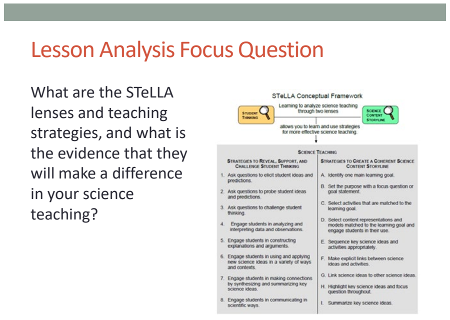
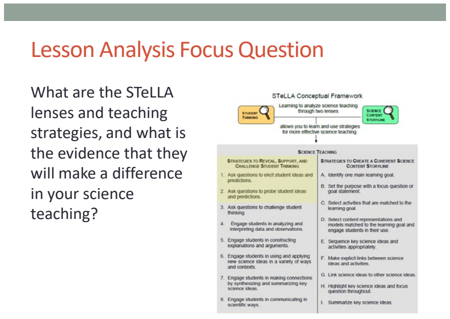
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
12:45–2:10 85 min (Includes 10-min break) **Content Deepening (Continued)** Slides 53–61	**Purpose** • Deepen participants' science-content knowledge of matter and its properties by exploring two central questions: *What is matter made of?* and *How can matter change?* **Content** • The study of matter revolves around two central questions: *What is matter made of?* and *How can matter change?* **What Participants Do** • Build six Lego water molecules and arrange them in a cardboard box to simulate how water molecules are arranged in an ice cube. • Draw different molecular models of ice. • Review and discuss NGSS disciplinary core ideas related to matter. **Supplies** • Science notebooks • Chart paper and markers • 6 Lego water molecules (per group) • Small cardboard box (per group) • Large ice-lattice model	 Content Deepening: Focus Question 2 How are water molecules arranged in an ice cube? Photo courtesy of BSCS Photo courtesy of Cal Poly Pomona	**Display Slide 53.** Content Deepening: Focus Question 2 (Less than 1 min) a. "Next, we'll explore the focus question, *How are water molecules arranged in an ice cube?*"
		 What Is Ice? • Ice is water in its **solid** form or state. • We can find ice in a variety of shapes and sizes, including a cube, a block, a wedge, a sliver, or a slab. • The molecules in a solid are arranged in a rigid, lattice-like structure. • A common characteristic of a solid like ice is that it holds its shape. Photo used with permission from BSCS	**Display Slide 54.** What Is Ice? (1 min) a. "Ice is water in its *solid* form or state. We can find ice in a variety of shapes and sizes, including a cube, a block, a wedge, a sliver, or a slab. The molecules in a solid are arranged in a rigid, lattice-like structure, so a common characteristic of a solid like ice is that it holds its shape. The arrangement of the molecules is the key!" b. "Let's look more closely at how water molecules are arranged in an ice cube."
		 A Molecular Model of Solid Water (Ice) • Build 6 Lego water molecules with red and white Lego bricks. • Arrange all 6 molecules in the cardboard box. The box represents **solid water** (an ice cube). • **Do not** take the water molecules apart to fit them in the box. The structure must remain intact. Photo used with permission from BSCS Courtesy of Pixabay.com	**Display Slide 55.** A Molecular Model of Solid Water (Ice) (15 min) a. "To help us to visualize how molecules are arranged in a solid state, we'll work in small groups to build a model using a small cardboard box to represent an ice cube and Legos to represent the water molecules that make up an ice cube." b. Have participants form small groups; then give each group a set of red and white Legos and a small cardboard box. c. "First, make six Lego water molecules with the

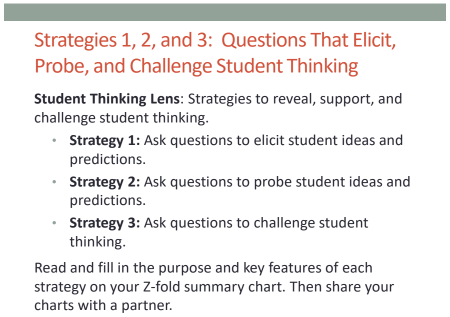
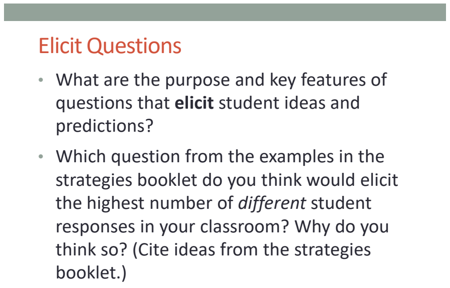
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			red and white Lego bricks. Then arrange the molecules in the cardboard box so they all fit. The only rule is that you can’t take the water molecules apart to fit them in the box. Their Mickey Mouse structure must remain intact inside the box.” d. Don’t tell participants how to arrange the Legos in the box. Simply encourage them to use their creativity.
