RESPeCT Summer Institute Professional Development Leader Guide (PDLG)

Grade Level	6	**Day**	5	**STeLLA Strategy**	Science Content Storyline Lens (SCSL) Strategy A: Identify One Main Learning Goal	**Subject Matter Focus**	The Sun's Effect on Climate (SEC)

Focus Questions	• What is the Science Content Storyline Lens (SCSL)? • Why is one main learning goal essential for science content storyline coherence? • What temperature patterns can you find on Earth at different latitudes? • What temperature patterns can you find on Earth at different times of the year?
Main Learning Goals	Participants will understand the following: • Research from the TIMSS Video Study of Science Teaching emphasizes the importance of creating science content storylines that support students in making links between classroom activities and science ideas. • The SCS Lens and strategies empower teachers to think in new ways about planning and teaching science lessons. • Identifying and focusing on one main learning goal in a lesson is an important strategy for creating a coherent science content storyline. • Temperatures on Earth's surface vary according to latitude and time of year.

Preparation

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.

Planning and Preparation Tasks

- Study the PDLG, PowerPoint slides (PPTs), video clips, and handouts. Make changes to PPTs if needed.
- Review the reflections from day 4 and create a summary slide.
- Watch video clips and anticipate participant responses.
- Prepare charts for the day's agenda and focus questions.
- Review the activities for SEC lessons

Materials

Posters and Charts

- STeLLA Framework and Strategies poster
- Day-5 Agenda (chart)
- Norms for Working Together (chart)
- Day-5 Focus Questions (chart)
- Effective Science Teaching chart (from day 1)
- Strategy charts from days 1–4 (STL strategies 1–6)
- Parking Lot poster

Handouts in RESPeCT PD Binder Front Pocket

- Z-fold summary chart: Science Content Storyline Lens Strategies (blank)

Handouts in RESPeCT PD Binder, Day 5

- 5.1 Analysis Guide A: Identifying One Main Learning Goal (2 copies)
- 5.2 Practice Identifying One Main Learning Goal
- 5.3 Transcript for Video Clip 5.1
- 5.4 Transcript for Video Clip 5.2
- 5.5 Transcript for Video Clip 5.3

Videos

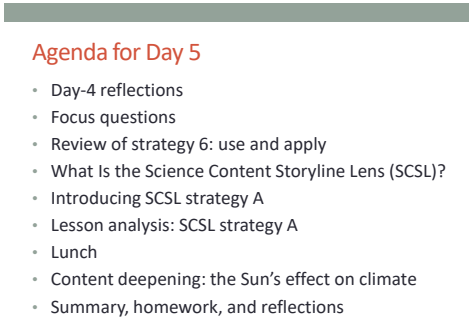
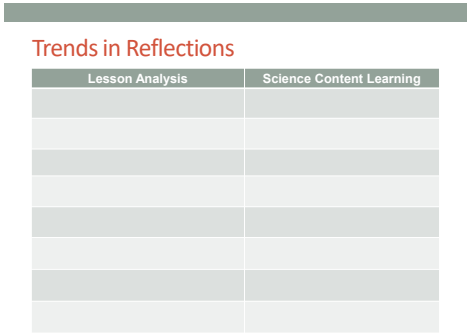
- Video clips from the same SEC lesson:
  - Video Clip 5.1: Evans classroom (beginning of lesson); 5.1_stella_SEC_evans_L6_c1
  - Video Clip 5.2: Evans classroom (during lesson); 5.2_stella_SEC_evans_L6_c2
  - Video Clip 5.3: Evans classroom (end of lesson); 5.3_stella_SEC_evans_L6_c3
- Seven video clips for content deepening:
  - *Climax, Kansas Supercells* (Stephen Locke, 2:57 min); https://www.youtube.com/watch?v=Y4EK2r9JJ1k
  - TV weather forecast (Jackie Johnson, *CBS2 News*, 2:37 min); https://www.youtube.com/watch?v=zsdQE275PvA
  - *LA Is on Storm Watch* (*Jimmy Kimmel Live*, 3:03 min);

1a and 1b in the lesson plans binder.
• Content deepening:
  • Preload the seven video clips for the group activity into a web browser and make sure the web links and video clips work correctly. If any of the links or clips have been moved or deactivated, find an updated link for the video or a suitable replacement.
  • Skip any advertisements and set the video to begin immediately following them.
  • Ensure volume is set correctly on computer, browser, and master volume control.
  • Make sure you know how to toggle between PowerPoint and the web browser, as well as how to move in and out of full-screen view.
  • Make a copy of handout 5.6 (World Map Record Page) and record on this map the July temperature data for each city from handout 1.2 (Average Temperatures around the World: January and July). Then photocopy this premarked handout (1 copy per participant) to distribute during the content deepening phase.
	• 5.6 World Map Record Page (from SEC lesson 1a)
	• 5.7 Extended Homework: RESPeCT Lesson Plan Analysis
	• 5.8 Daily Reflections—Day 5
	
	Handouts in RESPeCT Lesson Plans Binder
	• 1.1 Map of Average Temperatures in the United States, December–February (from SEC lesson 1a)
	• 1.2 Average Temperatures around the World: January and July (from SEC lesson 1a)
	• 1.4 Bar Graph of January Temperatures (from SEC lesson 1b)
	• 1.5 Bar Graph of July Temperatures (from SEC lesson 1b)
	• 1.6 Map of Average Yearly Temperatures on Earth (from SEC lesson 1b)
	• 5.1 Map of Average Temperatures in the United States, June–August (Teacher Master) (from SEC lesson 5a)
	
	PD Leader Masters, Days 5–8
	• PD Leader Master: Practice Identifying One Main Learning Goal (Answer Key)
	
	Supplies
	• Science notebooks
	• Chart paper and markers
	
	PD Resources
	• STeLLA strategies booklet
	• RESPeCT PD program binder
	• RESPeCT lesson plans binder
	
	Resources in Lesson Plans Binder
	Resources section:
	• The Sun's Effect on Climate Content Background Document
	• Common Student Ideas about the Sun's Effect on Climate and Seasons
		https://www.youtube.com/watch?v=z_pTv-qvRI0
		• *El Niño Explained* (Climatedogs, 1:19 min); https://www.youtube.com/watch?v=yCsMmajLYG4
		• *Drilling for Ice* (*Horizon*, BBC, 3:21 min); https://www.youtube.com/watch?v=fuT8Appwak8
		• *Earth: Climate and Weather* (National Geographic, 3:22 min); https://www.youtube.com/watch?v=zz_CRzcIT-Q
		• *Weather versus Climate Change* (Neil deGrasse Tyson, National Geographic, *Cosmos, A Spacetime Odyssey*, 2:09 min); https://www.youtube.com/watch?v=cBdxDFpDp_k

DAY 5 SESSION OUTLINE

Time	Activities	Purpose
8:00–8:25 25 min	**Getting Started: Housekeeping, Agenda, Day-4 Reflections, Norms, Focus Questions**	• Build community by sharing participants' reflections from day 4. • Set the stage for a day of learning.
8:25–8:40 15 min	**Review of Strategy 6: Use and Apply**	• Review STL strategy 6 (use and apply) and deepen participants' understandings of this strategy and the Genetics lesson content.
8:40–8:55 15 min	**What Is the Science Content Storyline Lens (SCSL)?**	• Help participants develop strong initial understandings of the Science Content Storyline Lens.
8:55–10:10 75 min (Includes 10-min break)	**Introducing SCSL Strategy A**	• Clarify and deepen participants' understandings of SCSL strategy A: Identify one main learning goal. • Clarify the distinctions between science ideas, student ideas, and main learning goals.
10:10–12:00 110 min	**Lesson Analysis: SCSL Strategy A**	• Use lesson analysis of classroom videos to better understand SCSL strategy A. • Deepen participants' science-content knowledge of the Sun's effect on climate through lesson analysis.
12:00–12:45 45 min	**LUNCH**	
12:45–3:10 145 min (Includes 10-min break)	**Content Deepening: The Sun's Effect on Climate**	• Deepen participants' understandings of the science content that is part of the SEC lesson series.
3:10–3:30 20 min	**Wrap-Up: Summary, Homework, and Reflections**	• Summarize and reflect on key ideas from today's learning, including the Science Content Storyline Lens, STeLLA strategy A, and the SEC science content.

DAY 5

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
8:00–8:25 25 min **Getting Started** Slides 1–8	**Purpose** • Build community by sharing participants' reflections from day 4. • Set the stage for a day of learning. **What Participants Do** • Review the day's agenda. • Discuss the reflections from day 4. • Review and discuss progress on the RESPeCT program norms. • Read the focus questions for day 5. **Posters and Charts** • STeLLA Framework and Strategies poster • Day-5 Agenda (chart) • Norms for Working Together (chart) • Day-5 Focus Questions (chart)		**Display Slide 1.** RESPeCT PD Program (5 min) a. Take care of any housekeeping issues.
			**Display Slide 2.** Agenda for Day 5 (2 min) a. Talk through the agenda for the day.
			**Display Slide 3.** Trends in Reflections (5 min) a. Give participants time to review your feedback on their reflections from day 4 and offer reactions, comments, or follow-up questions.

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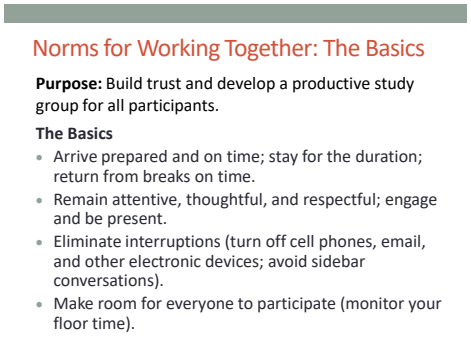
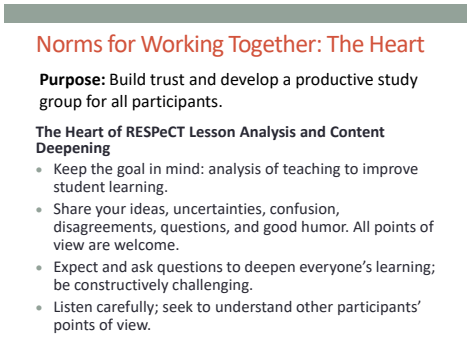
			**Display Slide 4.** Norms for Working Together: The Basics (5 min) a. Review the norms as a group. b. **Ask:** "Any comments or suggested changes? How are we doing with applying these norms?"
			**Display Slide 5.** Norms for Working Together: The Heart (5 min) a. Review these norms as a group. b. **Ask:** "Any comments or suggested changes? Which of these norms do you think we could get better at applying individually and as a group?" c. **Remind participants:** "These norms will become increasingly important during the Summer Institute and throughout the academic year as we analyze one another's classroom videos and learn together."

