## SSUP: Winter Institute PD Leader Guide Day 1

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| Grade Level | 5 | Day | 1 | STeLLA Strategies Focus | STL 1, 5 and 7 | Subject Matter Focus | | Matter | |
| Teacher Learning Goals | * The goals of the STeLLA PL program are to deepen knowledge of teaching and learning, increase ability to analyze and reflect on teaching and learning, increase ability to use content knowledge and knowledge of teaching and learning to transform classroom practice, deepen teacher content knowledge, and increase student learning in science. * Deepen our understanding that properties of matter can be used to identify substances and that matter is made up of particles too small to be seen and we can apply that knowledge to figure out what was mixed with the pond water. * The phenomenon of a local pond that has dead things in the water suggests that something has changed in the water. Scientists can investigate water to figure out if/how changes in the water caused the death of organisms by making observations and asking testable questions. | | | | | | | |
| Focus Questions | * Reflecting on the STeLLA Lenses and Strategies, how do we think our understanding and use of the strategies has changed or developed? * How can students be empowered to reveal their thinking and to listen to and interact with each other during classroom conversations? * How can we use our understanding of matter to figure out what was mixed with pond water that could have changed the water? | | | | | | | |
| Ideal Teacher Response | Reflecting on the STeLLA Lenses and Strategies, how do we think our understanding and use of the strategies has changed or developed?  Intentional use of the STeLLA Strategies in planning lessons, leading classroom learning, and reflecting on practice increase the likelihood that students will have multiple opportunities to learn in a classroom culture of student thinking.  How can students be empowered to reveal their thinking and to listen to and interact with each other during classroom conversations?  Strategy 1, asking questions to elicit students thinking helps make student ideas visible and reveal questions they may have related to the given phenomenon. This helps teachers support and guide student understanding. This classroom practice promotes a classroom culture where students are encouraged to share their thinking. Strategy 5, engaging students in analyzing and interpreting data and observations, allows students to connect observations or patterns to science ideas or use data and observations to answer a question. This supports Strategy 7, engage students in constructing explanations and arguments, as students are given opportunities to discuss their claims, evidence, and reasoning to come to a common understanding of the science content storyline.  How can we use our understanding of matter to figure out what was mixed with pond water that could have changed the water?  Different materials have different identifiable properties. Some matter seems to disappear when added to water but the matter is still there. The matter in the water-mixture is made of small particles too small to be seen. The particulate nature of matter explains why some new matter will dissolve in water faster. Models can be used to help us explain the particulate nature of matter and large interacting systems. | | | | | | | |
| Preparation | | | Materials | | | | Videos and Transcripts | |
| **Planning/Preparation Tasks:**   * Study PDLG, PPTs, video clips, and handouts. Make changes to PPTs, if needed. * Recreate Effective Science Teaching & Learning chart for day 3. * Link clips * Look at the Matter Mashup Key ahead of time * Make charts (see Materials column) * In preparation for Day 2, make mixtures of salt and water, fertilizer and water, detergent and water, the healthy and unhealthy pond water. Pour small amounts into petri dishes and use a blow dryer to evaporate each of the samples. You’ll use these for Lesson 6 on Day 2.   **Daily Set Up Tasks:**   * Check that video clips are correctly linked to PPT * Set up PowerPoint and speakers * Check video & sound * Arrange furniture, food (include social distancing protocols in set up) * Arrange posters/charts * Set up materials station for learner experience (see lesson plans 1-5 for set-up needs)   **Day 1 Set Up Task:**  Arrange teacher materials on tables:   * Tabletop name cards * Table boxes (small red, green, yellow dots; black permanent fine-tipped markers)   **Daily Follow-up Tasks:**   * Archive final PPT * Collect and turn in daily feedback * Disinfect common materials, tables and common areas per protocol | | | **Posters/Charts:**   * STeLLA Conceptual Framework poster * Communicating in Scientific Ways poster * Program Goals chart * Day 1 Agenda chart * Norms poster * Day 1 Focus Questions chart * Parking Lot chart * Notice/Wonder chart * Testable Questions chart * Driving Question Board chart * L2 Variables chart (also used in L4) * L2 & 3 Properties chart (don’t label as “properties” until the end) * L2 Ionic vs. Covalent bond chart (in dissolving discussion) * L5 Claim and counter claim chart * Gots and Needs chart * Effective Science Teaching and Learning chart   **Handouts in PD binder front pocket or in Pre-Tab:**   * Z-fold chart: Student Thinking Lens Strategies * Program Goals * Institute-at-a-Glance   **Handouts in SSUP PD binder, Tab 1:**   * Norms * DQB Transcript Belcastro Clip * Lesson 1, HO1 Student Models * Matter Idea Mashup * Lesson 1 placemat * (Extra copies if needed) STeLLA Discussion Guide * Belcastro\_L5\_C1 Transcript * Belcastro\_L5\_C1 LAP * Cut sheet: Science Content Handouts (incl Anchor Summary) * Lesson 1, HO1 Student Models * Matter Idea Mashup * Lesson 2, HO1 Data Table * Lesson 3, HO1 Data Table   **Resources:**   * STeLLA Strategies booklet * BSCS Journal (norms pasted into the journal) * Content Deepening Notebook * 11x14 sheets of paper   **Materials:**   * Prepare materials as described in Lessons 1-5 | | | | * Video Clip 1 DQB Video: Belcastro\_L1\_C1 * Tennessee Aquarium video 1: M\_G5\_L1\_SSUP\_video1\_captions <https://drive.google.com/file/d/1CG4TgGmYu5CvQpJH3l3lzqvfe4A5xpA2/view?usp=sharing> * M\_G5\_L2\_SSUP\_video2\_R1\_captions <https://drive.google.com/file/d/1etPy1EvvzhA1JvNoxMa9-IS1vr0FDA6t/view?usp=sharing> * M\_G5\_L3\_SSUP\_video3\_R1\_captions <https://drive.google.com/file/d/1h7lGDK9aD-Tzk9zDwEJaUSl1mFi7NsXs/view?usp=sharing> | |

**DAY 1 SESSION OUTLINE: 8:00 p.m. - 4:30 p.m.**

| **Time** | **Purpose** | **Content** | **Activities** |
| --- | --- | --- | --- |
| 8:00-8:15  15 min  Slides 1-6 | **Purpose:** Continue to build community and set the stage for learning throughout the winter institute and into the academic year. | **Content:** Share focus questions for the day:   * Reflecting on the STeLLA Lenses and Strategies, how do we think our understanding and use of the strategies has changed or developed? * How can students be empowered to reveal their thinking and to listen to and interact with each other during classroom conversations? * How can we use our understanding of matter to figure out what was mixed with pond water that could have changed the water? | **Opening**   * Goals, Agenda, and Norms * Focus Questions |
| 8:15-9:10  45 min  Plus 10 min break  Slide 7 | **Purpose:** Reflect on our learning from teaching the fall unit and using the STeLLA strategies. | **Content:** Teachers reflect on their semester one video. | **Reflection on Teaching the Fall Unit**   * Group discussion about fall teaching reflection |
| 9:10-9:55  45 min  Slides 8-19 | **Purpose:** Model effective STeLLA-based science teaching and learning through a common experience that is grounded in a 3D, phenomena/problem driven unit and designed for adult learners. The Teacher Set-up and Follow-up are reflective of STeLLA Strategy F (Activity Set-up, Activity, and Activity Follow-up) with an eye toward teachers as science learners. PDLs use the teacher follow-up to uncover T ideas about their experience and then leverage those ideas throughout analysis of practice. | **Content:** STeLLA model lessons/units attend to the characteristics of effective science teaching and learning (e.g., 3D, phenomenon/problem-driven, student-centered, make student thinking visible and support sense-making, coherent, and access/engage PK and develop metacognitive abilities).  **Science content:** The phenomenon of a local pond that has dead things in the water suggests that something has changed in the water. Scientists begin to investigate water by making observations and asking testable questions. | **Content Deepening: Anchor Lesson 1**   * Teacher Set-up * Anchor Experience for Adult Science Learners * Teacher Follow-up |
| 9:55-10:40  45 min  Slides 20-25 | **Purpose:** The purpose of this session is to develop a shared understanding of STeLLA Strategy 1 (Ask questions to elicit student ideas and predictions) *and its use in developing the DQB*. | **Content:** Asking questions to elicit students thinking helps make student ideas visible and reveal questions they may have related to the given phenomenon. This helps teachers support and guide student understanding. | **Video Analysis of DQB Storyline**   * Set Up: Norms/Basics/Process * Lesson context * Identify/Analyze/Reflect |