		 A Molecular Model of Solid Water (Ice) In the **bottom left quadrant**, draw 6 Mickey Mouse water molecules that look similar to the Lego ice molecules that you arranged in the cardboard box.	**Display Slide 56.** A Molecular Model of Solid Water (Ice) (12 min) a. **Individuals:** “Now draw a box with four quadrants on a blank page in your science notebooks. In the bottom left quadrant, draw six Mickey Mouse water molecules that look similar to the Lego ice molecules you arranged in the cardboard box.” b. Give participants 1 minute to draw their solid water molecules. c. **Turn and Talk:** “Now share your diagrams with an elbow partner. See if you can find any similarities between your drawings.” d. **Whole group:** Invite participants to share their drawings and descriptions with the group. Ask them to identify any similarities among the drawings.

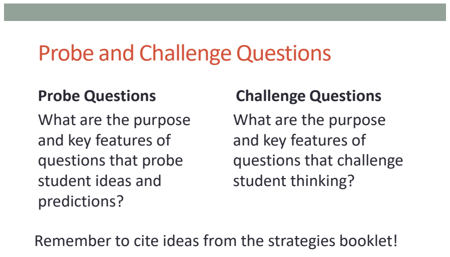
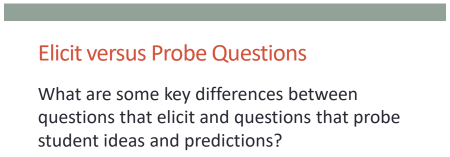
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
		 A Molecular Model of Solid Water (Ice) Scientists know that the molecules in solid water **vibrate** in place. This helps them maintain a rigid, lattice-like structure. Courtesy of ScienceLine Photo courtesy of BSCS	**Display Slide 57.** A Molecular Model of Solid Water (Ice) (10 min) a. “Interestingly, scientists know that the molecules in solid water or ice vibrate in place. This helps them maintain a rigid, lattice-like structure.” b. “Using your six Lego water molecules, see if you can figure out the overall configuration or arrangement of *solid water* molecules in a larger system.” c. Give small groups a few minutes to manipulate their Lego water molecules. **Note:** It will be interesting to see whether participants identify the H-bonds or temporary attractions between the hydrogen atoms of one water molecule and the oxygen atom of a neighboring molecule. The nonbonding electrons of the oxygen atoms in the Lewis dot structure are responsible for these intermolecular attractions, which are represented by the dotted lines in the lattice diagram on the slide. d. Show participants the large ice-lattice model like the one on the slide and discuss the hexagonal shape (configuration) of the six water molecules.
		 A Molecular Model of Solid Water (Ice) In the **bottom right quadrant**, draw 6 Mickey Mouse water molecules that look similar to the lattice-like ice structure that scientists use. Courtesy of ScienceLine	**Display Slide 58.** A Molecular Model of Solid Water (Ice) (12 min) a. **Individuals:** “Now in the bottom right quadrant of your box, draw six Mickey Mouse water molecules that look similar to the lattice-like structure that scientists use.” b. Place the large ice-lattice model on the table for participants to refer to as they draw their molecules. c. Give participants 1 or 2 minutes to draw their ice-

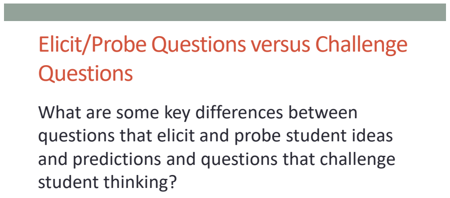
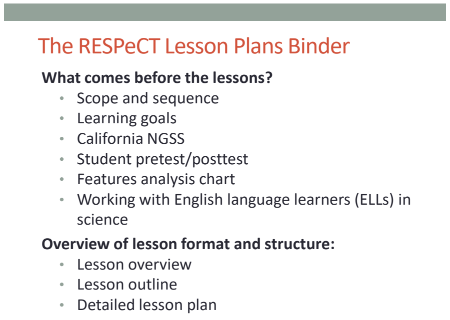
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			lattice molecules. d. **Turn and Talk:** "Now share your ice-lattice diagrams with an elbow partner. Compare your drawings and discuss any similarities and differences you notice." e. **Whole group:** Invite participants to share their drawings and descriptions with the group. Ask them to compare the drawings and identify any similarities and differences.