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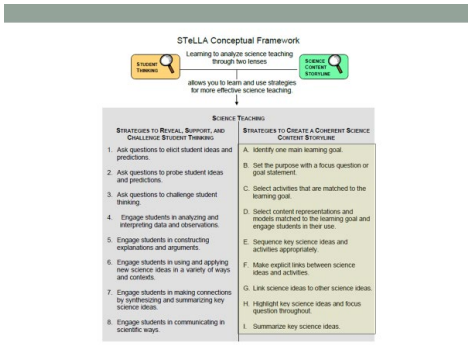
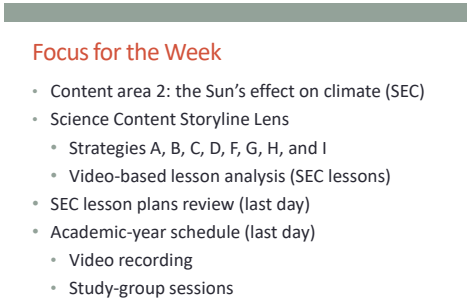
			**Display Slide 6.** STeLLA Conceptual Framework (2 min) a. **Transition:** This slide marks the transition from the STL strategies to the Science Content Storyline Lens strategies. b. "Throughout the PD program, we'll continue learning about the Student Thinking Lens (STL) strategies, but today we'll transition to the Science Content Storyline Lens strategies." c. Highlight the SCSL strategies on the slide.
			**Display Slide 7.** Focus for the Week (1 min) a. "This week we'll focus on a new content area: the Sun's effect on climate. We'll also examine the Science Content Storyline Lens strategies and the SEC lessons you'll be teaching in the fall, analyze video clips of those lessons, and deepen your science-content knowledge related to the lesson plans." b. "On the last day of the RESPeCT PD program, we'll review the lesson plans and the schedule for the academic year." c. "You may notice that we skip strategy E: Sequence key science ideas and activities appropriately. This strategy will be addressed during the school year as you teach the STeLLA lesson plans and analyze how they're sequenced within each lesson and across lessons."

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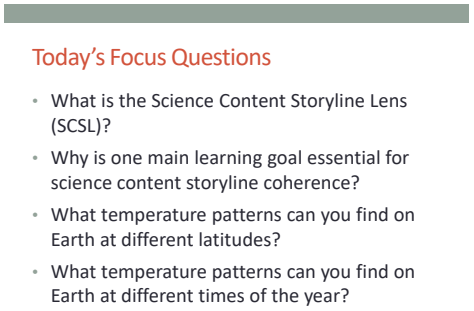
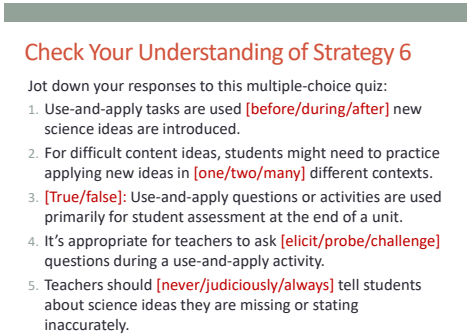
			**Display Slide 8.** Today's Focus Questions (1 min) a. Introduce the focus questions that will guide today's work.
8:25–8:40 15 min **Review of Strategy 6: Use and Apply** Slides 9–10	**Purpose** • Review STL strategy 6 (use and apply) and deepen participants' understandings of this strategy and the Genetics lesson content. **Content** • STL strategy 6 engages students in using and applying new science ideas in a variety of ways and contexts. **What Participants Do** • Take a multiple-choice quiz to check their understanding of STL strategy 6. • Work on a scenario that engages them in using and applying strategy 6 and the Genetics lesson content. **Supplies** • Science notebooks		**Display Slide 9.** Check Your Understanding of Strategy 6 (7 min) **Note:** Display this slide only if it wasn't used on day 4. a. "To check your understanding of STL strategy 6, jot down your responses to this multiple-choice quiz in your science notebooks." b. Have participants discuss their answers either in pairs or as a group. (If time is short, just read the answers aloud.) **Answer key:** 1. After 2. Many 3. False 4. Challenge (and probe) 5. Judiciously (defined as "good or discriminating judgment; wise, sensible, or well advised")

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		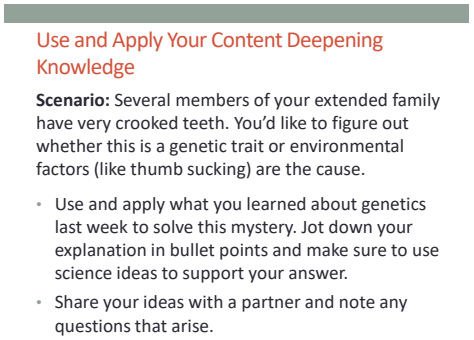	**Display Slide 10.** Use and Apply Your Content Deepening Knowledge (8 min) a. **Think-Pair-Share (3 min):** "Think about the scenario on the slide. Use and apply what you learned about genetics last week to figure out why several members of your extended family have very crooked teeth. Jot down your explanation in bullet points in your notebooks, making sure to use science ideas to support your answer. Then share your ideas with an elbow partner and note any questions that arise." b. **Whole-group share-out (4 min):** "What ideas did you have for solving this use-and-apply scenario?" **Ideal responses:** • "If a trait is genetic, it will show up in a specific pattern among my relatives." • "I'd create a chart showing who in my family has crooked and straight teeth, and then I'd track this through as many generations as possible." • "Based on a guess that crooked teeth might be a dominant or recessive trait, I'd show two recessive alleles for each person who has that trait. For those who exhibit what might be a dominant trait, I'd indicate the possibility that they might have two dominant alleles or one dominant and one recessive allele." • "I'd use these allele markers to figure out whether the pattern in visible traits makes sense (or is even possible). If it doesn't make sense, I'd reverse my guess about dominant and recessive traits and redesignate the possible alleles of each individual."

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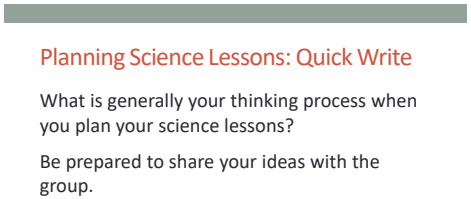
			• "If neither the dominant or recessive scenarios generate a pattern of inheritance that makes sense, I'd consider how other environmental influences might have come into play for the various individuals in my family."
8:40–8:55 15 min **What Is the Science Content Storyline Lens (SCSL)?** Slides 11–13	**Purpose** • Help participants develop strong initial understandings of the Science Content Storyline Lens. **Content** • A science content storyline brings coherence within and across science lessons. **What Participants Do** • Write about and discuss their typical process of planning science lessons. • Discuss their reading about the definition of a science content storyline. • Review and discuss the TIMSS (Trends in Mathematics and Science Study) research basis for the Science Content Storyline Lens. **Posters and Charts** • STeLLA Framework and Strategies poster **PD Resources** • STeLLA strategies booklet		**Display Slide 11.** Planning Science Lessons: Quick Write (6 min) **Note:** This activity is a lead-in for thinking about specific SCSL strategies. When planning science lessons, are participants thinking primarily about (1) SCSL issues, such as learning goals, (2) student misconceptions (an STL issue), which is a great start but doesn't include SCSL strategies, or (3) activities and/or classroom management and timing issues? a. **Individuals:** Direct participants to take 2–3 minutes to write down the key things they think about when planning science lessons. b. **Whole group:** Ask participants to share their reflections with the group. c. **Tell participants:** "The Science Content Storyline Lens strategies should provide some new or additional ways of thinking about planning your science lessons."

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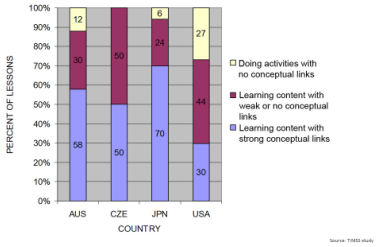
		Lesson Analysis: Focus Question 1 What is the Science Content Storyline Lens (SCSL)? • What is a science content storyline, and why is it important? • What is challenging about developing a science content storyline?	**Display Slide 12.** Lesson Analysis: Focus Question 1 (7 min) a. **Small groups:** Direct half the group to focus on the first bulleted question on the slide, and the other half to focus on the second. Allow groups 2 minutes to think about their assigned questions as they review "Introduction to the Science Content Storyline Lens" in the STeLLA strategies booklet. b. **Whole group:** Have each group share their ideas and responses for these questions. c. As you listen to participants, make sure that what they're saying is consistent with the strategies booklet. If you aren't sure they're interpreting the text accurately, ask them to identify the specific text they're drawing from.
		The TIMSS Video Study Findings and the Science Content Storyline Lens 	**Display Slide 13.** The TIMSS Video Study Findings and the Science Content Storyline Lens (2 min) a. Emphasize the research basis for the Science Content Storyline Lens and its importance. Remind participants that the data on the slide was presented on day 1 of the PD program. b. **Ask:** "What does this graph reveal about US science lessons compared with higher-achieving countries?" **Ideal response:** According to the study, US science lessons didn't do as well linking science ideas to lesson activities; in fact, many lessons were activity focused and included significantly fewer science ideas

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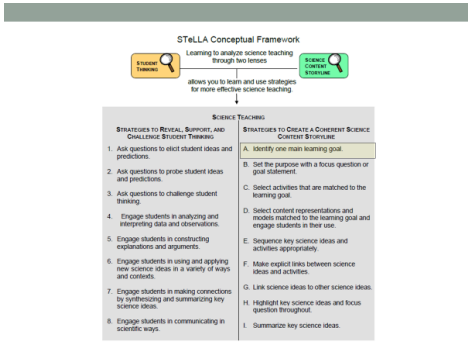
			compared to other countries. c. **Summarize:** Point to strategies F and G on the STeLLA strategies poster: Make explicit links between science ideas and activities (strategy F) and link science ideas to other science ideas (strategy G). These strategies and the idea of a Science Content Storyline Lens grew out of the TIMSS research findings. d. "Today we'll begin our study of the Science Content Storyline Lens, with a focus on strategy A: Identify one main learning goal."
8:55–10:10 75 min (Includes 10-min break) **Introducing SCSL Strategy A** Slides 14–23	**Purpose** • Clarify and deepen participants' understandings of SCSL strategy A: Identify one main learning goal. • Clarify the distinctions between science ideas, student ideas, and main learning goals. **Content** • A main learning goal is a big idea that students are expected to learn and take away from a lesson or series of lessons. Everything in the lesson supports the development of this one main learning goal. **What Participants Do** • Make a chart highlighting the purpose and key features of SCSL strategy A. • Review the differences and relationships among student		**Display Slide 14.** Lesson Analysis: Focus Question 2 (1 min) a. Read the focus question on the slide.
			**Display Slide 15.** STeLLA Conceptual Framework (1 min) a. "Now let's dig into SCSL strategy A!" b. "As you can see, strategy A is the first of nine Science Content Storyline Lens strategies. It appears first because it's the foundation on which all the other SCSL strategies are built. This will become clearer as we delve into the other strategies and see how important it is that each of them is matched to the lesson's