| 10:40-4:10  290 min (4 hours 50 minutes) plus 10 min break, 30 for lunch  Slides 26-49 | **Purpose:** Model effective STeLLA-based science teaching and learning through a common experience that is grounded in a 3D, phenomena/problem driven unit and designed for adult learners. The Teacher Set-up and Follow-up are reflective of STeLLA Strategy F (Activity Set-up, Activity, and Activity Follow-up) with an eye toward teachers as science learners. PDLs use the teacher follow-up to uncover T ideas about their experience and then leverage those ideas throughout analysis of practice. | **Content:** STeLLA model lessons/units attend to the characteristics of effective science teaching and learning (e.g., 3D, phenomenon/problem-driven, student-centered, make student thinking visible and support sense-making, coherent, and access/engage PK and develop metacognitive abilities).  The content deepening experience will **include explicit modeling and use** of elicit, probe, and challenge questions as well as focal STeLLA strategies for each lesson:   * L2: STL 5/ SCSL F * L3: STL 5 * L4: STL I/9 * L5 STL 7   **Science content:** The phenomenon of a local pond that has dead things in the water suggests that something has changed in the water. Scientists begin to investigate water by making observations and asking testable questions. | **Content Deepening: Lesson 2-5**   * Teacher Set-up * Curriculum Immersion Experience for Adult Science Learners * Teacher Follow-up |
| 4:10 – 4:30  20 min  Slide 50-52 | **Purpose:** Reflect on the day’s experiences and learning and prepare for Day 2. | **Content:** Revisit Focus Questions   * Reflecting on the STeLLA Lenses and Strategies, how do we think our understanding and use of the strategies has changed or developed? * How can students be empowered to reveal their thinking and to listen to and interact with each other during classroom conversations?   How can we use our understanding of matter to figure out what was mixed with pond water that could have changed the water? | **Closing**   * Revisit and reflect on Focus Questions   Review Homework for the day |

### DAY 1

| **Time and Focus** | **Purpose and Content &**  **What Participants Do** | **Slides** | **Process** |
| --- | --- | --- | --- |
| 8:00-8:15  15 min  Slides 1-6 | **Opening**  **Purpose:** The purpose of this session is to continue to build community and set the stage for learning throughout the week and into the academic year.  **Content:** Focus Questions   * Reflecting on the STeLLA Lenses and Strategies, how do we think our understanding and use of the strategies has changed or developed? * How can students be empowered to reveal their thinking and to listen to and interact with each other during classroom conversations? * How can we use our understanding of matter to figure out what was mixed with pond water that could have changed the water?   **What participant do:** Participants reconnect with one another and the goals and the content of the program.  **Resources:**   * Name Tags * Journals * Norms Poster * PD Binder * STeLLA Strategies Booklet * STeLLA Conceptual Framework poster   **Charts**   * Program Goals * Day 2 Agenda * Day 2 Focus Questions * Parking Lot * Effective T & L |  | 1. **SSUP (0 min)** 2. Greet participants as they enter. Help them pick their materials and find their seats. |
|  | 1. **Opening (10 min)**    1. Welcome the team to the winter institute.    2. Provide instructions for introductions to be done in their table groups as directed on the slide. Give table groups about 5 min to complete introductions.    3. Ask tables to share a few examples of things that brought them joy and some things people are looking forward to for the institute. |
|  | 1. **Program Goals (5 min)** 2. Briefly share the program goals (p. \_\_). 3. These are the goals we have been working towards throughout the academic year and remain our goals for our time together. 4. Ask participants to consider how these goals resonate with their expectations for the next three days. Invite participants to record some ideas in their notebook.   **PDL Note:** Be sure to link what we will do during the winter institute to work toward these goals. |
|  |  | 1. **Institute at a Glance (5 min)** 2. Refer participants to p.\_\_ in the PD binder. 3. Provide an overview of the week. 4. Point to the Day 1 agenda chart (note that there will be homework). 5. Remind participants how we will work.    1. Parking lot    2. Breaks/take care of your own needs |
|  |  | 1. **Norms (5 min)**    1. Remind participants of the importance of community and how the STeLLA norms support our work together. Note that we’ll continue to attend to the spirit of the norms in our work today.    2. Prompt participants to select a norm that helped to push their thinking during content deepening opportunities last semester. Have a few participants share out which norm they selected and why. |
|  |  |  | 1. **Focus Questions (5 min)**    1. Share the focus questions for Day 1. Link back to the program goals.   **Transition:** *This program is all about improving our science teaching so we can improve students’ learning. To get us started, we’ll consider our own experience teaching the fall unit and reflecting on our video.* |
| 8:15-9:10  45 min  Plus 10 min break  Slide 7 | **Reflection on Teaching the Fall Unit**  **Purpose:** Reflect on our learning from teaching the fall unit and using the STeLLA strategies.  **Content:** Teachers reflect on their semester one video. |  | 1. **Discussion about Teaching the Fall Unit (50 min)**    1. Review the directions on the slide for sharing their reflections with the group.    2. Remind teacher participants that this is an opportunity for them to reflect on their learning so their ideas will drive the discussion. The PDL is there just as a time-keeper.    3. If groups have time left over, the facilitator can prompt them to discuss patterns among their responses or what resonated in others’ responses.   **Transition:** *As you know, one opportunity offered by this program is to deepen our content knowledge—to learn some science together. We’ll continue this work through experiences grounded in our next unit of instruction that you’ll use with your students this Spring. For our team, that unit will focus on Matter.*  *We’ll revisit these ideas later as we continue to dig deeper into the STeLLA Lenses and Strategies as we experience the Spring unit.* |
| 9:10-9:55  45 min  Slides 8-19 | **Content Deepening: Anchor Lesson 1**  **Purpose:** Model effective STeLLA-based science teaching and learning through a common experience that is grounded in a 3D, phenomena/problem driven unit and designed for adult learners. The Teacher Set-up and Follow-up are reflective of STeLLA Strategy F (Activity Set-up, Activity, and Activity Follow-up) with an eye toward teachers as science learners. PDLs use the teacher follow-up to uncover T ideas about their experience and then leverage those ideas throughout analysis of practice.  **Content:** STeLLA model lessons/units attend to the characteristics of effective science teaching and learning (e.g., 3D, phenomenon/problem-driven, student-centered, make student thinking visible and support sense-making, coherent, and access/engage PK and develop metacognitive abilities).  **Science content:** The phenomenon of a local pond that has dead things in the water suggests that something has changed in the water. Scientists begin to investigate water by making observations and asking testable questions.  **Resources:**  -Materials needed for Lesson 1  -Journals  -Science Notebook  **PD Binder:**  Science Ideas/Common Student Ideas (Mash up)  **Handout:**  2\_M\_g5\_L1HO1 Rev  **Charts**  -Parking Lot Chart  -Day 1 Focus Questions Chart  -Notice/Wonder Chart  -DQB Chart  -Testable Question Chart |  | 1. **Matter (0 min)**     1. Note that we are transitioning into our first exploration of our new unit for the semester. |
|  |  | 1. **Content Deepening: Teacher Set-up (5 min)**   **PDL Note:** The purpose of the Teacher Set-up is to set the stage for teacher learning through the content deepening experience. This part of the session should engage teachers as learners and elicit their prior knowledge and experience.   1. Note the “teacher hat” in the upper right-hand corner of the slide and that we’ll begin with some time to think and write about how you usually teach about matter. 2. Provide time for individual journaling based on the prompts. 3. Whip around and gather ideas.   Possible participant responses:   * This usually is about molecules/small particles. * It’s not always a very fun topic for students * Matter is stuff all around us * Students think dissolving means the substance isn’t there anymore. * Students struggle with the idea of particles, it is too abstract.   **Transition:** *Over the next hour or so, we’ll experience the anchor lesson of our unit focused on Matter. While this experience is grounded in lesson 1, we’ve designed the experience for you as adult learners—as science learners. You’ll see a ball cap in the upper right-hand corner of the slide to signify the new “science learner hat”.*  *To make the most of this time, set aside your teacher hat and thoughts/questions about how you’ll do this in your classroom with your kids. Give yourself and our whole team the gift of immersing yourself in the experience as a science learner. When the inevitable wonderings about teaching come up, capture them on a sticky note or in your BSCS journal so you can re-focus as a learner on our shared experience.*  *Don’t worry, just as we are in the teacher set-up right now, there will be a teacher follow-up immediately after this science learner experience where we will address any teacher thoughts. Give yourself a moment to get organized. As you are doing that, consider what you’ll do to stay in the learner experience.*   * **PDL Note:** Be sure to refer to the common experience as learner hat and not student hat. We want participants to engage in the activities as adult science learners not as one of their students. |