		 Reflect: Content Deepening Focus Question 2 How are water molecules arranged in an ice cube? Photo used with permission from BSCS Photo courtesy of Cal Poly Pomona	**Display Slide 59.** Reflect: Content Deepening Focus Question 2 (8 min) a. Review the focus question on the slide. b. **Individuals:** "Reflect on what we learned about matter and molecules during today's content deepening session. Then answer this focus question in your science notebooks using ideas and evidence from our investigations." c. **Whole group:** Discuss participants' answers to the focus question and record key ideas on chart paper.
		 NGSS Connections **Disciplinary core ideas (2-PS1-1–2-PS1-3):** 1. Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties. 2. Different properties are suited to different purposes. 3. A great variety of objects can be built up from a small set of pieces. • **How did today's content deepening activities address these core ideas?** • **How would addressing these ideas in the classroom be valuable for our students?**	**Display Slide 60.** NGSS Connections (10 min) a. "Today's investigations have a direct connection to NGSS standards." b. Read the NGSS disciplinary core ideas on the slide. Then ask participants, "How did our content deepening activities address these core ideas? How would addressing these ideas in the classroom be valuable for our students?" c. **Individuals:** Ask participants to think about these questions and then write their ideas in their science notebooks. d. **Whole group:** Invite participants to share their

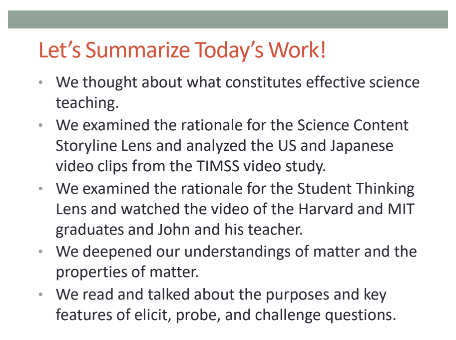
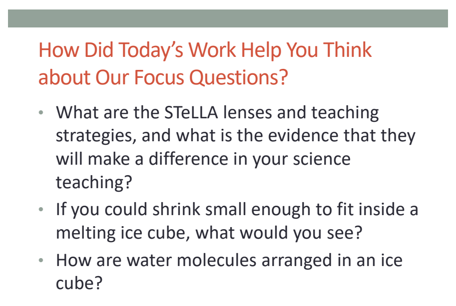
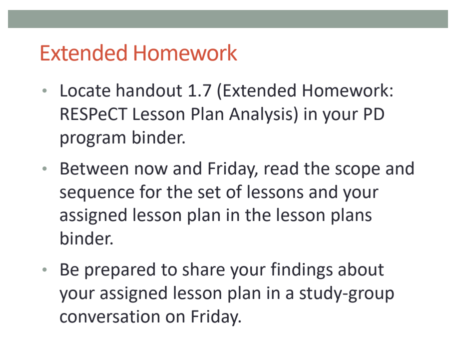
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			responses with the group. Record key ideas on chart paper.
		 Unit Central Questions What is matter made of? How can matter change? Courtesy of Pixabay.com	**Display Slide 61.** Unit Central Questions (8 min) a. Review the unit central questions on the slide and ask participants how they would answer these questions based on today's content deepening work. b. Avoid adding on to participants' responses. Simply ask probe and challenge questions to ensure that participants express their ideas about matter in scientifically accurate ways. c. "Tonight, make sure to read sections 1–4 in the Properties of Matter Content Background Document in your lesson plans binders. As you review the ideas we talked about today, write down any questions you still have." d. Have participants write this assignment in their science notebooks.