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	ideas, science ideas, and main learning goals. • Practice identifying student ideas and science ideas in a written list. • Practice identifying strong main learning goals using the analysis guide for strategy A. **Handouts in PD Binder** • 5.1 Analysis Guide A • 5.2 Practice Identifying One Main Learning Goal **PD Leader Masters** • PD Leader Master: Practice Identifying One Main Learning Goal (Answer Key) **Supplies** • Chart paper and markers **PD Resources** • STeLLA strategies booklet • SCSL Z-fold summary chart (blank copy in front pocket of PD binder) **Resources in Lesson Plans Binder** *Resources section:* • Content background document • Common Student Ideas		main learning goal." **Display Slide 16.** Purpose and Key Features of Strategy A (25 min) a. **Pairs:** "Share with a partner what you wrote on your Science Content Storyline Lens Z-fold summary chart about the purpose and key features of strategy A." b. **Whole group**: Have one or two participant volunteers lead the group in creating a chart that describes the purpose and key features of strategy A. c. **Transition:** "Next, we'll review the difference between a science idea and the main learning goal of a lesson. Then you'll practice identifying and clarifying this distinction."
		Purpose and Key Features of Strategy A • Review your SCSL Z-fold summary charts and share with a partner the purpose and key features of strategy A: Identify one main learning goal. • Remember to cite passages from the STeLLA strategies booklet. • Be prepared to share with the group.	
		A Main Learning Goal Is … • A big science idea that you want students to learn • A big idea that shows the relationship among science ideas • The focus of the lesson (or series of lessons) • Stated in a complete sentence (for planning purposes) • Stated by the teacher, a student, a text, or a multimedia resource • A support for teacher planning	**Display Slide 17.** A Main Learning Goal Is … (1 min) a. "This slide lists some key ideas about the definition of a main learning goal." b. Read through the ideas. c. **Emphasize:** "Notice the parenthetical reference to 'lessons' in the third bullet point. Each lesson should have only one main learning goal, but you might need two or more lessons to help students accomplish a difficult goal. So it's often necessary to spend more than one lesson on a specific learning goal."

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		A Main Learning Goal Is NOT … • A topic or phrase • An activity • A question • A performance task or objective • A supporting detail, definition, or fact • A student misconception or idea that isn't scientifically accurate	**Display Slide 18.** A Main Learning Goal Is NOT … (1 min) a. Review what is **not** considered a main learning goal.
		Definitions: One Main Learning Goal and Science Ideas 1. Read these sections in the STeLLA strategies booklet: (1) STeLLA Strategy A: Identify One Main Learning Goal, and (2) Student Ideas and Science Ideas Defined. 2. Based on these readings, what are the differences between a main learning goal and a science idea?	**Display Slide 19.** Definitions: One Main Learning Goal and Science Ideas (10 min) a. Have participants locate these two readings in the strategies booklet: (1) STeLLA Strategy A: Identify One Main Learning Goal, and (2) Student Ideas and Science Ideas Defined. b. "After you read these sections in the strategies booklet, we'll discuss the differences between a science idea and a main learning goal." c. **Individuals (3 min):** Give participants time to read the specified sections in the strategies booklet. d. **Whole group (7 min):** Discuss the question on the slide. e. **Emphasize:** "While you might incorporate several science ideas that support the main learning goal of a lesson, be careful not to plan an 'all about' lesson with too many different science ideas that will likely come across to students as a bunch of disconnected

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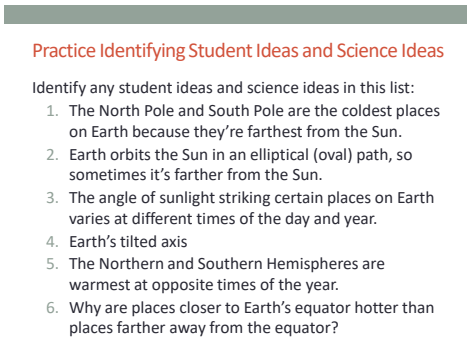
			facts to be memorized."
			**Display Slide 20.** Practice Identifying Student Ideas and Science Ideas (5 min) a. "Next, we'll practice identifying student ideas and science ideas just to make sure you understand the way we're defining these terms." **Note:** As needed, refer participants to the section in the strategies booklet where student ideas are defined (Student Ideas and Science Ideas Defined). b. **Individuals:** "First, identify examples of **science ideas** on the slide. If you need help, refer to the document in your lesson plans binders titled Common Student Ideas about the Sun's Effect on Climate and Seasons. Then identify examples of **student ideas** on the slide." c. **Whole group:** Discuss participants' responses and the correct answers (see answer key). **Answer key:** • Science ideas: 3, 5 • Student ideas: 1, 2 • Neither: 4, 6

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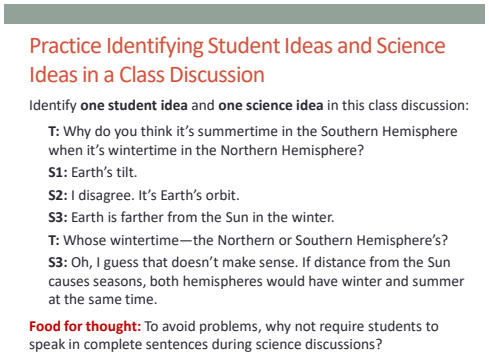
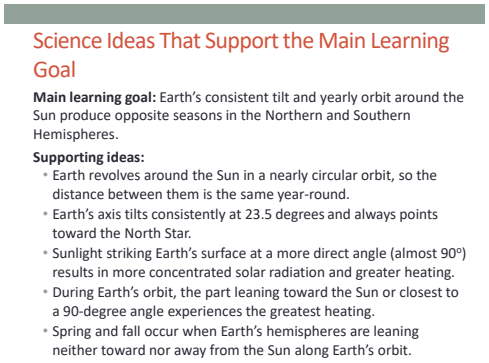
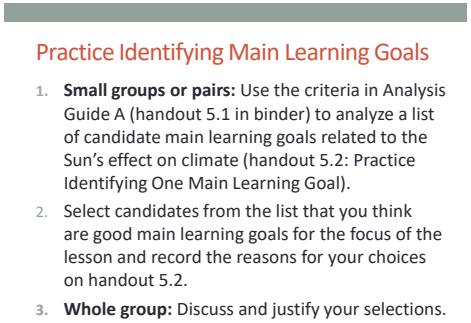
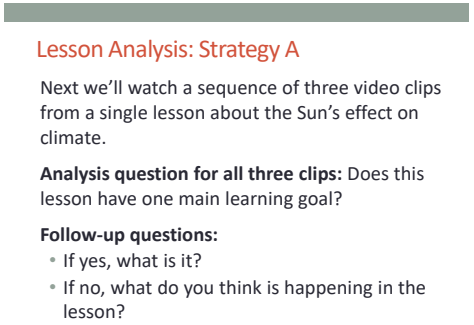
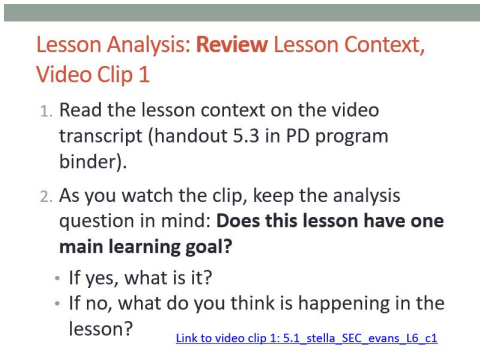
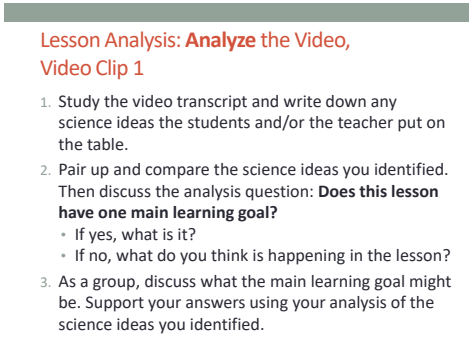
			**Display Slide 21.** Practice Identifying Student Ideas and Science Ideas in a Class Discussion (5 min) a. "It's a little trickier to recognize student ideas and science ideas in class discussions because students sometimes give only one- or two-word answers to teacher questions. But if you link the teacher's question with a student's response, you can sometimes find a science idea or a student idea." **Note:** In the RESPeCT PD program, we encourage students to speak in complete sentences as much as possible. b. "Let's practice linking the teacher's question with student responses in the sample discussion on the slide." c. **Pairs:** "Work with a partner to see if you can identify one student idea and one science idea in this discussion." d. **Whole-group share-out:** Have participants share the ideas they identified in the sample discussion. Then review the answers (see answer key). e. **Emphasize**: "Here's some food for thought: To make student thinking more visible, why not require students to speak in complete sentences during classroom discussions about science ideas?" **Answer key:** • *Student ideas/misconceptions:* • Since it's the combination of Earth's orbit and tilt that causes opposite seasons, both S1 and S2 have only part of the

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			science idea, so these would be considered "student ideas; incomplete understanding." • At first, S3 expresses another student idea—that the distance from Earth to the Sun is different during different seasons. S3 realizes this is an error based on the teacher's probe question and states a science idea (but not the answer to the original question): If distance from the Sun caused seasons, the Northern and Southern Hemispheres would experience summer and winter at the same time. • *Correct and complete science idea:* • It's warmer in the Southern Hemisphere when it's cooler in the Northern Hemisphere because the tilt of Earth and its orbit around the Sun cause the most direct (straight-on or concentrated) sunlight to shift from the Northern Hemisphere to the Southern Hemisphere at different times of the year.
			**Display Slide 22.** Science Ideas That Support the Main Learning Goal (6 min) a. Display **only** the main learning goal on the slide. b. **Pairs:** "Work with a partner to come up with two or three science ideas that might support the development of this main learning goal. Use the SEC content background document and the Common Student Ideas chart as resources." c. **Whole group:** Have pairs share the supporting science ideas they came up with.