|  |  |  | 1. **Content Deepening: Teacher Set-up (5 min)** 2. Invite teachers to turn to binder p. X and consider the ideas and science practices on the page. Note any ideas that are similar to those they shared in their previous conversation. 3. Provide instructions and time for the task. 4. Note that they’ll have periodic opportunities to revisit and discuss these ideas throughout the week.   **Transition:** *Over the next hour or so, we’ll experience lesson 1 of a unit focused on matter. While this experience is grounded in lesson 1, we’ve designed the experience for you as adult learners—as science learners. You’ll see a ball cap in the upper right-hand corner of the slide to signify the new “science learner hat”.*  *To make the most of this time, set aside your teacher hat and thoughts/questions about how you’ll do this in your classroom with your students. Give yourself and our whole team the gift of immersing yourself in the experience as a science learner. When the inevitable wonderings about teaching come up, capture them on a sticky note or in your BSCS journal so you can re-focus as a learner on our shared experience.*  *Don’t worry, just as we are in the teacher set-up right now, there will be a teacher follow-up immediately after this science learner experience where we will address any teacher thoughts. Give yourself a moment to get organized. As you are doing that, consider what you’ll do to stay in the learner experience.*  **PDL Note:** Be sure to refer to the common experience as learner hat and not student hat. We want participants to engage in the activities as adult science learners not as one of their students. |
|  |  |  | 1. **The Situation (5 min)**     1. The situation we’ll be investigating is in a pond downhill from a school here in our community. Kids walk by and sometimes play in the pond on their way home from school sometimes. One day when they’re walking home, they notice a few dead fish on the side of the pond. This is really unusual – they've never seen this before. They wonder if something changed in the water and whether the water is safe for fish and for them to play in. During our time together, we’re going to investigate what is changing in the water that is causing the death of living things and how can we, as scientists, investigate the water?   **PDL Note:** Point teachers to their science learner journals. This part of the session should attend to teacher learning goals.  Engaging in lesson as a learner may be a new experience for some participants. They may find it difficult to remain in learner hat. If you notice participants talking in teacher hat, gently encourage them to capture their teacher idea on a sticky note or in their BSCS journal to return to after the common learner experience. If a participant asks the whole group a teacher-focused question, you have a couple of options:  1) you can acknowledge that we will return to their great teacher question in the debrief and invite them to remain in learner hat for now, or  2) you can turn it into a learner hat question, or  Example:  Teacher question: *How do I help kids ask questions for the DQB?*  PDL follow-up:  *So are you asking how we could work together to develop better questions for the DQB? Or*  *Great question. Let’s think together about how we could ask better questions for the DQB.*  3) you can acknowledge that it’s a conversation you would also have with students.  Example:  Teacher statement:  *Kids will really struggle with this.*  PDL follow-up:  *We can all struggle with this. Let’s pause and talk about OUR struggles...just like we’d do with our kids in class. Let’s talk about it as learners.*  Example:  Teacher statement:  *These content representations are really important. I think we need to pause and talk about the purpose of each in kids’ learning.*  PDL follow-up:  *Exactly and this is something I’d want to do with kids in the classroom, so let’s us do this as learners, too. What role did content representation 1 play in your learning? In our learning?*  The anchor experience will include explicit modeling and use of CSW and of elicit, probe, and challenge questions. Example of challenge questions include:   * How does your idea connect to X’s idea? * What did you observe during the Anchor Lesson (NOT activity) that helped you ask that question? * How does \_\_\_\_\_\_\_\_\_\_\_\_ relate to your past experiences? * What are you observing that prompts you to make that claim? |
|  |  |  | 1. **Lesson Focus Question (5 min)** 2. Share the Lesson Focus Question. 3. Have participants write down the focus question in journals and invite them to capture their ideas. 4. Keep this section brief! Save any discussion about testable/non-testable questions for slide 13.   Possible Responses:   * 1. Visit other ponds to compare.   2. Take it to a pool supplier to test the water.   3. Make observations around the pond to look at how other species were affected. |
|  |  |  | 1. **Anchor Lesson: Noticings and Wonderings (10 min)** 2. Give each small group a sample of healthy and unhealthy pond water. Ask that groups keep the bottles closed during their investigation since we have a limited amount of the samples and we’re not sure whether they’re safe. 3. Invite teachers to share their noticings and wonderings in their small group while they practice using the Communicating in Scientific Ways sentence starters: 1. Ask how and why questions and 2. Observe. 4. As teachers share out their ideas record their ideas on the “noticing and wondering” chart.   Possible responses:   * 1. I notice one sample looks cloudy.   2. I wonder if the sample has harmful chemicals in it?   3. Why does one sample have bubbles in it?   4. I notice scummy stuff on one sample.   5. There are bubbles in one sample.   6. I wonder could the weather have caused this to happen, like acidic rainfall?   7. Will the scum eventually settle?   d) If anyone starts to venture into an explanation of what’s happening, redirect to save those thoughts for the next step and avoid charting anything but what they could observe with the samples. |
|  |  |  | 1. **Developing Models (20 min)** 2. Ask teachers to consider what they think each water sample would look like if we zoomed way, way in. Explain that we will take a few minutes to capture ideas that show what each water sample looks like when we zoomed in. 3. Describe the task. 4. Teachers will make an initial “zoomed in” model of each water sample in their notebooks. 5. Encourage teachers to use picture and symbols along with some labels to show their thinking. The focus on these first models is to make our thinking visible about the change that occurs over time, not to have perfect models or ideas. 6. Note that initial models can help scientists generate more questions about the phenomenon. It’s important that you note those questions that comes up at the bottom of the paper.   **PDL Note:** Initial models may include drawings of containers of the water. Models may indicate differences in the clarity of the water. In the zoom in portion of the model, there may be squiggles or dots to indicate “stuff” in the water.  **PDL note:** This is another opportunity to ask questions to elicit and probe thinking and the use CSW stems.  f) As teachers work on their models, questions may come up for them. Prompt participants to add questions about what happened to the pond water, the water samples, and/or what it would look like if you zoomed way way in on each sample to their page if necessary.   1. Discuss the distinction between testable and non-testable questions. 2. Highlight that some questions scientists pose are testable questions and others are researchable questions. Invite participants to review the questions they posed with a partner to see if they can identify a clear example of a testable question and a clear example of a researchable question. Encourage participants to pay attention to the characteristics of the questions as they categorize. Limit this to a partner share for time.   Examples   1. Can we see water molecules under a microscope? (researchable at least in our classroom!) 2. What kinds of things are in the pond water that should be there? Should not? (testable with some field work) 3. How does the amount of salt in water affect the conductivity of the water? (independent variable is amount of salt and dependent variable is conductivity) 4. Once the group has negotiated a few examples, pull out/share and chart the key characteristics of testable questions below. 5. Examples. Testable questions 6. Lend themselves to empirical investigations 7. Lead to gathering and using data to develop explanations of scientific phenomena 8. Focus student inquiries 9. Answers can be based on observations and scientific knowledge obtained from reliable sources 10. Generate a “need to know” 11. Focus on something to measure or observe or things that CAN be measured and observed. 12. Chart participant ideas, add ideas that they don’t come up with, and ask which characteristics seems most relevant for them.   **PDL Note**: Some questions are more philosophical in nature. We don’t plan to talk about them here, but it is sometimes helpful to name this type of question. |