2:00–2:10 10 min	**BREAK**		

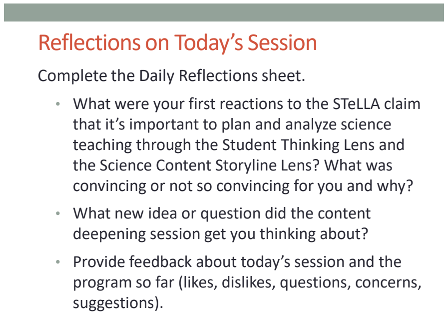
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
2:10–3:00 50 min **STL Strategies: Elicit, Probe, and Challenge Questions** Slides 62–68	**Purpose** • Begin to develop shared understandings of the Student Thinking Lens (STL) and STeLLA strategies 1, 2, and 3 (elicit, probe, and challenge questions). **Content** • Participants are introduced to the purposes and key features of Student Thinking Lens strategies 1, 2, and 3 (elicit, probe, and challenge questions). This is the first step in learning about these strategies. Learning will continue on day 2 when participants watch video footage of these strategies in action. • Elicit questions are designed to reveal a variety of student ideas, misconceptions, and experiences before they learn new content. • Probe questions follow up on something a student has already said to find out more. • Challenge questions are designed to push students toward more-scientific understandings by making new connections and changing their	 Lesson Analysis Focus Question What are the STeLLA lenses and teaching strategies, and what is the evidence that they will make a difference in your science teaching? STeLLA Conceptual Framework Student Thinking Learning to analyze science teaching through two lenses Science Content Storyline allows you to learn and use strategies for more effective science teaching. Science Teaching Strategies to Reveal, Support, and Challenge Student Thinking 1. Ask questions to elicit student ideas and predictions. 2. Ask questions to probe student ideas and predictions. 3. Ask questions to challenge student thinking. 4. Engage students in analyzing and interpreting data and observations. 5. Engage students in constructing explanations and arguments. 6. Engage students in using and applying new science ideas in a variety of ways and contexts. 7. Engage students in making connections by synthesizing and summarizing key science ideas. 8. Engage students in communicating in scientific ways. Strategies to Create a Coherent Science Content Storyline A. Identify one main learning goal. B. Set the purpose with a focus question or goal statement. C. Select activities that are matched to the learning goal. D. Select content representations and models matched to the learning goal and engage students in their use. E. Sequence key science ideas and activities appropriately. F. Make explicit links between science ideas and activities. G. Link science ideas to other science ideas. H. Highlight key science ideas and focus question throughout. I. Summarize key science ideas.	**Display Slide 62.** Lesson Analysis Focus Question (1 min) a. Read the focus question on the slide. b. “The visual on this slide tells us a little about the first part of our focus question: What are the STeLLA lenses and teaching strategies? As you can see, there are eight specific science teaching strategies to support the Student Thinking Lens.” c. **Acknowledge:** “I know you have existing frameworks (ideas and language) regarding teaching and learning, and I expect you’ll continuously draw from them throughout the Summer Institute.”
		 Lesson Analysis Focus Question What are the STeLLA lenses and teaching strategies, and what is the evidence that they will make a difference in your science teaching? STeLLA Conceptual Framework Student Thinking Learning to analyze science teaching through two lenses Science Content Storyline allows you to learn and use strategies for more effective science teaching. Science Teaching Strategies to Reveal, Support, and Challenge Student Thinking 1. Ask questions to elicit student ideas and predictions. 2. Ask questions to probe student ideas and predictions. 3. Ask questions to challenge student thinking. 4. Engage students in analyzing and interpreting data and observations. 5. Engage students in constructing explanations and arguments. 6. Engage students in using and applying new science ideas in a variety of ways and contexts. 7. Engage students in making connections by synthesizing and summarizing key science ideas. 8. Engage students in communicating in scientific ways. Strategies to Create a Coherent Science Content Storyline A. Identify one main learning goal. B. Set the purpose with a focus question or goal statement. C. Select activities that are matched to the learning goal. D. Select content representations and models matched to the learning goal and engage students in their use. E. Sequence key science ideas and activities appropriately. F. Make explicit links between science ideas and activities. G. Link science ideas to other science ideas. H. Highlight key science ideas and focus question throughout. I. Summarize key science ideas.	**Display Slide 63.** Lesson Analysis Focus Question (1 min) a. “Today we’ll begin learning about three of the Student Thinking Lens teaching strategies.” b. Read the strategies highlighted on the slide. c. “These three types of questions will help reveal, support, and challenge student thinking.” d. **Emphasize:** “Even though we’re studying the strategies this summer, you’ll better understand them as you start trying them out in your teaching next fall.”