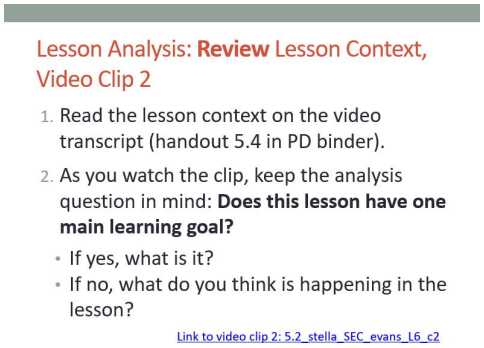
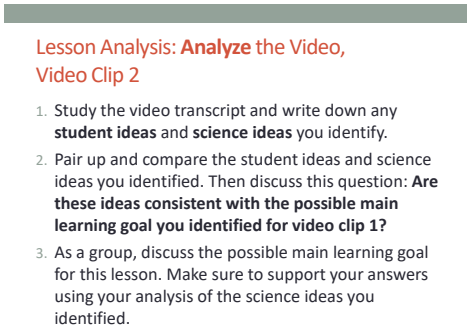
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			d. Next, reveal the list of possible supporting science ideas one by one on the slide and compare them with participants' ideas. e. **Highlight:** "Some of these supporting science ideas could also be a lesson's main learning goal."
			**Display Slide 23.** Practice Identifying Main Learning Goals (10 min) a. Direct participants to locate handout 5.1 (Analysis Guide A: Identifying One Main Learning Goal) and handout 5.2 (Practice Identifying One Main Learning Goal) in their PD program binders. b. **Small groups/pairs:** Have participants form small groups or pairs and use the criteria from Analysis Guide A to analyze the list of possible learning goals on handout 5.2. c. Direct participants to write yes or no on the handout to indicate whether the statement is or is not a good candidate for a lesson's main learning goal. Then have them state the reason for each assessment using criteria from the analysis guide. d. **Whole-group share-out:** Have participants share and discuss their selections. e. Be sure to highlight what distinguishes a main learning goal from supporting science ideas, topics, phrases, activities, or questions. f. Also use this discussion to clarify science content. **Content note:** One question that might emerge is the shape of Earth's orbit around the Sun.

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			Refer to the content background document (page 3, middle paragraph) to clarify this concept. Participants may not yet have an idea about the impact of Earth's spherical shape and the changing angles of the Sun on climate. Let them know they'll be exploring this in more depth during the content deepening work this week. **Note:** For answers, see PD Leader Master: Practice Identifying One Main Learning Goal (Answer Key).
10:00–10:10 10 min	**BREAK**		
10:10–12:00 110 min **Lesson Analysis: SCSL Strategy A** Slides 24–32	**Purpose** • Use lesson analysis of classroom videos to better understand SCSL strategy A. • Deepen participants' science-content knowledge about the Sun's effect on climate through lesson analysis. **Content** • Using one main learning goal brings coherence within and across lessons. • A main learning goal is a big idea that students are expected to learn and take away from a lesson or series of lessons.		**Display Slide 24.** Lesson Analysis: Strategy A (1 min) a. Make sure participants understand that they will be viewing a sequence of three video clips from the same lesson on the Sun's effect on climate. b. "For all three clips, we'll answer the analysis question, *Does this lesson have one main learning goal?*" c. "If the answer is yes, what is the learning goal? If no, why do you think that's the case? What do you think is happening in the lesson?"

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
	Everything in the lesson supports the development of this one main learning goal. **What Participants Do** • Watch a sequence of three video clips from one lesson. Analyze the science ideas in each clip and determine whether they're organized to support one main learning goal. • Use the criteria in Analysis Guide A to determine the quality of the main learning goal identified for this lesson. • Examine a lesson plan from the SEC unit to see how the main learning goal and supporting science ideas are identified. **Videos** • Video Clip 5.1, Evans classroom (beginning of lesson) • Video Clip 5.2, Evans classroom (during the lesson) • Video Clip 5.3, Evans classroom (end of lesson) **Handouts in PD Binder** • 5.1 Analysis Guide A • 5.3 Transcript for Video Clip 5.1 • 5.4 Transcript for Video Clip 5.2 • 5.5 Transcript for Video Clip 5.3 **Supplies** • Science notebooks • Chart paper and markers	 	**Display Slide 25.** Lesson Analysis: Review Lesson Context, Video Clip 1 (5 min) a. Have participants read the lesson context at the top of the video transcript (handout 5.3 in PD program binder). (Less than 1 min) b. Read the information on the slide. (Less than 1 min) c. Show the video clip. (4 min) **Display Slide 26.** Lesson Analysis: Analyze the Video, Video Clip 1 (25 min) a. Before participants analyze the video transcript, remind them of these key points: (1 min) • A science idea is a full-sentence idea that students could take away as something they learned during the lesson. • Science ideas are sometimes identified by linking the teacher's question with the student's response. b. **Individuals (8 min):** "Study the video transcript and write in your notebooks any science ideas you identify in the discussion." c. **Pairs (5 min):** "Pair up and compare the science ideas you identified in the transcript. Then discuss the questions on the slide." d. **Whole group (11 min):** Have participants share what they think might be the main learning goal of this lesson, using their analyses of the science ideas they identified

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

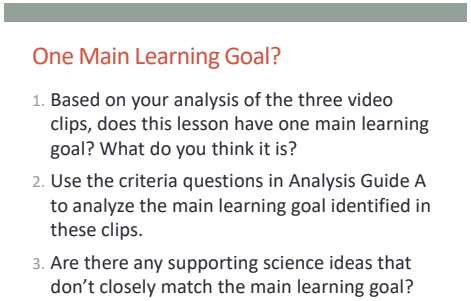
	PD Resources
	• RESPeCT lesson plans binder
			to support their suggestions.
			e. List the possible learning goals on chart paper.
			f. Let participants know they'll revisit this list of possible main learning goals for the lesson after they watch the remaining video clips.
			Observations:
			• The unit central question is "Why are some places on Earth hotter than others at different times of the year?" The focus question for this lesson is "How does being near the ocean or at a higher elevation affect air temperature?"
			• The following ideas emerge about the simulation:
			  • The heat lamp represents the Sun (video segment 0:00:12.1).
			  • Students will test the impact that heating has on soil and water and relate this to temperature patterns in San Francisco, Colorado Springs, and St. Louis, Missouri (segments 0:00:20.7 and 0:00:37.5).
			  • When the heat lamp is off, it represents winter (segment 0:00:31.4).
			  • When the heat lamp is on, it represents summer (segment 0:00:36:8).
			• The teacher prompts students to recall other ideas they learned about in previous lessons:
			  • The curve of Earth's surface affects climate at different locations (segment 0:00:59.3).
			  • The distance between Earth and the Sun stays constant throughout the year at 93 million miles (segments 0:01:11.8–0:01:18.5).
			  • Earth's tilt is essentially constant at 23.5 degrees (segments 0:01:21.1–0:01:42.1).

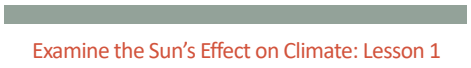
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			Possible main learning goal: • In addition to the factors that cause uneven heating on Earth, such as the curve of Earth's surface, Earth's tilt and orbit, and latitude, another factor that impacts an area's climate is proximity to a large body of water.
			**Display Slide 27.** Lesson Analysis: Review Lesson Context, Video Clip 2 (5 min) a. Have participants read the lesson context at the top of the video transcript (handout 5.4 in PD binder). (Less than 1 min) b. Review the instructions on the slide. (Less than 1 min) c. Show the video clip. (4 min)
			**Display Slide 28.** Lesson Analysis: Analyze the Video, Video Clip 2 (25 min) **Note:** This video clip includes two segments. For the sake of time, show only the first segment, stopping the video at 1:18. a. Review the definitions of a science idea and a student idea. Remind participants that students can express correct science ideas and inaccurate student ideas at the same time. (1 min) b. **Individuals (8 min):** "Study the video transcript and write in your notebooks any student ideas and science ideas you identify."

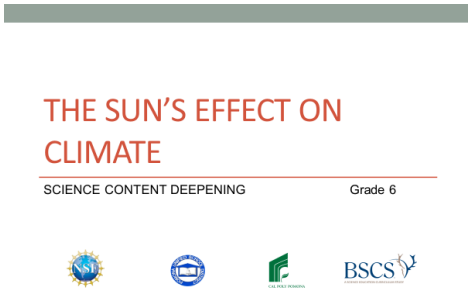
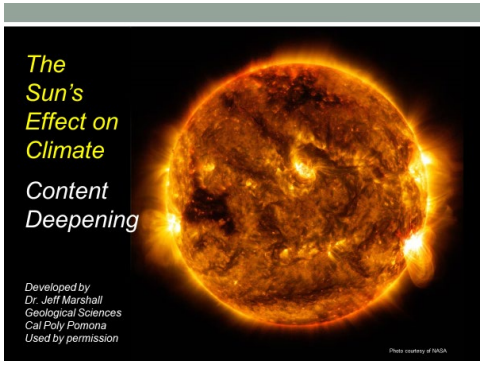
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			c. **Pairs (5 min):** "Pair up and compare the student ideas and science ideas you identified in the transcript. Then discuss the questions on the slide." d. **Whole group (11 min):** Have participants share what they think might be the main learning goal of this lesson, using their analyses of the science ideas they identified to support their suggestions. e. List the possible learning goals on chart paper. f. Let participants know they'll revisit this list of possible main learning goals for the lesson after they watch one more video clip. **Observations:** • The clip begins with a student stating that water cools down slower and heats up faster—an idea *not* supported by the data (video segment 0:00:01.4). • The teacher asks students to link the simulation results to real cities like San Francisco (segment 0:00:19.7). • Referring specifically to the data, a student points out that the soil heats up faster (segment 0:00:54.4). • Again referring to the data, students show that water heats up more slowly than soil (segments 0:01:04.3–0:01:39.9). • At segment 0:02:21.6, the teacher again asks students to link the data they collected in the simulation to the actual temperature readings (plotted on graphs in lesson 5) of three US cities (San Francisco, Colorado Springs, and St. Louis); however, he doesn't stick around to hear whether students are making the connections.