|  |  |  | 1. **A Field Trip to the Tennessee Aquarium (10 min)** 2. Teachers will watch a video to learn more about how scientists study a body of water and investigate water quality. 3. Show the video. 4. Key ideas to highlight in the video include: 5. As scientists study water quality, they will often start with observations. 6. Observations could include: how quickly is the water moving, how clear is the water, what does the base of the stream/pond look like, are there any living creatures in the water, what is the vegetation like around the water? |
|  |  |  | 1. **Our Questions (10 min)**    1. Direct participants to consider all the ideas they have gathered today about the phenomenon. Explain that they will now transfer their testable questions to sticky notes, which will be shared with the class. Direct participants to write out each question on a separate sticky note. |
|  |  |  | 1. **Anchor Phenomenon and DQB (5 min)** 2. Building our Driving Question Board: Note that we have generated a lot of individual and group questions so far; it will be useful to organize them so we can begin to answer them. Invite participants to write their questions in complete sentences on sticky notes, one question per sticky note. 3. Possible responses: What is in the water? Why did the fish die? How did the stuff get in the water? Could there be too much algae in the water? Why did the unhealthy water sample have bubbles? Why is the water green? 4. II. Invite participants to bring their sticky notes and stand around the Driving Question Board (DQB) chart. Invite participants to take turns reading one of their questions aloud and then sticking it on the chart. After each question is read and placed on the chart, have others with similar or related questions to read them and place them near that sticky note to begin spatially organizing clusters of questions.   **PDL Note:** Invite participants with fewer sticky notes to share first to ensure the greatest number of participants have the opportunity to read their question aloud.   1. As questions are organized into clusters, help the group identify category names for each cluster. Add category names to the top of each cluster. Invite participants to return to their tables and open their science notebooks. 2. Possible clusters: What’s in the water, how did the stuff get into the water, possible investigations of the water, or living things in the water. 3. Return to the focus question for the anchor lesson and provide time for participants to revise their ideas from the beginning of the lesson and capture any new ideas. Encourage them to use a different color so they can see how their ideas have changed and grown. Invite participants to share their thinking using sentence stems from row 13 of the CSW chart.   ***Transition:*** *Now, let’s put on Teacher hat and think back over our experience with Lesson 1. What STeLLA strategies did you notice? Capture several ideas into your journal.*   * 1. Give participants a couple minutes to capture ideas.   2. Then, have the participants share their ideas with the whole group.   *You know, these strategies are in the lessons. Now let’s take a deeper look into the lessons.* |
|  |  |  | 1. **Content Deepening: Teacher Follow-up (30 min)**   **PDL Note:** Keep in mind that everything up to the next CD experience is part of the teacher debrief.  The purpose of the Teacher Follow-up is to continue teacher learning from the content deepening experience. This part of the session should engage teachers as learners and support them in explaining and reflecting on their experience.   1. Hand out Lesson 1 placemat 2. Provide time for teachers to look at the placemat and share observations with a shoulder partner. 3. Ask for a few observations with the whole group about the placemat. 4. Possible responses: The first three columns match the lesson overview in the lesson plan. 5. The “STeLLA Strategy” column from the lesson plans is empty. 6. There’s a space for notes. 7. Explain to participants that the goal of this tool is for you as teachers to process the experience you had in learner mode back in your teacher hat. 8. Note that we could fill up the STeLLA strategy column with a bunch of strategies. Instead we want to consider which strategies are really at the heart of each lesson. 9. Ask for an anchor lesson like the group just experienced, which 2 or 3 strategies are at the heart of our work? 10. Possible responses should include: Elicit, CSW, engage students in developing and using content representations and models (Strategy 6).   **PDL Note:** The goal is NOT to name all the strategies! There may be some that occur consistently in each lesson as part of the lesson structure. You may note those at each corresponding "Phase of the Lesson." Otherwise, consider which strategy/strategies were focal to the learning that happened during the learner experience.   1. Also note that the final column is a space for them to capture other pedagogical notes they want to remember for instruction. This could be anything about ideas that surfaced, PD Leader moves, or other things participants note about how the learner experience unfolded.   l) Give participants a few minutes to fill in the placemat individually, then share in pairs or at their table. Finally, depending on how much time there is left, invite participants to share out. As others share out, they should feel free to add ideas to their placemat. |
|  |  |  | 1. **Meta Moment (5 min)**    1. Say that we will pause here to reflect on our own experience now. Review the prompts with the group.    2. Provide a few minutes for participants to respond to the prompt in their journal.   **Transition:** *Now that we have had the opportunity to experience the first lesson as a learner, we will now have an opportunity to watch students in a classroom experience the same lesson.* |
| 9:55-10:40  45 min  Slides 20-25 | **Video Analysis of DQB Storyline**  **Purpose:** The purpose of this session is to develop a shared understanding of STeLLA Strategy 1 (Ask questions to elicit student ideas and predictions) *and its use in developing the DQB*.  **Content:** Asking questions to elicit students thinking helps make student ideas visible and reveal questions they may have related to the given phenomenon. This helps teachers support and guide student understanding.  **Resources:**  - Video Clip 1 DQB Video: Belcastro\_L1\_C1  -DQB Video: Belcastro\_L1\_C1 Transcript  -STeLLA Strategies Booklet |  | 1. **Conceptual Framework (5 min)**    1. Direct attention to the focus questions on the slide. Mark that we have completed a dive into the research that underpins the STeLLA Lenses.    2. Point to the strategies highlighted on the slide –we will begin a deep dive into the Student Thinking Lens Strategies: 1) ask questions to elicit student ideas and predictions; and 2) ask questions to probe student ideas and predictions that we experienced in our content deepening session.    3. Invite participants to pull out their Z-fold and Strategies Booklet. |
|  |  | 1. **Lesson Analysis: The Basics (0 min)** 2. Direct participants’ attention to the Viewing Basics and Analysis Basics as a quick reminder. Share that both the Viewing and Analysis Basics will help us dig deeper and learn more from our analyses while keeping us focused on the ultimate goal – improved student learning. Mark that this process is NOT about critiquing teachers but improving student learning. 3. Remind participants that the videos we will analyze are not necessarily exemplars. You might say, *The videos we’ll be viewing throughout the program are not necessarily exemplars, but rather they show teachers working to implement the STeLLA Strategies. “Real world” examples deepen our thinking because we can see the sometimes unintended results of a teacher’s decisions and consider missed opportunities.*   c) Tell participants they can find additional information about both the Viewing and Analysis Basics in their Strategy booklet. |
|  |  |  | 1. **Video Analysis: The Process (5 min)**    1. Remind participants of the process for video analysis and reiterate that framing our analysis in this way helps us focus more holistically on BOTH teaching strategies and the impact of those strategies on student thinking and learning, and the storyline that students are constructing (e.g. the two lenses). |
|  |  |  | 1. **Preparing for Video Analysis: The Context (5 min)**   **PDL note:** Participants will not identify places where elicit and probe questions are observed. Instead, after watching the video, we will analyze the video together by comparing the students’ initial questions with the participants own initial questions.   * 1. Provide instructions for watching the video clip and using the transcript to identify students’ initial questions.   2. Invite participants to read the context for this clip at the top of the transcript. |