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
	thinking. **What Participants Do** • Read about STeLLA strategies 1, 2, and 3 and write summaries on their blank STL Z-fold summary charts. • Chart and discuss the purposes and key features of strategies 1, 2, and 3. • Discuss key similarities and differences among the three strategies. **Supplies** • Chart paper and markers **PD Resources** • STeLLA strategies booklet • STL Z-fold summary chart (blank copy in front pocket of PD binder)	 Strategies 1, 2, and 3: Questions That Elicit, Probe, and Challenge Student Thinking **Student Thinking Lens**: Strategies to reveal, support, and challenge student thinking. • **Strategy 1:** Ask questions to elicit student ideas and predictions. • **Strategy 2:** Ask questions to probe student ideas and predictions. • **Strategy 3:** Ask questions to challenge student thinking. Read and fill in the purpose and key features of each strategy on your Z-fold summary chart. Then share your charts with a partner.	**Display Slide 64.** Strategies 1, 2, and 3: Questions That Elicit, Probe, and Challenge Student Thinking (20 min) a. Orient participants to the STeLLA strategies booklet. Forecast that you'll come back to this resource repeatedly to ensure consistent use of ideas, meaning, and language that match the STeLLA conceptual framework. b. **Individuals:** Have participants read about all three strategies and write on their blank STL Z-fold summary charts the purpose(s) and key features of each strategy. State that in the future, they'll do this kind of reading and writing as homework. c. **Pairs:** Have participants pair up and share their Z-fold summary charts. Encourage them to provide evidence from the readings to support their ideas and ask each other questions consistent with the norms for working together, such as "Where did you find that?" or "I interpreted that differently."
		 Elicit Questions • What are the purpose and key features of questions that **elicit** student ideas and predictions? • Which question from the examples in the strategies booklet do you think would elicit the highest number of *different* student responses in your classroom? Why do you think so? (Cite ideas from the strategies booklet.)	**Display Slide 65.** Elicit Questions (5 min) a. As a group, discuss the purpose and key features of questions that elicit student ideas and predictions. Write these features on chart paper and hang the chart where it can be referenced later. b. Sample chart: **Key Ideas about Elicit Questions** **Purpose:** To reveal students' ideas, predictions, misconceptions, and experiences *before* they learn about the content. **Key features:**

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			- Asked anytime, but often at the beginning of a lesson - Phrased in everyday language that students can understand even before studying the related content - Addressed to multiple students (usually the whole class) - Reveals a variety of student ideas - Useful to teachers in adapting instruction - Useful to students so they see that others have different ideas - Can be a prediction - Can set up a discrepant event
		 Probe and Challenge Questions **Probe Questions** What are the purpose and key features of questions that probe student ideas and predictions? **Challenge Questions** What are the purpose and key features of questions that challenge student thinking? Remember to cite ideas from the strategies booklet!	**Display Slide 66.** Probe and Challenge Questions (13 min) a. **Small groups (5 min):** Split participants into two groups—one group for probe questions and one group for challenge questions. Have each group create a chart of the purpose and key features of the assigned strategy *from the STeLLA strategies booklet* (not from experience). b. **Whole group (8 min):** Share the charts with the entire group. Encourage participants to add to, delete from, and modify them as needed to ensure they're accurate and match the language in the strategies booklet.
		 Elicit versus Probe Questions What are some key differences between questions that elicit and questions that probe student ideas and predictions?	**Display Slide 67.** Elicit versus Probe Questions (5 min) a. **Turn and Talk:** "Discuss this question with an elbow partner." b. **Whole-group share-out:** Invite participants to share their ideas with the group. **Key ideas about elicit questions versus probe questions:**

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			- Elicit questions are addressed to the whole class; probe questions are addressed to individual students. - Elicit questions are used before students have studied a concept; probe questions can be asked at any time. - Elicit questions start a discussion; probe questions follow up on something a student has already said.
		 Elicit/Probe Questions versus Challenge Questions What are some key differences between questions that elicit and probe student ideas and predictions and questions that challenge student thinking?	**Display Slide 68.** Elicit/Probe Questions versus Challenge Questions (5 min) a. **Turn and Talk:** "Discuss this question with your elbow partner." b. **Whole-group share-out:** Invite participants to share their ideas with the group. **Key ideas about elicit/probe questions versus challenge questions:** - Elicit and probe questions focus on understanding students' existing ideas rather than trying to change students' thinking. - In contrast, challenge questions are designed to push students' thinking toward more-scientific understandings and support them in changing their thinking.