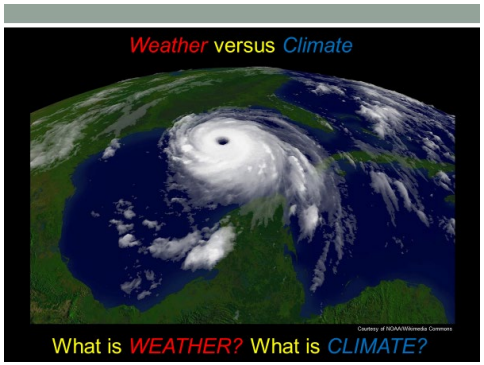
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			• The discussion is entirely focused on different rates of heating for water and soil. At this point, it's unclear whether students are connecting the simulation results to differential heating in three US cities, but the discussion is consistent with the main learning goal identified in the first clip.
		Lesson Analysis: **Review** Lesson Context, Video Clip 3 1. Read the lesson context on the video transcript (handout 5.5 in PD binder). 2. As you watch the clip, keep the analysis question in mind: **Does this lesson have one main learning goal?** • If yes, what is it? • If no, what do you think is happening in the lesson? Link to video clip 3: 5.3_stella_SEC_Evans6_L6_C3	**Display Slide 29.** Lesson Analysis: Review Lesson Context, Video Clip 3 (5 min) a. Have participants read the lesson context at the top of the video transcript (handout 5.5 in PD binder). (Less than 1 min) b. Review the instructions on the slide. (Less than 1 min) c. Show the video clip. (4 min)
		Lesson Analysis: **Analyze** the Video, Video Clip 3 1. Study the video transcript and write down any **student ideas** and **science ideas** you identify. 2. Pair up and compare the student ideas and science ideas you identified. Then discuss this question: **Are these ideas consistent with the possible main learning goal you identified for clips 1 and 2?** 3. As a group, discuss the possible main learning goal for this lesson. Make sure to support your answers using your analysis of the science ideas you identified.	**Display Slide 30.** Lesson Analysis: Analyze the Video, Video Clip 3 (24 min) a. **Individuals (8 min):** "Study the video transcript and write in your notebooks any student ideas and science ideas you identify." b. **Pairs (5 min):** "Pair up and compare the student ideas and science ideas you identified on the transcript. Then discuss the questions on the slide." c. **Whole-group (11 min):** Have participants share what they think might be the main learning goal of this lesson, using their analyses of the science ideas they identified

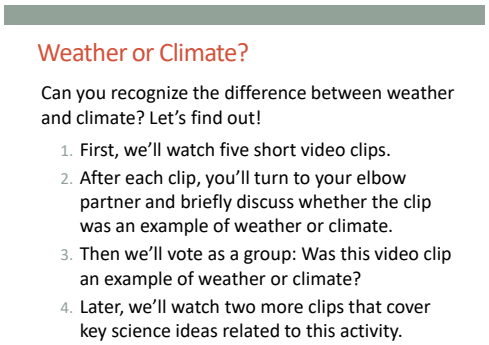
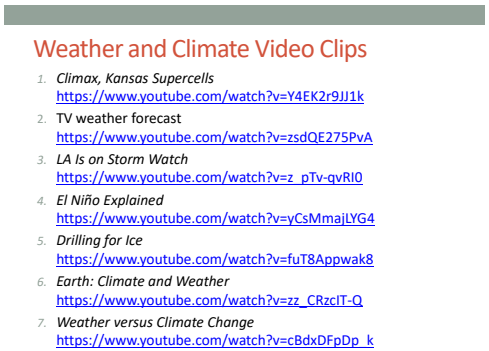
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			to support their suggestions. d. List the science ideas and possible learning goals on chart paper. e. **Ask:** "Did the three video clips develop coherence across the lesson or include too many ideas that didn't support the main learning goal?" **Observations:** • In this whole-group lesson summary, the teacher asks students if they've answered the day's focus question regarding the impact of proximity to water and elevation on the average temperature of cities at the same latitude. • Referring to their data from the simulation, students claim that water retains heat, thus keeping it hot or warm throughout the year (video segment 0:00:17.2), and the soil temperature fluctuated greatly (segment 0:00:28.1). • Students didn't specifically relate the soil and water data to the three US cities. • Students also refer to St. Louis as being really flat (no mountains) but don't relate any ideas about how elevation might impact a location's temperature. It's unclear whether they understood the connection between elevation and temperature. • Whereas the stated focus question indicates that there is a dual focus in this lesson on proximity to water and elevation as factors causing temperature variation, from the clips we viewed and the lesson summary, it appears that the main learning goal was mostly about proximity to water. This is consistent with what was identified in clips 1 and 2. Participants may notice that the

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			students don't make a clear connection in the three clips between their data and the three US cities.
			**Display Slide 31.** One Main Learning Goal? (15 min) a. **Whole group:** Discuss the first question on the slide and reach a consensus on the main learning goal for the lesson. **Ideal response:** *Earth's daily spin (rotation), yearly orbit (revolution), and tilt contribute to changes in temperature that relate to differences in an area's overall climate and daily changes in weather.* b. **Pairs:** Have participants work in pairs to answer the criteria questions in Analysis Guide A for the main learning goal they agreed upon for this lesson. Also have them identify any supporting science ideas that don't closely match the main learning goal. c. **Whole group:** Discuss participants' responses to the questions in Analysis Guide A and the final question on the slide. **Observations:** • There does appear to be one main learning goal in this lesson: Water holds heat energy and doesn't fluctuate as much as soil; therefore, locations closer to large bodies of water would have a more stable temperature with less fluctuation between winter and summer. The fact that the focus question refers to the impact of elevation on a location's temperature patterns seems to distract from the main learning goal. Students don't have much to say about elevation's

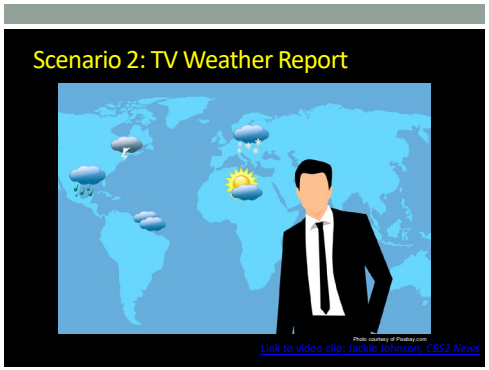
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			influence on temperature other than observing in the lesson summary that St. Louis is flat.
			**Display Slide 32.** Examine the Sun's Effect on Climate: Lesson 1 (5 min) **Note:** This slide is **optional** if time is running short. It's designed to help participants see how the lesson plans are written to highlight the main learning goal and science ideas that support the main learning goal. a. Have participants examine the main learning goals for lessons 1a and 1b in the scope and sequence chart of their lesson plans binders. Then have them review the supporting science ideas in the Science Content Storyline column. b. **Ask:** "What two patterns do students identify in these lessons?" c. Encourage participants to keep the identified patterns in mind throughout the lesson sequence.
12:00–12:45 45 min	**LUNCH**		

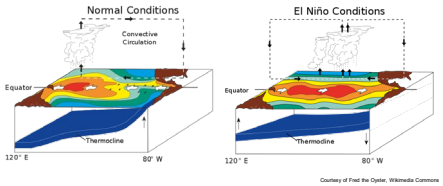
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
12:45–3:10 145 min (Includes 10-min break) **Content Deepening: The Sun's Effect on Climate** Slides 33–70	**Purpose** • Deepen participants' understandings of the science content that is part of the SEC lessons. **Content** • It's essential that students understand the difference between weather and climate. Weather describes short-term atmospheric conditions in specific locations, while climate refers to long-term atmospheric conditions across a large region. • *Temperature patterns at different latitudes:* In both the Northern and Southern Hemispheres, average temperatures are warmer near the equator and colder near the poles. In general, average temperatures north and south of the equator are comparable at similar latitudes around the world.		**Display Slide 33.** Content Deepening: The Sun's Effect on Climate (Less than 1 min) a. "Now let's begin our investigation of the Sun's effect on climate." **Note:** Throughout this content deepening phase, refer as needed to the Sun's Effect on Climate Content Background Document and Common Student Ideas about the Sun's Effect on Climate and Seasons.
			**Display Slide 34.** Content Deepening: The Sun's Effect on Climate (Less than 1 min) a. "Today's content deepening work will focus on science ideas about the Sun's effect on climate from SEC lesson 1."

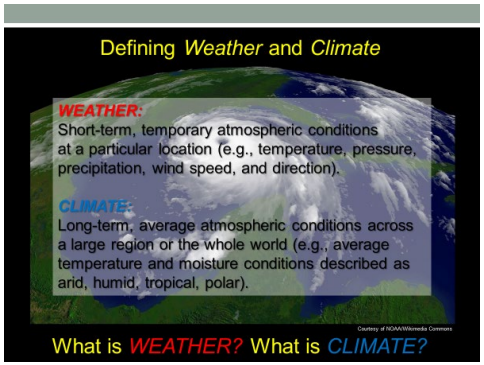
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
	• *Temperature patterns at different times of the year:* In July, average temperatures are warmer in the Northern Hemisphere and colder in the Southern Hemisphere. The opposite occurs in January. **What Participants Do** • Investigate the differences and similarities between weather and climate. • Explore and discuss key science ideas behind the SEC lessons. • Apply content learning to answer the SEC unit central question and the focus questions for lessons 1a and 1b. **Videos** • *Climax, Kansas Supercells* • TV weather forecast • *LA Is on Storm Watch* • *El Niño Explained* • *Drilling for Ice* • *Earth: Climate and Weather* • *Weather versus Climate Change* **Handouts in PD Binder** • 5.6 World Map Record Page (from SEC lesson 1a) **Handouts in Lesson Plans Binder** • 1.1 Map of Average Temperatures in the United States, December–February (from SEC lesson 1a)		**Display Slide 35.** Weather versus Climate (20 min) a. Introduce the two questions on the slide. b. **Individuals:** Ask participants to think about these questions and jot down brief answers in their science notebooks. c. As participants are working, create a two-column chart on chart paper to document participants' responses to these questions. Label one column "Weather" and the other column "Climate." d. **Whole group:** In a round-robin discussion, call on participants to share their responses to the questions. e. Record participants' responses on the chart you created. List key words rather than entire sentences. f. After everyone has shared their responses, briefly highlight some of the key ideas that characterize weather and climate. g. Ask participants these questions: • Why is it important for students to understand the difference between weather and climate? • What are the key similarities between these terms? What are the key differences?