|  |  |  | 1. **Video Analysis: Analyze (20 min)**     1. Show the video clip.    2. Individually: Ask participants to recall their initial questions about the phenomenon. Share the prompt on the slide. Give time for teachers to review the transcript for students’ initial questions.    3. Whole Group: Discuss their thoughts to the prompt.   d) Key ideas to highlight: Student questions were along the lines of: Is it polluted? Is it drinkable? Are there bacteria in it? What does it smell like? Are the bubbles made by a fish/animal? Our questions were.... How did our questions compare to theirs? |
|  |  |  | 1. **Video Analysis: Reflect and Apply (10 min)** 2. Invite participants to respond to the prompt in their journals.   b) Have several participants share their ideas with the whole group. |
| 10:40-4:10  290 min (4 hours 50 minutes) plus 10 min break, 30 for lunch  Slides 26-49 | **Content Deepening**  **Purpose:** The purpose of this session is to model effective STeLLA-based science teaching and learning through a common experience that is grounded in a 3D,  **Content**: STeLLA model lessons/units attend to the characteristics of effective science teaching and learning (e.g., 3D, phenomena/problem-driven, student-centered, make student thinking visible and support sense-making, coherent, and access/engage PK and develop metacognitive abilities). The content deepening experience will include explicit modeling and use of STeLLA strategies.  **Science content:** We can use our understanding of the particulate nature of matter and properties of matter to explain the world around us.  **What participant do:** Participants watch a video to help them connect to and understand the context/phenomenon and then investigate  **Resources:**   * Chart paper * cups * Healthy and unhealthy pond water samples * water * syringes * hand lenses * Salt, fertilizer, dirt, oil, soap, measuring spoons and small syringes * stir sticks * filter * pH strips, circuit, Secchi disks, thermometers * Scale   **Videos:**   * Lesson 2-5 TN Aquarium Videos |  | 1. **Content Deepening: Teacher Set-Up (10 min)**    1. Invite participants to take out their mash up homework from the previous day. They should compare their ideas with a partner as well as any questions that came up as they completed their individual mash-ups.    2. Invite a few people to share a notable difference or question that arose. Mark that we will further discuss these ideas tomorrow after we wrap up our content deepening experiences.    3. Highlight that one idea that we’ll consider together is that of concentration. It’s part of our work today, but it not in the student-facing materials/lessons. |
|  | 1. **Link to our Last Lesson (5 min)**    1. Ask participants to summarize the question clumps that arose yesterday during our DQB development.    2. Invite participants to share and add any new questions that arose overnight or with the mash up. |
|  | 1. **Lesson Focus Question (0 min)** 2. Mark the Lesson Focus Question. As possible, link it to any clumps that are on the DQB. Note that we’re going to shift our focus away from the pond to instead investigate some possible dangerous materials that could be in the pond water. 3. Elicit initial ideas by asking, “What might we want to observe or investigate about dangerous materials that could be in the pond?” Have participants share their thoughts with a partner. |
|  | 1. **What could be in the water? (90 min)**   ***PDL Note:*** *Times within this slide are an estimate. Watch generally how your timing is going but note that you may need to spend more time on some steps and less time on others.*   1. Share the origin of the video with participant. 2. Possible narrative:   *Before we can investigate the pond water specifically, we have a video the Tennessee Aquarium helped us create to learn more about what dangerous substances may be in the water. As you watch this video, pay attention to what dangerous materials are most common in ponds or streams.”* (5 min)   1. Play the video once or twice as needed. 2. Key ideas to highlight in the video include:    1. Definition of pollutant: substance or energy introduced into the environment that has undesired effects, or adversely affects the usefulness of a resource.    2. Difference between point source pollutant and non-point source pollutant: A point source is a single, identifiable source of a pollutant; a non-point source pollutant can’t be attributed to a single source.    3. Five common pollutants found in bodies of water include salt, soil, fertilizer, detergent, and oil, and    4. Soil acts as a pollutant when it washes away (erodes) from the land and is deposited in water sources. 3. Ask the group, “If we wanted to learn more about these five pollutants, what could we do?” Elicit ideas listening for a range of ideas that include observational information and tests that involve mixing each pollutant with water. Probe ideas that may lead to some of the ways we’ll observe and collect data about the pollutants or any ideas that feel unclear. Note that we should add water on to our table since it’s another important factor in this situation (you can assign a group who is done early to capture observations about water or do it together). (5 min) 4. Move to a chart paper and capture each of the pollutants going down the left side. Start by modeling what you mean by saying, “For example, salt was one of our common pollutants” and note salt at the top on the data table. (2 min) 5. Let the group know that at first, we’re going to follow Sarah’s advice in the first video and begin by making observations about each of the pollutants. Draw on their ideas that would be something they could learn through observation. Ask the group for any big categories we could write along the top to capture our ideas about observations, or suggest that based on what the group said, we could organize our observations around what each pollutant looks like on its own and mixed with water. Don’t title the chart yet and leave space to the right for additional columns that will come in the Lesson 3 investigations. (3 min) 6. Let participants know that initially each person will begin by observing salt and that the group will check in to share out results in 5 minutes. Do not direct people to write anything in their data table yet – let them know we’ll capture ideas together once we’re done observing. (7 min) 7. Orient participants to the materials station: cups, water, syringes, hand lenses, salt, stir sticks, filters. Let them know if there’s anything else they need, they can ask to see whether it’s available. Note all the ways participants are observing – hand lenses, flashlights from their phones, etc. 8. If participants ask for how much of anything to use, shrug for now and say that you don’t know. Don’t engage more in that conversation at this point: that will be the next step. **At this stage we hope that participants use different amounts of water and salt to lead into a conversation about controlling for variables among tests.** If you hear conversation around standardizing how much people are using, jump in and ask an elicit questions to ask participants why they’re asking others that question. Let them know they don’t need to worry about that at this point but ask whoever brought it up to mention it when we bring the group back together. You may want to hand materials around to avoid these conversations between adult learners, but you may want to mark that facilitator move during the placemat reflection in “teacher lens” and that you would be less likely to do that with students. If groups are not using dramatically different amounts of salt, you may want to make a mixture that is saturated so you can offer this as a contrast during the next discussion. (14 min)   **PDL NOTE:** *Do not set out any materials for the Lesson 3 investigations yet. We want participants to begin by just collecting observational data. These tests will be introduced in the next stage.*   1. Walk from person to person to ask what they’re noticing. Mark who is finding differences especially around the amount of salt added or whether the salt is stirred into the water, so it dissolves. Note any of these differences for the following discussion. If nobody is finding different results, make a quick mixture with enough salt to saturate the water (a few scoops with 50 mL should be enough) and stir it up to then use as a counter example to their observations. 