Description of the Session 2: Launching work on mathematical explanations and video workshop

Session 2 extends the work from Session 1 that focused on studying mathematics teaching and introduced a mathematics problem, the Pool Border Problem. First, participants will explain and evaluate different approaches and solutions for the problem. Then, they will use a video of fifth-grade students working on the same problem to examine students' reasoning and to notice the work that teachers do to nurture an environment that supports students' reasoning. The discussion around this classroom video will simulate the video workshop process used in later sessions. Finally, participants will be introduced to the idea of video workshop, and all steps in the video workshop process will be identified.

Activities and goals of the session

Activities*	Times	Corresponding parts of the session	Goals
I. Preview	5 minutes	Part 1	• Participants will be oriented to the work of the session.
II. Continued work on the Pool Border Problem	35 minutes	Parts 2 & 3	• Participants will make conjectures and provide justifications. • Participants will recognize and understand that that there are multiple approaches to solving the Pool Border Problem and there are several equivalent equations/expressions to determine the number of tiles in any border. • Participants will develop an understanding of the role that shared knowledge plays for a community in their work on reasoning. • Participants will begin to identify mathematical practices that are a part of their work, but will not yet tie those practices to the CCSS.
III. Simulating a video workshop	30 minutes	Part 4	• Participants will begin to notice how students reason about a problem. • Participants will begin to notice what a teacher can do to establish and maintain an environment that nurtures mathematical practice. • Participants will begin to use video evidence to notice and discuss how students support and explain their approaches using words, drawings and/or tools. • Participants will engage in an early experience with a video workshop.
IV. Identifying steps of the video workshop process	10 minutes	Part 5	• Participants will understand the purposes of video workshops and the processes and expectations for participating in them.
V. Wrap up	10 minutes	Part 6	• Participants will understand ways of connecting the session content to their classroom.

*A conversation about a CCA from the last session is integrated into the session.

Classroom Connection Activities

Required	Optional
Type of task: Practice and extension of in-class work Description: In your classroom, spend 15-20 minutes working on the version of the Pool Border Problem that corresponds to your grade level with your students. Video record the entire activity. Type of task: Video workshop preparation Description: Watch the classroom video that you recorded. Using the focus questions provided, write a reflection on the student thinking and teaching moves you saw in the video.	Type of task: Reading Description: Sherin (2000) on the purposes and benefits of studying videos of teaching with colleagues. Type of task: Mathematics Reading Description: The Pool Border Problem Math Notes on novel approaches to the problem and connections between the problem and the mathematical practices.

Preparing for the session

☐ Make copies as needed:

- *Resources:* Handout: Approach 1 – Perimeter + 4 (notebook page) (Part 2); Handout: Approach 2 – Square root of area x 4 + 4 (notebook page) (Part 2); Handout: Approach 3 – A' – A" (notebook page) (Part 2); Transcript: Classroom video – Pool Border Problem (Part 4); Handout: The video workshop process (Part 5)
- *Supplements:* Math notes: Analysis of the Pool Border Problem (Part 2)

☐ Customize and make copies of the Classroom Connection Activities

☐ Test technical setups: Internet connection, speakers, projector

Developing a culture for professional work on mathematics teaching (ongoing work of the facilitator throughout the module)

1. Encourage participation: talking in whole-group discussions; rehearsing teaching practices; coming up to the board as appropriate.
2. Develop habits of speaking and listening: speaking so that others can hear; responding to others' ideas, statements, questions, and teaching practices.
3. Develop norms for talking about teaching practice: close and detailed talk about the practice of teaching; supporting claims with specific examples and evidence; curiosity and interest in other people's thinking; serious engagement with problems of mathematics learning and teaching.
4. Develop norms for mathematical work:
   a) Reasoning: explaining in detail; probing reasons, ideas, and justifications; expectation that justification is part of the work; attending to others' ideas with interest and respect.
   b) Representing: building correspondences and making sense of representations, as well as the ways others construct and explain them.
   c) Carefully using mathematical language.

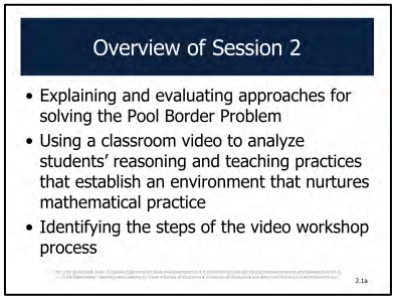
5. Help participants make connections among module content and develop the sense that this module will be useful in helping them improve their mathematics teaching, their knowledge of mathematics, their understanding of student thinking, and their ability to learn from their own teaching.
6. Help participants understand connections between module content and the Common Core State Standards.