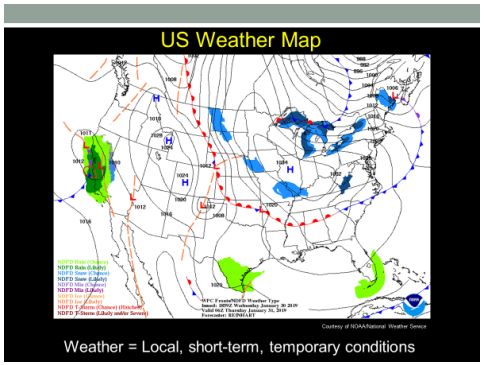
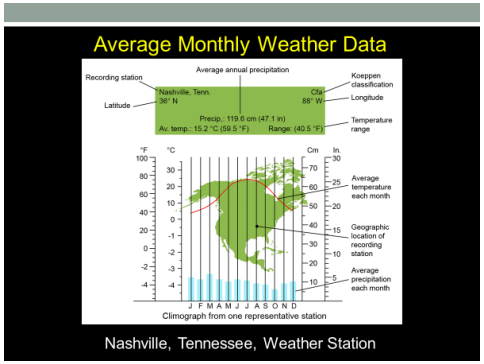
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
	• 1.2 Average Temperatures around the World: January and July (from SEC lesson 1a) • 1.4 Bar Graph of January Temperatures (from SEC lesson 1b) • 1.5 Bar Graph of July Temperatures (from SEC lesson 1b) • 1.6 Map of Average Yearly Temperatures on Earth (from SEC lesson 1a) • 5.1 Map of Average Temperatures in the United States, June–August (Teacher Master) (from SEC lesson 5a) **Supplies** • Science notebooks • Chart paper and markers **PD Resources** • RESPeCT lesson plans binder **Resources in Lesson Plans Binder** *Resources section:* • Content background document • Common Student Ideas		
			**Display Slide 36.** Weather or Climate? (2 min) a. Go over the instructions on the slide. b. "Next we'll watch a sequence of five short video clips showing different scenarios. After each clip, you'll turn to an elbow partner and discuss whether the scenario was an example of weather or climate. Then we'll vote on the scenario as a group, and I'll track the results on chart paper." c. "Later we'll watch two more clips that cover key science ideas related to this activity."
			**Display Slide 37.** Weather and Climate Video Clips (1 min) a. Briefly review the list of video clips participants will be watching. The first five clips present weather-versus-climate scenarios, and the last two cover key science ideas related to this activity. **Note:** To facilitate preloading the video clips, all seven web links are displayed on this slide. Links are also included on slides 38–42 and 49–50. Loading these videos into a web browser before starting this segment will make it easier and more efficient to switch back and forth between this PowerPoint presentation and each of the Internet videos. (See overview page for advance preparation instructions.)

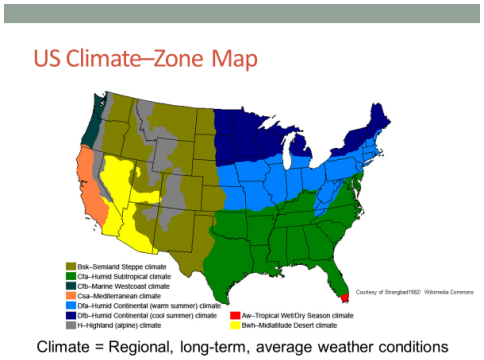
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			**Display Slide 38.** Scenario 1: Midwest Thunderstorm (6 min) **Note:** For slides 38–42, introduce the video scenario and then switch to the web browser to show the video. Afterward, switch back to the PowerPoint slide. a. Review the steps for analyzing each scenario: (1) Watch the video clip, (2) pair up and discuss whether the scenario depicts weather or climate (or both), and (3) vote as a group on the final decision. b. Introduce scenario 1, "Midwest Thunderstorm"; then switch to the web browser and show the video clip. c. **Turn and Talk:** After showing the clip, switch back to this PowerPoint slide and ask participants to discuss their observations with an elbow partner. d. **Whole group:** Following the Turn and Talk, have the entire group vote on whether the scenario was an example of weather or climate. Record the results on chart paper. **Note:** Don't discuss voting results at this point. There will be a group discussion after all five videos have been viewed.

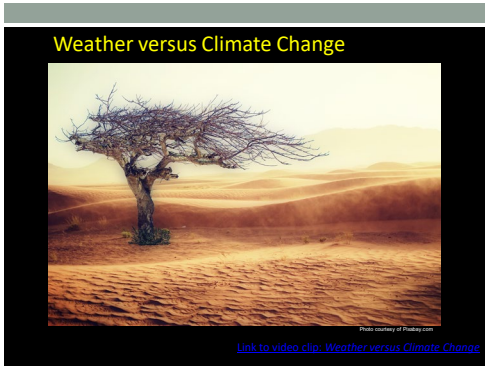
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			**Display Slide 39.** Scenario 2: TV Weather Report (6 min) a. Introduce scenario 2, "TV Weather Report"; then switch to the web browser and show the video clip. b. **Turn and Talk:** After showing the clip, switch back to this PowerPoint slide and ask participants to discuss their observations with their elbow partners. c. **Whole group:** Following the Turn and Talk, have the group vote on whether the scenario was an example of weather or climate. Record the results on chart paper.
			**Display Slide 40.** Scenario 3: LA Is on Storm Watch! (6 min) a. Introduce scenario 3, "LA Is on Storm Watch!"; then switch to the web browser and show the video clip. b. **Turn and Talk:** After showing the clip, switch back to this PowerPoint slide and ask participants to discuss their observations with their elbow partners. c. **Whole group:** Following the Turn and Talk, have the group vote on whether the scenario was an example of weather or climate. Record the results on chart paper.

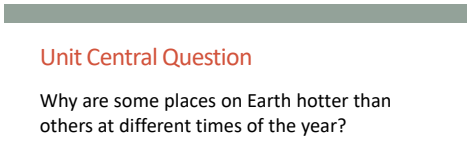
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
		Scenario 4: El Niño Explained  Courtesy of Fred the Oyster, Wikimedia Commons Link to video clip: Climatedogs, El Nino	**Display Slide 41.** Scenario 4: El Niño Explained (5 min) a. Introduce scenario 4, "El Niño Explained"; then switch to the web browser and show the video clip. b. **Turn and Talk:** After showing the clip, switch back to this PowerPoint slide and ask participants to discuss their observations with their elbow partners. c. **Whole group:** Following the Turn and Talk, have the group vote on whether the scenario was an example of weather or climate. Record the results on chart paper.
		Scenario 5: Ice-Core Research  Courtesy of Lonnie Thompson, Wikimedia Commons Link to video clip: *Drilling for Ice*	**Display Slide 42.** Scenario 5: Ice-Core Research (6 min) a. Introduce scenario 5, "Ice-Core Research"; then switch to the web browser and show the video clip. b. **Turn and Talk:** After showing the clip, switch back to this PowerPoint slide and ask participants to discuss their observations with their elbow partners. c. **Whole group:** Following the Turn and Talk, have the group vote on whether the scenario was an example of weather or climate. Record the results on chart paper.

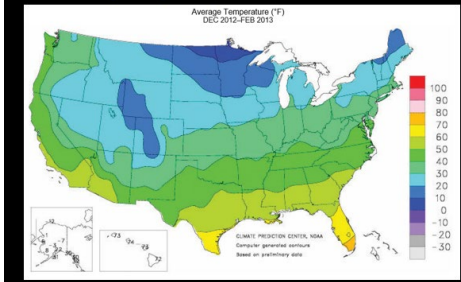
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			**Display Slide 43.** The Results: Weather or Climate? (7 min) a. **Whole-group discussion:** Discuss the voting results as a group. • Did everyone reach a consensus on all five weather-versus-climate scenarios? • Were some scenarios more challenging to evaluate than others? Why? • What criteria did participants use to make their decisions? • What are the defining characteristics of weather? What are the defining characteristics of climate? b. Refer participants to the key ideas you charted earlier on weather and climate. c. Did any of the video scenarios include elements of both weather and climate? Which ones?
			**Display Slide 44.** Defining *Weather* and *Climate* (6 min) a. Read the definitions of *weather* and *climate* on the slide. b. Direct participants to write these definitions in their science notebooks. c. **Ask:** "Do these definitions match the criteria we developed from the video scenarios?" d. Invite a few participants to share their thoughts.

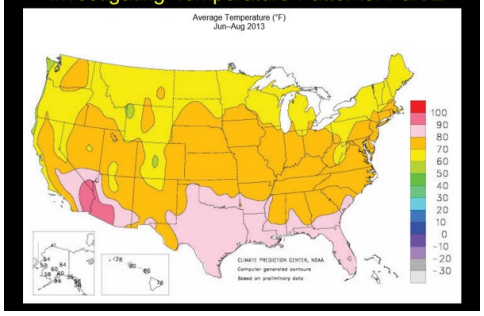
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			**Display Slide 45.** US Weather Map (2 min) a. "Next we'll examine three content representations and two more video clips that summarize the difference between weather and climate." b. "This weather map of the United States shows weather conditions at 6:00 a.m. on a Thursday. On the map, we can see temperatures, weather fronts, and high- or low-pressure cells in many locations across the country. Since these atmospheric conditions are short term and temporary, they meet our definition of *weather*."
			**Display Slide 46.** Average Monthly Weather Data (2 min) a. "This slide shows average monthly weather data from a weather station in Nashville, Tennessee. The data include average temperatures and rainfall totals over a 12-month period." b. "When short-term, regional weather data are compiled and averaged over longer periods of time, this meets our definition of *climate*." c. Point out the Köppen classification for this weather station at the top right-hand corner of the slide. (*Cfa* refers to a humid subtropical climate.) The Köppen climate classification is a system that describes different types of regional climates. So short-term, local weather patterns can help define long-term, regional climate.