2. After 5 minutes, pull participants back together and ask them to share what they noticed. Capture consensus ideas If any ideas come up that vary among participants, pause there and elicit those differences. Look for an opportunity to introduce the terms “soluble” and “dissolve.” Use these words as fit in the upcoming activities. Ask probe questions around those differences around what procedures each person used – amount of salt, water, or stirring. (5 min) 3. Mark two mixtures (either from participants or include one that you made that is saturated). Note that among these two whatever variables will give them different concentrations (for example, these two used the same amount of salt but two different amounts of water or these two used the same amount of water but two different amounts of salt). Invite participants to sketch a quick model of the two mixtures, zoomed in so much that we could see the salt particles. Have participants compare their model with others at the table and identify similarities and differences. Ask participants to share out. Cue into ideas that relate to concentration and introduce the term. (10 min) 4. Without recording any observations around which there were differences, say something like, “So, it seems like we can’t record some of our observations because we found different results between some of us due to the different concentrations. What would we need to do to reach consensus around some of these observations?” Emphasize ideas that come up about controlling variables between groups. (4 min) 5. Note that when we’re working as scientists, and each person or group is doing the same investigation, we call those trials. For us to be able to compare our results between trials to be more confident in our observations, it’s important to control some variables. (1 min)   ***NOTE TO FACILITATOR:*** *This next step is a key teacher move in Lesson 2 that will set up the investigations in Lesson 4. You may want to step out of learner mode for a moment and point this out, so that teachers note how this conversation sets up Lesson 4 later.*   1. Move to a new chart paper. Mark that while we want to set our constants so we can compare results across trials today, we COULD design an investigation to test some of the things groups might have done differently from each other. If we changed other variables, they could lead us to new testable questions. Ask something like, “What variables could we change in this mixture?” Record ideas like amount of water, amount of salt, **amount/speed of stirring, particle size, or temperature of the water.** Keep probing and challenging to surface a variety of answers. The ones that need to be present for Lesson 4 are: temperature, amount of stirring, and size of particle. Capture other ideas in addition to those as well. You’ll refer back to this chart for the Lesson 4 content deepening experience, but you can put it aside for now and move to another blank chart. (5 min) 2. Ask, "As we investigate these pollutants, what should we keep consistent between our groups so that we can compare our results?” The list should include things like amount of water, amount of each pollutant, amount of stirring. Try to get an amount of each material that is small enough so that the salt will all dissolve. One 10 mL scoop dissolves completely in 50 mL of water. (3 min) 3. Ask which CSW rows may be helpful during this investigation. Elicit a few responses. (1 min) 4. Let groups know since they are adult learners, we won’t capture notes but just observe carefully. Have 5 groups each get a dry sample and a sample of the pollutant mixed in water then invite everyone to do a gallery walk and observe all five. They’ll have 10 minutes to set up their pollutant and to make observations about all 5 pollutants on their own and mixed with water. They should keep their mixtures on their table in case there are discrepancies in the observations. (10 min) 5. Circulate among the groups and ask elicit and probe questions about what they notice. 6. Draw participants back together. Ask questions to fill in the chart and check in with the other groups around consensus. Note CSW row 6 and how important it is so that participants can listen to note whether all ideas are captured and to make sure they agree with those ideas being shared. Row 7 is also key as participants may agree or disagree with each other. Sample responses may include: (15 min) 7. Quickly have participants share their observations and have another facilitator (or 2) quickly write their responses on the chart to move into the next activity/discussion. 8. Salt: (On its own) White, crystals, bumpy, shiny, solid (In water) clear, seems to disappear (If anyone says the water is cloudy or that you can see the salt on the bottom, pause and dig into this response. The idea that when salt dissolves in water the mixture is clear will be a key idea in later lessons). 9. Detergent: (on its own) milky, cloudy, white/yellow, thick, sticky, gooey, liquid (in water) cloudy, murky, spreads evenly throughout water 10. Oil: (on its own) thick, brown, slick, liquid (in water) yellow, floats at the top or makes bubbles throughout when you mix it up (probe ideas around bubbles and clarify where the oil ends up when it settles), some goes to the bottom 11. Dirt: (on its own) brown, powdery/chunky, you can crush little balls of it, solid (in water) mixes together for a bit then sinks to the bottom, murky, brown 12. Fertilizer: (on its own) bright blue, crystals/powder/chunky, solid (in water) cloudy, bright blue, white pieces floating, spreads evenly throughout 13. Have participants turn and talk about how you would represent a model of the pollutant they set up (so just one of the five) mixed with water if they were to zoom way, way in.   ***Transition:*** *We’ve just made observations of each pollutant on its own and in water. After we return from a break, we’ll discuss one pollutant in particular: salt when mixed with water.* |
|  | **BREAK: 10 min** |
|  | 1. **Dissolving and Solubility (10 min)**   **PDL Note:** As you describe the differences between covalent and ionic bonds and what a polar molecule means, use chart paper to sketch what’s happening when salt dissolves in water to reinforce those big ideas.   * 1. Defined the terms needed for the unit: soluble and dissolve.   2. Note that as adult learners, going to take on an additional learning goal that will not be included for students. We’re going to explore why some substances dissolve and others don’t.   3. Invite participants to take a minute to capture their thoughts about why some substances dissolve and some don’t. They can use a combination of words and sketches if it helps to show their thinking.   4. Let’s consider what happens to salt when it dissolves in water.   5. Reviewed/charted the chemical formula for salt and water (NaCl and H2O)   6. Discuss the type of bonds formed between the atoms and their “charges”. Asked "what is meant by atoms bond together. What do you know about ionic or covalent bonds?”   7. Discuss the difference between ionic and covalent bond.   8. H2O forms a covalent bond: the electrons are shared, but the O is slightly more negative and the H is positive. Since the water molecules are *slightly* charged, we say water is a **polar** molecule.   9. Because water molecules are polar with these slight charges on either side, they interact differently with substances that have ionic bonds.   10. The slightly positive side of the water molecule is attracted to Na+ combines with Cl- to form NaCl and is an ionic bond. One atom takes the electrons from the other atom and thus becomes more negative.   11. Salt, or NaCl, has an ionic bond. When it’s mixed into water, the polarity of the water molecules gives a little tug to the Na and Cl. Because Na and Cl have an ionic bond, water is able to disassociate the atoms, or pull them apart. This is a physical change.   12. The atoms in substances that form ionic bonds like salt (NaCl) break apart in water and creates an electric charge which the electrode can detect.   13. The atoms in molecules that form covalent bonds stay together. They do not break apart in water. They do not produce an electric charge (Used sugar as an example)   14. Punch line: when salt dissolves in water, the ionic bond between the charge particles breaks apart retaining their charge. This allows for electric conductivity to occur in water.   15. Invite participants to return to their notebooks and capture their thoughts about why some substances dissolve and some don’t. They can use a combination of words and sketches if it helps to show their thinking. |
|  | 1. **Where did the salt go? (slides 31-32: 5 min)** 2. After the ionic/covalent bond and polarity discussion, describe the conservation of mass demonstration that is in Lesson 2, so that teachers know how and where that concept is introduced. 3. Students will be asked whether the salt is still in the cup when it seems to disappear. We would take and note initial masses in grams of the empty cup, the cup with salt in it, another empty cup, that cup with salt in it (just to get the mass of the salt). 4. Students will predict the mass when we add the salt to the water and stir it up. Note that students usually have a range of responses here. 5. The teacher will add the salt to the water, stir until it dissolves, then find the mass (should be very close to the water + salt + cup) 6. That illustrates for us an important scientific principle we want to remember as we figure out ideas about matter and properties in this unit. |
|  | 1. **Where did the salt go?** 2. This principle is called “conservation of mass.” This principle means that matter is neither created nor destroyed. While it may change forms, the same amount is still there. |