3:00–3:30 30 min **Wrap-Up: Summary, Homework, and Reflections** Slides 69–73	**Purpose** - Summarize and reflect on key ideas from today's learning and foreshadow what will be addressed tomorrow and later in the week. **What Participants Do** - Review the lesson plans binder. - Summarize today's learning and discuss the focus questions.	 The RESPeCT Lesson Plans Binder **What comes before the lessons?** - Scope and sequence - Learning goals - California NGSS - Student pretest/posttest - Features analysis chart - Working with English language learners (ELLs) in science **Overview of lesson format and structure:** - Lesson overview - Lesson outline - Detailed lesson plan	**Display Slide 69.** The RESPeCT Lesson Plans Binder (5 min) a. **Foreshadow:** "In a moment, we'll review the details of a homework assignment related to the lesson plans you'll be teaching in the upcoming school year." b. "But before we look at the assignment, let's review the organization and contents of the lesson plans binder."

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
	• Go over directions for an extended homework assignment related to the Properties of Matter lesson plans (content area 1). • Write reflections on today's session. **Handouts in PD Binder** • 1.7 Extended Homework: RESPeCT Lesson Plan Analysis • 1.8 Daily Reflections—Day 1 **PD Resources** • RESPeCT lesson plans binder		c. Use the slide to guide participants through the binder contents.
		 Let's Summarize Today's Work! • We thought about what constitutes effective science teaching. • We examined the rationale for the Science Content Storyline Lens and analyzed the US and Japanese video clips from the TIMSS video study. • We examined the rationale for the Student Thinking Lens and watched the video of the Harvard and MIT graduates and John and his teacher. • We deepened our understandings of matter and the properties of matter. • We read and talked about the purposes and key features of elicit, probe, and challenge questions.	**Display Slide 70.** Let's Summarize Today's Work! (5 min) a. Remind participants of the various activities they've been involved in today. b. **Foreshadow:** Let participants know that you're going to ask them to reflect on what they've learned from these activities.
		 How Did Today's Work Help You Think about Our Focus Questions? • What are the STeLLA lenses and teaching strategies, and what is the evidence that they will make a difference in your science teaching? • If you could shrink small enough to fit inside a melting ice cube, what would you see? • How are water molecules arranged in an ice cube?	**Display Slide 71.** How Did Today's Work Help You Think about Our Focus Questions? (10 min) **Note:** If time is running short, you may want to skip the Turn and Talk or the entire slide. a. **Turn and Talk:** "Discuss these questions with an elbow partner." b. **Whole-group share-out:** Invite participants to share their ideas with the group.
		 Extended Homework • Locate handout 1.7 (Extended Homework: RESPeCT Lesson Plan Analysis) in your PD program binder. • Between now and Friday, read the scope and sequence for the set of lessons and your assigned lesson plan in the lesson plans binder. • Be prepared to share your findings about your assigned lesson plan in a study-group conversation on Friday.	**Display Slide 72.** Extended Homework (5 min) a. Assign each participant one of the lessons in the Properties of Matter lesson-plan sequence. There are five 2-part lessons in this content area, with two additional extension lessons. Each teacher should take responsibility for one 2-part lesson. That is, Teacher 1 will study lessons 1a and 1b; Teacher 2 will study lessons 2a and 2b; and so forth. b. If the study group is small, figure out who will be

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			assigned an extra lesson (or when you, as the PD leader, will cover any extra lessons). c. If the study group is large, assign lessons to more than one teacher later in the sequence. d. Go over the homework sheet (handout 1.7) with participants. If time allows, have them read the assignment sheet before discussing.
		 Reflections on Today's Session Complete the Daily Reflections sheet. • What were your first reactions to the STeLLA claim that it's important to plan and analyze science teaching through the Student Thinking Lens and the Science Content Storyline Lens? What was convincing or not so convincing for you and why? • What new idea or question did the content deepening session get you thinking about? • Provide feedback about today's session and the program so far (likes, dislikes, questions, concerns, suggestions).	**Display Slide 73.** Reflections on Today's Session (5 min) a. Review the questions on the Daily Reflections sheet (handout 1.8). b. Ask participants to think about these questions and write down their reflections.