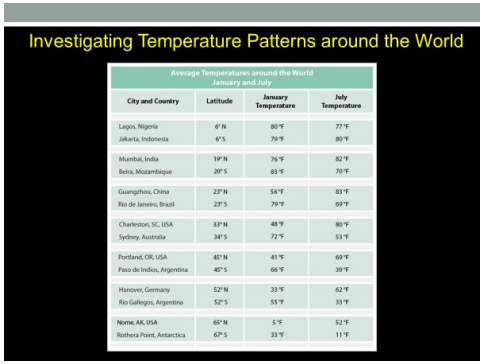
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			**Display Slide 47.** US Climate–Zone Map (2 min) a. "This map shows the climate zones of the continental United States. The color key in the bottom left-hand corner classifies the different climate zones based on the Köppen classification system." b. "A climate-zone map like this one shows the types of regional climates based mostly on average temperatures and precipitation data from hundreds of weather stations across each region. These long-term, average atmospheric conditions across large regions of the United States meet our definition of *climate*."
			**Display Slide 48.** Climate and Weather (7 min) a. "Next, we'll watch two more video clips that cover key science ideas related to our investigation." b. Introduce the National Geographic video *Climate and Weather*: "This National Geographic video presents a nice synopsis of the difference between weather and climate." c. Switch to the web browser and show the video clip. d. After showing the clip, switch back to this PowerPoint slide. e. **Whole-group discussion:** "What aspects of this video stood out to you? In what ways were the definitions of *weather* and *climate* in the video similar to or different from our

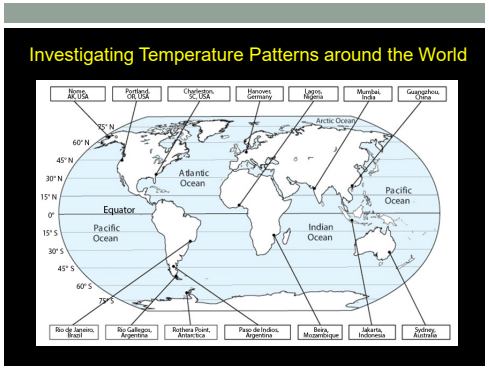
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			definitions?" f. Invite a few participants to share their observations.
			**Display Slide 49.** Weather versus Climate Change (7 min) a. Introduce the National Geographic video *Weather versus Climate Change*, hosted by astrophysicist Neil deGrasse Tyson. b. Explain that this video offers another unique look at the difference between weather and climate. c. Switch to the web browser and show the video clip. d. After showing the clip, switch back to this PowerPoint slide. e. **Whole-group discussion:** "What aspects of this video stood out to you? In what ways were the definitions of *weather* and *climate* in the video similar to or different from our definitions?" f. Invite a few participants to share their observations.

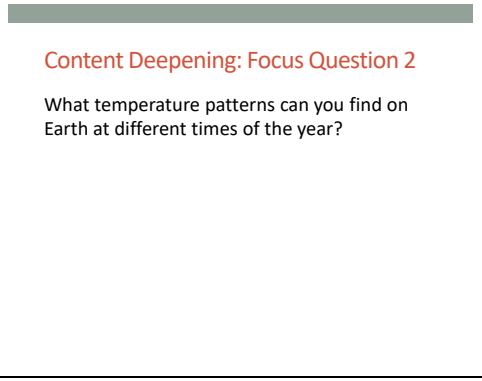
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			**Display Slide 50.** Unit Central Question (2 min) a. Read the unit central question on the slide and emphasize that students will think about this question throughout the SEC lesson series. **Note:** If time allows, have participants review the overview page of SEC lesson 1a in their lesson plans binders to orient themselves to the lesson plan. b. "The science ideas we'll explore during our content deepening work this week will help us answer this question." c. Have participants write the unit central question in their science notebooks and draw a double-lined box around it.
	10-MINUTE BREAK		
			**Display Slide 51.** The Sun's Effect on Climate: Lesson 1a (Less than 1 min) a. "Next, we'll explore key science ideas about the Sun's effect on climate from SEC lesson 1a."

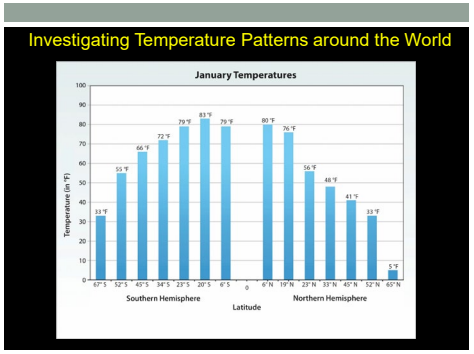
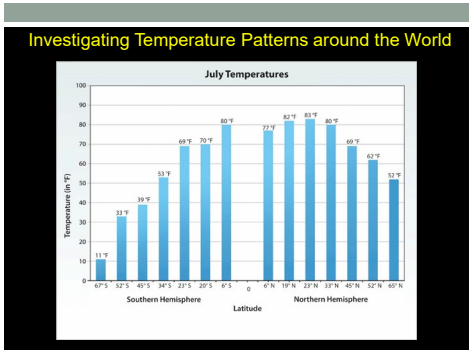
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
		Content Deepening: Focus Question 1 What temperature patterns can you find on Earth at different latitudes?	**Display Slide 52.** Content Deepening: Focus Question 1 (Less than 1 min) a. Read the focus question on the slide. b. "This focus question will guide student learning throughout lesson 1a." c. Have participants write this focus question in their science notebooks and draw a box around it. Make sure they leave space below the question to write a response later.
		Investigating Temperature Patterns: Part 1  	**Display Slide 53.** Investigating Temperature Patterns: Part 1 (Less than 1 min) a. "This map shows average US temperatures from December 2012 through February 2013." b. Direct participants to locate handout 1.1 (Map of Average Temperatures in the United States, December–February) in their lesson plans binders. c. "For this investigation, you and an elbow partner will work together analyzing this map and answering a series of questions about the patterns you observe."

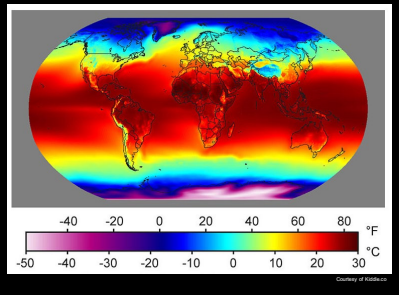
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
		Investigating Temperature Patterns: Part 1 Examine the map of average US temperatures from December 2012 through February 2013. • What overall temperature patterns do you see? • How do temperatures vary from north to south? • How do temperatures vary from east to west? • What other patterns do you notice? **Note:** Answer as concisely and specifically as you can. Use compass directions (e.g., "north" rather than "up" or "top") and refer to the color scale.	**Display Slide 54.** Investigating Temperature Patterns: Part 1 (6 min) a. Read the instructions and questions on the slide. b. **Pairs:** "Discuss these questions with an elbow partner and answer them as concisely and specifically as possible. Be prepared to share your observations and responses with the group." c. **Whole group:** Invite a few pairs to share their observations and answers to the questions. Probe and challenge the responses and elicit differing points of view.
		Investigating Temperature Patterns: Part 2  	**Display Slide 55.** Investigating Temperature Patterns: Part 2 (Less than 1 min) a. "This map shows average US temperatures from June through August 2013." b. Have participants locate handout 5.1 (Map of Average Temperatures in the United States, June–August) in their lesson plans binders. c. "For this investigation, you and your elbow partner will compare this map with the first temperature map and answer a series of questions about the patterns you observe."

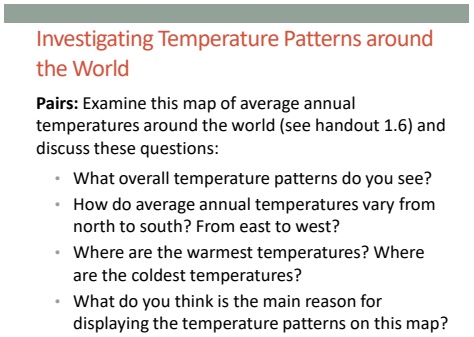
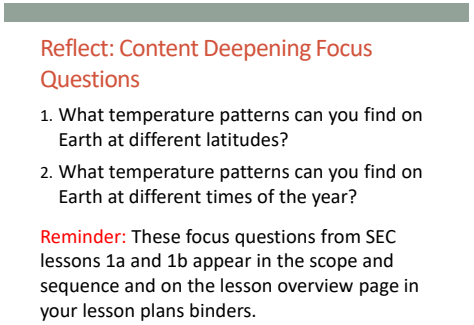
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			**Display Slide 56.** Investigating Temperature Patterns: Part 2 (6 min) a. Read the instructions and questions on the slide. b. **Pairs:** "Discuss these questions with your elbow partners and answer them as concisely and specifically as possible. Be prepared to share your observations and responses with the group." c. **Whole group:** Invite a few pairs to share their observations and answers to the questions. Probe and challenge the responses and elicit differing points of view.
			**Display Slide 57.** Investigating Temperature Patterns around the World (2 min) a. "Next we'll investigate temperature patterns around the world." b. Draw participants' attention to the data table on the slide and direct them to handout 1.2 (Average Temperatures around the World: January and July) in their lesson plans binders. c. "This table shows average temperatures for 14 cities around the world. These cities are listed in the left-hand column, and their latitudes are listed in the second column. Each city is paired with a city located at a similar latitude in the opposite hemisphere." d. "For example, the first pair of cities—Lagos, Nigeria, and Jakarta, Indonesia—are located at 6 degrees north of the equator and 6

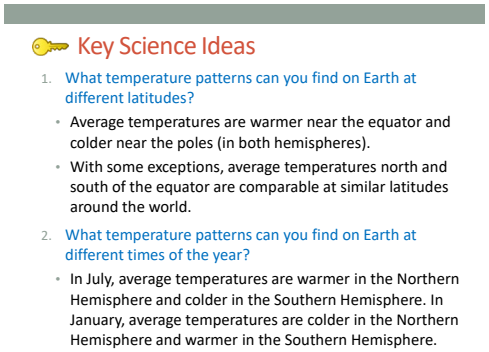
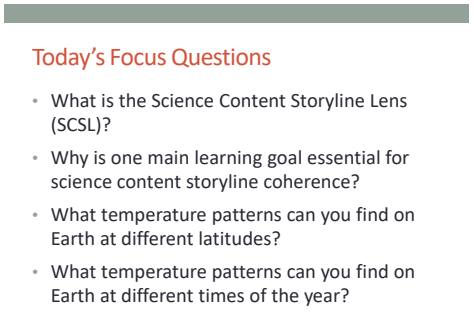
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			degrees south of the equator, respectively." e. "The third and fourth columns on the table show average temperatures for these cities in January and July." f. "For this investigation, you and your elbow partner will plot the temperature data for these cities on a world map."
			**Display Slide 58.** Investigating Temperature Patterns around the World (2 min) a. "This world map shows the locations of the 14 cities from the data table. It also shows the equator and latitude lines in the Northern and Southern Hemispheres." b. Distribute the premarked copy of handout 5.6 (World Map Record Page) showing the July temperature data from the table on handout 1.2 (Average Temperatures in the United States: January and July). Then direct participants to locate the blank copy of this handout in their PD program binders.
		Investigating Temperature Patterns around the World • Work with your elbow partner to find the average January temperature for each city on the data table and record it on the world map. (The July map has already been completed for you.) • Write the temperature **next to the dot** for the corresponding city, **not** next to the city name! • Compare the two maps for January and July. • What temperature patterns do you notice? How do the temperatures change from January to July?	**Display Slide 59.** Investigating Temperature Patterns around the World (6 min) a. "The map showing average July temperatures for each city has already been completed for you, but you and your partner will need to record the average January temperatures for each city on the blank map." b. Review the instructions and questions on the slide. c. **Pairs:** Direct pairs to record the January temperature data for each city on the