|  | 1. **A Field Trip to the Tennessee Aquarium (10 min)**    1. Invite participants to note key ideas and that we’ll work together to summarize the important ideas we hear in the video.    2. Play video.    3. Key ideas in video include:    4. Common measures that scientists use to measure water quality are temperature, pH, conductivity, and turbidity    5. pH: pH strips are used to test for pH, using the scale inside the package to match what the indicator looks like after dipping it in liquid. Water has a pH of 7. The closer numbers get to 1 the more acidic a substance is. The closer the numbers get to 14, the more basic a substance is. Numbers closer to the middle of the scale are safer than numbers on either end.    6. Turbidity: in deep water, a Secchi disk is used to lower down to see how far it can go down before you can’t see it anymore. In a classroom, more descriptive terms can be used to describe the cloudiness.    7. Temperature: Use a thermometer to register the temperature. Look at the numbers on the scale and see how far up the red line goes.    8. Conductivity: Water by itself can’t make a path for electricity to flow through. If you put probes for a circuit in a water sample, if the buzzer sounds or a light bulb lights up, it means there’s something in the water that is making a path for the electricity.    9. Summarize tests to run and ask whether there are any questions about how to do these tests. |
|  | 1. **Testing our Pollutants (20 min)**    1. Invite participants to look at the additional supplies available in the materials station. In five small groups, let each group know they will run all of those tests on one pollutant (assign pollutants to groups). If groups have additional time, they can test additional pollutants. They have 10 min to perform these tests and record results. Have groups wait to clean up mixtures until after investigations are done.    2. At some point, a participant may note that temperature doesn’t seem like a meaningful measurement since the water is not coming right out of a river, stream, or pond. Have that person bring up that issue with the larger group and note that while that’s a variable Sarah mentioned they test in the field, it isn’t a meaningful piece of data in a classroom setting.    3. Share out and add consensus results to the data table. One facilitator can lead the discussion while another one captures the data on the chart. If there’s any uncertainty, retest together. Some results can be captured in different ways. If groups describe some results, like turbidity, in different terms, try to honor the different ways of communicating results and look for similarities among the methods of describing results. Results should be something like:    4. Salt water: pH – 6/7, conductivity – yes, turbidity – low    5. Detergent water: pH – 5/6, conductivity – low or not at all, turbidity – high    6. Oil: pH – 7, conductivity – no, turbidity – low    7. Dirt/soil: pH – 7, conductivity – no, turbidity – high    8. Fertilizer: pH – 3, conductivity – yes, turbidity – high    9. Water: pH – 7,   Conductivity – no,  Turbidity – no   * 1. Add the title “Properties” to the data table, explaining that properties is the term scientists use to describe those things that can be observed (like in L2) and measured (like in L3). |
|  | 1. **pH Scale** 2. Show during investigation as needed. |
|  | 1. **Mixtures with the Pollutants (10 min)**    1. Assign individuals different pollutant/water mixtures.    2. Give everyone 5 minutes to create their models then gather the models on a table or on a wall for a gallery walk.    3. Once everyone can see all the models, invite observations about similarities and differences. Ask if anyone has a clarifying question for someone else based on their model. **Ask probe questions to highlight differences particularly whether people represented all of matter as particles or not.**    4. Ask if any new questions come up from these models that we want to add to our DQB.   ***Transition:*** *Now that we’ve looked at the models you all have created, we’ll look at another model to consider how some scientists picture what water looks like when you zoom way way in. (Ahead of time, go to the PhET simulation for states of matter basics. Choose Neon in a liquid form and zoom in enough so that participants can’t see the key on the side that says “neon.” If the screen won’t stay zoomed in as you flip between the PowerPoint and browser, freeze the screen so you can zoom it in to not raise questions about why we’re looking at neon instead of water.)* |
|  | 1. **Considering Another Model (10 min)**    1. Introduce this model scientists use to imagine what water looks like really zoomed in. Ask participants what they notice? And if this model shows pure water, what they think it would look like if there were something else mixed in as well.    2. Note that when we do this with students and for our work together today, we’re going to look at neon instead of water. We do this because, while we as adults know that water molecules look different, our fifth-grade standards use language of “particles” rather than “atoms and molecules.” The neon particles let us stay at the level of thinking about water particles, not the specific structure of water molecules.    3. Make sure that the idea surfaces that all matter is made of particles too small to be seen. It’s not like the pollutant particles are in the uniform water.    4. Ask what similarities and differences participants note between this model and theirs. Ask if any questions surface from this model. If they are new questions, invite participants to add them to the DQB. If questions surface that are answerable at this point, put those questions back to the group to see what they think. |
|  | 1. **Checking Your Model (5 min)**    1. Invite participants to take 5 minutes to revise their first models (i.e., tweak or overhaul).    2. This time they’ll also add a caption that says, I showed \_\_\_ [they should note a feature of their model here]. This represents \_\_\_\_ [this should be a science idea either about the properties of the pollutant or another science idea we’ve learned at this point.]    3. If time is running low, they can share their sentence with a partner instead of writing it down. |
|  | 1. **Eliminating Some Pollutants? (10 min)**    1. Ask the group to use what we’ve learned about properties at this point to answer the question on the slide.    2. If participants offer an idea without providing evidence based on properties, ask a probe question to ask them for that evidence.    3. At this point, participants should confidently eliminate oil and dirt. Note that they may want to eliminate fertilizer, but if you can keep that one in the running by introducing some uncertainty or eliciting uncertainty from others in the room, the next activity will be richer if fertilizer is still on the list of possible options.    4. Complete an Idea Tracker together on a chart paper for the question: What can we learn about the possible dangerous materials in the pond water?    5. If there’s time, build in a moment for them to stretch their legs and move around before starting Lesson 4. You may invite participants to stand up and share their response to the Idea Tracker with someone from another table.   ***Transition:*** *Now that we were able to eliminate some pollutants, we are going to discuss factors that may affect how material dissolves in water.* |
|  | 1. **Lesson 4 Focus Question (10 min)**    1. Show the next FQ. Ask whether we have any ideas that could help us get started answering this question. Our list of possible variables to change with salt from Lesson 2 can get the group started with this FQ.    2. Ask if there’s anything the group wants to add to our initial list.    3. Use the poster to initiate a discussion around what we’d like to test to answer our question.    4. Split the group into pairs/groups of three people. Ask each group which one of the variables we brainstormed that they’d like to test. Make sure one of the groups has particle size, temperature, and amount of stirring. Otherwise, let groups pick variables as they want. Hand one 11x14 piece of blank paper to each group.    5. Use one group’s variable as an example and say something like, “If this group is going to test temperature, can anyone tell me what’s the testable question this group will be answering?”    6. When someone responds, “What is the effect of the temperature (or blank) of the water **on how quickly salt dissolves**?” invite the group testing temperature to write that testable question horizontally across their paper as the heading. If needed, model phrasing their variable as a testable question with one more group. If not needed, invite all the other groups to write their testable question along the top of the paper. If any groups want to test for two different variables (which adult learners can definitely do), they’ll need one piece of paper for each variable, and they should add a heading to each.   ***Transition:*** *Next we’re going to create our plan for our investigation using a storyboard.* |
|  | 1. **Example Investigation Plan (15 min)** 2. Display this slide and invite participants to take a moment to observe this storyboard. 3. Ask what they think the testable question is that this group is answering (Example: **What’s the effect of** the temperature (or whatever variable) of the water on **how quickly the salt dissolves?**). Ask how they know. 4. Note that besides the temperature of the water, all the other variables in their plan are consistent between each of the tests. 5. Let groups know that for their investigations, they should have at least three different tests. For example, they would need another row here to show a third temperature of water to test. 6. Note that their storyboard may have more variables than this example. Note this isn’t meant to be an exemplar, but to offer a starting point to get them thinking. 7. Once groups have completed their investigation plan, let them know they can get materials and start their investigations. 8. As groups are working, pop into groups and ask what they’re noticing of how they’re keeping other variables consistent between the trials. 9. As groups are working, advance to the next slide to support groups with capturing their results. |