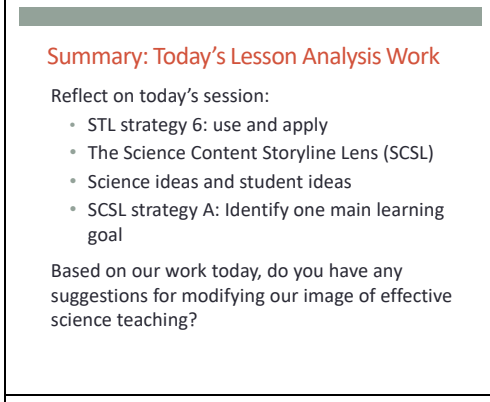
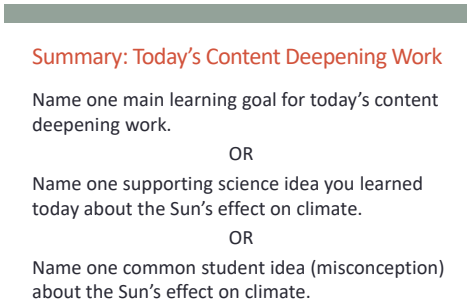
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			corresponding map. d. "After you finish your maps, discuss your observations and work together to answer the questions on the slide. Be prepared to share your observations and responses with the group." e. **Whole group:** Invite a few pairs to share their observations and answers to the questions. Probe and challenge the responses and elicit differing points of view.
			**Display Slide 60.** The Sun's Effect on Climate: Lesson 1b (Less than 1 min) a. "Now let's explore ideas about the Sun's effect on climate from lesson 1b."
			**Display Slide 61.** Content Deepening: Focus Question 2 (1 min) a. Read the focus question on the slide. b. Emphasize that this focus question will guide student learning throughout lesson 1b. c. Have participants write this focus question in their science notebooks and draw a box around it. Make sure they leave space below the question to write a response later.

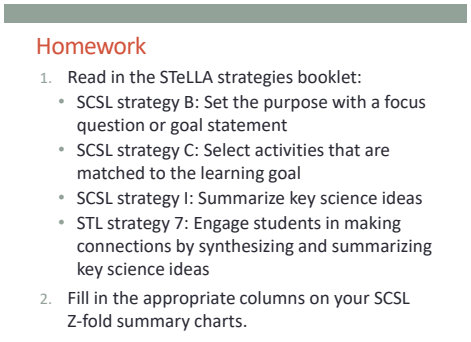
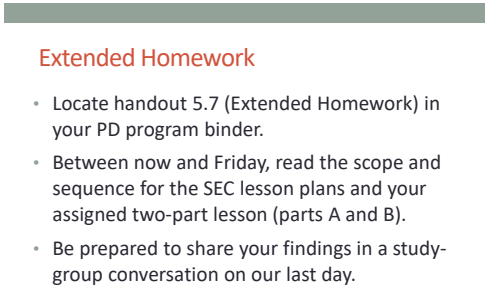
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			**Display Slide 62.** Investigating Temperature Patterns around the World (1 min) a. "This bar graph shows average temperatures around the world during the month of January. Temperatures in degrees Fahrenheit are recorded on the *y*-axis, and latitude north or south of the equator is recorded on the *x*-axis. The equator is in the middle of the graph at 0 degrees, the Northern Hemisphere is on the right, and the Southern Hemisphere is on the left."
			**Display Slide 63.** Investigating Temperature Patterns around the World (1 min) a. "This bar graph shows average temperatures around the world for the month of July." b. "You'll find these two bar graphs in your SEC lesson handouts, one for January temperatures and another for July temperatures." c. Have participants locate handouts 1.4 (Bar Graph of January Temperatures) and 1.5 (Bar Graph of July Temperatures) in their lesson plans binders. d. "In this investigation, you and your elbow partner will compare the two bar graphs and answer a series of questions about the patterns you observe."

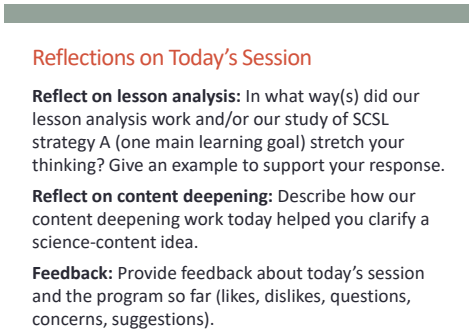
PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
		Investigating Temperature Patterns around the World **Pairs:** Compare the average temperatures by latitude on the January and July bar graphs (see handouts 1.4 and 1.5). Then discuss these questions: • Where is the equator on the bar graphs? Which direction is north? Which direction is south? • How do the bar graphs relate to the previous temperature maps you worked with? • What temperature patterns do you notice on the January and July bar graphs? • How do the temperature patterns change from January to July? Why is this change happening?	**Display Slide 64.** Investigating Temperature Patterns around the World (6 min) a. Read the instructions and questions on the slide. b. Before pairs begin the activity, toggle back and forth between the two previous slides several times. Tell participants that if they look carefully at the bar graphs, they'll see the temperature variations between January and July. c. **Pairs:** Return to this slide and direct pairs to compare the bar graphs on their handouts and then discuss the questions on the slide. d. **Whole group:** Invite a few pairs to share their observations and answers to the questions. Probe and challenge participants about the responses and elicit differing points of view.
		Investigating Temperature Patterns around the World  	**Display Slide 65.** Investigating Temperature Patterns around the World (1 min) a. "This map shows average annual temperatures around the world for an entire year." b. Have participants locate handout 1.6 (Map of Average Yearly Temperatures on Earth) in their lesson plans binders. c. "Once again, you and your partner will examine this map and answer a series of questions about the patterns you observe."

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			**Display Slide 66.** Investigating Temperature Patterns around the World (6 min) a. Read the instructions and questions on the slide. b. **Pairs:** "Examine this map of average annual world temperatures on your handouts and discuss your observations with your elbow partner. Then work together to answer the questions on the slide. Be prepared to share your ideas with the group." c. **Whole group:** Invite a few pairs to share their observations and answers to the questions. Probe and challenge the responses and elicit differing points of view.
			**Display Slide 67.** Reflect: Content Deepening Focus Questions (6 min) a. Review the focus questions on the slide. b. Remind participants that these focus questions from SEC lessons 1a and 1b appear in the scope and sequence and on the overview page for each lesson in their lesson plans binders. c. **Individuals:** Have participants answer these questions in their science notebooks. d. **Whole group:** Ask a few participants to share their answers in complete-sentence statements, using evidence from the investigations they've just completed to support their conclusions. e. As participants share their answers, write down key ideas on chart paper. Direct others

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			to listen carefully to the responses and think about whether they agree, disagree, have something to add from the investigations, or have a question.
			**Display Slide 68.** Key Science Ideas (5 min) a. Highlight the key science ideas on the slide that answer the content deepening focus questions. Emphasize that today's investigations and the evidence they gathered helped shape these responses. b. **Whole-group discussion:** "Does everyone agree with the answers to these focus questions? Would you like to add or revise anything?" c. Ask participants to copy the answers to the focus questions into their science notebooks.
3:10–3:30 20 min **Wrap-Up: Summary, Homework, and Reflections**	**Purpose** • Summarize and reflect on key ideas from today's learning, including the Science Content Storyline Lens, STeLLA strategy A, and the SEC science content. **What Participants Do** • Review today's focus questions. • Share key ideas from today's lesson analysis (SCSL strategy		**Display Slide 69.** Today's Focus Questions (1 min) a. Review the focus questions addressed during today's session.

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
Slides 69–74	A) and content deepening work. • Copy down the homework assignment for day 6 • Discuss expectations for the extended homework assignment (SEC lesson plan review). • Write reflections on today's learning. **Posters and Charts** • Effective Science Teaching chart **Handouts in PD Binder** • 5.7 Extended Homework • 5.8 Daily Reflections—Day 5 **Supplies** • Science notebooks		**Display Slide 70.** Summary: Today's Lesson Analysis Work (3 min) a. **Individual think time (1 min):** Ask participants to reflect on the work they accomplished during today's lesson analysis and think about the questions on the slide. b. **Whole-group share-out (2 min):** Invite participants to share their ideas for modifying the image of effective science teaching based on today's work. Revise the chart as needed.
			**Display Slide 71.** Summary: Today's Content Deepening Work (3 min) a. **Individual think time (1 min):** Present the options on the slide and give participants 1 minute to come up with a statement that summarizes today's content deepening work in one of these areas. b. **Whole-group round-robin (2 min):** Go quickly around the room and have each participant share one summarizing statement. **Push for complete sentences!**

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			**Display Slide 72.** Homework (3 min) a. Review the homework assignment on the slide and have participants write it in their notebooks. b. Make sure participants are clear about the reading and writing tasks.
			**Display Slide 73.** Extended Homework (3 min) a. Go over the information on the slide. b. Have participants review the Extended Homework assignment sheet (handout 5.7), which provides further details about the assignment. c. Remind participants that like the extended homework on the Genetics lessons they were assigned during week 1, participants are responsible for reading parts A and B of their assigned lesson plan. d. Assign a two-part lesson to each participant. e. Ask if there are any questions about the assignment. f. **Emphasize:** The group share-out on the last day of the PD program (day 8) should focus on the assignment-sheet questions (section 2). Participants won't have time to share all the details of each lesson plan.

PD Model: Time/Phase	Purpose, Content, and What Participants Do	Slides	Process
			**Display Slide 74.** Reflections on Today's Session (7 min) a. Allow **at least 5 minutes** for participants to think about today's session and write their reflections and feedback on the Daily Reflections sheet (handout 5.8 in PD program binder).