|  | 1. **Communicating Our Results (10 min)**    1. As groups finish up (5 minutes should be enough time), circulate among groups. Ask groups what their results were and what was their evidence. If they are scientifically sound, ask them to write their results as a complete sentence at the bottom of their plan and have each group clean up as other groups finish. If any conclusions don’t sound consistent with science ideas, ask about their evidence and any relevant probe questions.    2. Then, if needed, let the group know the results they found are surprising and that you’ve found a different result in previous trials. Ask if they’d like to rerun the investigation or ask another group to validate their results.    3. Invite each group to share out their claims & evidence.    4. Anticipated responses: The salt dissolved faster in warmer water than in cooler water. Smaller salt particles dissolved faster than larger salt particles. Salt dissolved faster when the water was stirred faster/more than when it was stirred slower/less. Container size doesn’t affect the rate that salt dissolves.    5. To summarize results, do an Idea Tracker on chart paper for the question: What factors affect how soluble solids dissolve into water? |
|  |  |  | 1. **Lesson 5 Focus Question (5 min)**    1. Invite participants to capture their individual thoughts in their journals about the FQ.    2. We won’t share these now but they’ll be using their individual thinking in a small group soon. |
|  | 1. **What evidence would support each claim? (10 min)**    1. Ahead of time, create a chart to match this slide.    2. Use the chart (on the slide and created earlier) to help participants consider each of the competing claims we have left. This will help us figure out which pollutants may be in the unhealthy pond water.    3. Consider each claim. Ask the group, “based on our work with properties of each pollutant, what would you expect to see/measure if the unhealthy pond water has fertilizer in it?”    4. Possible responses 2. Color of water will be blue (may vary depending on fertilizer in the kit). 3. There will be stuff at the bottom. 4. The pH will be 3 or 4.    1. As participants respond, hand them a sticky note to capture ideas consistent with the properties we identified.    2. Go through each of the claims/counter claims and gather anticipated evidence. |
|  | 1. **Planning Our Investigation (20 min)**    1. Let participants know each group can use a bottle of the healthy and unhealthy water samples to investigate.   ***NOTE TO FACILITATOR:*** *Developing, reviewing, and revising plans should take about 8 minutes total. Prompt groups to work quickly so they have enough time for their investigation. These plans can be simple and still be effective!*   * 1. Teams will create a storyboard for their investigation. Let them know that it can be as simple as it needs to be to tell what’s in the water. For example, they might just observe, test conductivity, pH, and turbidity to see which properties the healthy and unhealthy pond water have.   2. If groups are making an overly complicated plan, you may ask E, P, C questions to get a sense for why they are thinking what they are and whether there’s a simpler way.   3. Set out plans in a gallery walk so other teams can review. Ask for ideas about what types of feedback could help groups strengthen their plan? Note that you may look to CSW for ideas about types of feedback.   4. Some possible responses could be: This part needs more information. I can’t tell what is happening in this step.   5. Give teams a few minutes to update their investigation plans if needed.   6. Have groups begin their investigations as they’re ready. Let groups know as they begin that they are thinking specifically about which claims the evidence they find supports. Wait to clean up supplies until the group has reached consensus around the evidence.   7. Once groups have finished their investigations, share out evidence they collected. If there are contradicting pieces of evidence, feel free to retest altogether and interpret those results collectively. As people share out evidence, ask the whole group which claims each piece of evidence supports. Write that evidence on the chart next to the claims each support. If participants try to interpret the evidence at this point, have them hold off on that step in the process for now. This part can take awhile, but move teachers quickly through this. One facilitator can capture notes while another leads the discussion.   8. Once evidence has been captured on the chart, look at each pair of claim/counter claim separately. **Ask for each which one the evidence better supports.**   9. Ask for a summarizing statement from 1-2 people that captures what our evidence suggests is in the unhealthy pond water. |
|  | 1. **Write an Argument: What pollution is in the pond water? (10 min)**    1. Invite participants to consider the evidence and to select a claim and support that claim with evidence.    2. Provide the instructions listed on the slide.    3. Give participants a moment to write their statements inside their journals. |
|  | 1. **Link to Next Lesson (0 min)**    1. Invite participants to read the prompt on the slide. Tell participants we will investigate if pollutants can be removed from water in the next lesson.    2. If there’s time, you may want to give teachers a 5-minute break here. |
|  | 1. **Teacher Follow-Up: Placemat Reflection (35 min)**    1. Pass out Lesson 2-5 placemats. Invite participants to work in pairs to identify strategies and record notes for lessons 2-5 (20 min): 2. Use the artifacts around the room to point out which charts correspond to each lesson 2-5 and label each with a sticky note. 3. As a reminder, we know we could fill up the STeLLA strategy column with a bunch of strategies. Instead, we want to consider which strategies are really at the heart of each lesson. 4. Ask about lesson 2 (identifying the observable properties of each pollutant) like the group just experienced, which 2 or 3 strategies are at the heart of our work for lesson 2? 5. Note that now that we’re oriented, they’ll work with a partner to fill out the placemat fully for one lesson. Groups will take 10 minutes to fill in as much as they can then each group will share out so others can capture their notes. 6. Possible responses: 7. Lessons 2 & 3 – Strategy 5: Engage students in analyzing and interpreting data and observations; Strategy 6: Engage students in using content representations and models. 8. Lesson 4 – Strategy 4: Engage students in communicating in scientific ways (SEP: Planning and carrying out investigations) 9. Lesson 5 -- Strategy 5: Engage students in analyzing and interpreting data and observations; Strategy 6: Engage students in using content representations and models; Strategy 7: Engage students in constructing explanations and arguments.    1. Notes might include the poster in Lesson 2 setting the groundwork for Lesson 4; Inviting students into conducting investigations when they have a question about the data; Letting the students wrestle with uncertainty in the data and challenging them to come up with a plan for how to figure it out rather than telling them the “right” answers; The setup controlling for concentration.    2. Invite pairs to share out. They should each quickly review their responses then the group can spend around 5 minutes on each lesson, so each person can capture notes that will be helpful to their instruction.   **Transition:** *As we plan to enact these strategies in our classrooms, it is important to envision what they might look like during instruction.* |
| 4:20 - 4:30  10 min  Slides 49-52 | **Closing: Reflection & Homework**  **Purpose:** Reflect on the day’s experiences and learning and prepare for Day 2.  **Content:**  Focus Questions:   * Reflecting on the STeLLA Lenses and Strategies, how do we think our understanding and use of the strategies has changed or developed? * How can students be empowered to reveal their thinking and to listen to and interact with each other during classroom conversations? * How can we use our understanding of matter to figure out what was mixed with pond water that could have changed the water?   **What participants do:** Participants reflect on their learning experiences through the day. |  | 1. **Focus Questions (0 min)**    1. Remind participants of our focus questions for today. Invite participants to consider how, in the spirit of STL 5 & 7, their ideas about these questions have grown and changed throughout the day. |
|  | 1. **Homework (5 min)**    1. Encourage participants to skim the Teacher Content Background document as it will help as we engage as learners tomorrow in the final lesson of the unit. |
|  | 1. **Gots n Needs (5 min)**    1. On people’s way out the door, ask them to capture at least one got and one need from our time together. |
|  | 1. **BSCS (0 min)** 2. Thank participants for a great day! |