Scope of the module *(focal content of this session in* ***bold****)*

Mathematics	Student thinking	Teaching practice	Learning from practice
• **making and justifying/refuting conjectures and generalizations** • **recognizing and using multiple approaches to solve mathematics problems** • understanding features of a "good" mathematical explanation and producing "good" explanations • **identifying foundations of mathematical reasoning** • using and knowing the mathematical practices identified in the CCSS	• **monitoring students' mathematical reasoning** • noticing collective elements of mathematical reasoning	• supporting students' engagement in mathematical practices by teaching them explicitly • supporting students in explaining their mathematical reasoning • **establishing and maintaining an environment that emphasizes reasoning** • adapting tasks to nurture mathematical reasoning	• **using norms that support engagement in video workshop** • **understanding the video workshop process** • learning to analyze teaching and learning in the context of video workshop

Part 1: Preview (~5 minutes)

Goals	***Instructional sequence***	***Resources***
• Participants will be oriented to the work of the session.	1. Introduce the session and watch the introductory video. 2. Introduce routine of how CCAs will be taken up in the sessions.	• Video (01:41): Session overview

Detailed description of activity	Comments & other resources
1. Introduce the session: This session launches work on mathematical explanations and video workshop, an approach to learning from one's own teaching. The session builds on the work started in Session 1 by using the Pool Border Problem in order to work on all four elements of module content. In this session, participants use the context of the Pool Border Problem to explore core elements of practice: • Mathematics content: Explaining and evaluating approaches for solving the Pool Border Problem • Student thinking & teaching practice: Using a classroom video to analyze students' reasoning and teaching practices that establish an environment that nurtures mathematical practice • Learning from practice: Identifying the steps of the video workshop process Have participants watch the *video* in which Dr. Ball frames the work of the session. 	
2. Introduce the routine of discussing one of the CCAs during the session: • Explain that, in each session, participants will discuss or use ideas or examples from the Classroom Connection Activities completed since the previous session. • Emphasize that it is important for participants to bring ideas and materials related to the CCAs to the sessions because these ideas and materials are what make this portion of the session so valuable. • Explain that, at the end of this session, participants will discuss the "Experiences with Patterning" article they read as part of the CCA. Furthermore, participants will be discussing their work on the Pool Border Problem during the session. The module includes Classroom Connection Activities because learning about teaching is an extended process that needs to be connected with and supported by learning in and from one's own teaching. These activities provide significant opportunities to learn. Routine tasks in the activities encourage participants to: • use their teaching as a context for learning • connect professional development content with common classroom resources • support feedback on learning and teaching • extend thinking about mathematics and teaching practices that arose in the session.	*Discussing CCA work from previous sessions establishes its importance in the module.* *Note that most of the time you will be taking up items from the CCAs that are more practice-based, so it is unusual to be discussing a reading. However, we have chosen to focus on a reading in this case because it helps to unpack the kind of mathematics that is foundational to the module.*

Part 2: Discussing Pool Border Problem explanations (~20 minutes)

Goals

- Participants will make conjectures and provide justifications.
- Participants will recognize and understand that that there are multiple approaches to solving the Pool Border Problem and there are several equivalent equations/expressions to determine the number of tiles in any border.

Instructional sequence

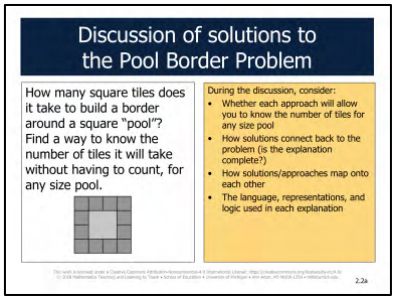
1. Introduce Part 2 and have participants share solutions to the Pool Border Problem.
2. Watch and discuss a subset of Videos A-C.

Resources

- Video A (01:16): Approach 1 – Perimeter + 4
- Video B (01:59): Approach 2 – Square root of area x 4 + 4
- Video C (03:26): Approach 3 – A' – A"
- Handout: Approach 1 – Perimeter + 4 (notebook page)
- Handout: Approach 2 – Square root of area x 4 + 4 (notebook page)
- Handout: Approach 3 – A' – A" (notebook page)

Supplements

- Math notes: Analysis of the Pool Border Problem

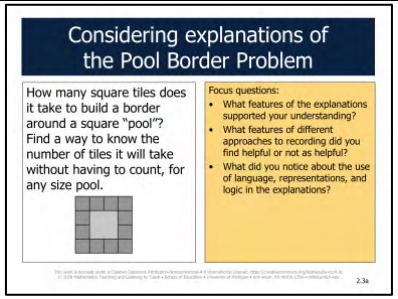
Detailed description of activity	Comments & other resources
1. Introduce Part 2: This part continues work on the Pool Border Problem from the first session with a focus on explaining and evaluating methods and solutions to the problem. Have multiple participants share their responses to the CCA question "Represent an approach for solving the Pool Border Problem. Write an explanation of how that approach would work for any size pool."  Ask participants to be considering the following questions throughout the discussion: • Whether each approach will allow you to know the number of tiles for <u>any</u> size pool • How solutions connect back onto the problem (is the explanation complete?) • How solutions/approaches map onto each other • The language, representations, and logic used in each explanation	*Make note of how this is an example of the way participants will routinely draw on the work that they do in the Classroom Connection Activities as the basis for work in subsequent sessions.* *In this module, the terms* approach/method *and* solution *refer to the following:* • *Approach/method – the process used to work on a problem.* • *Solution – a statement of the outcome, such as an answer, of work on the problem.* *The focus questions are designed to surface aspects of mathematical practices, including both the mathematical practices articulated in the Common Core State Standards and the ways of doing mathematics that are named in the process standards of the National Council of Teachers of Mathematics Principles and Standards document (2000). Mathematical practices in the Common Core will be formally introduced in Session 3.* *Encourage participants to listen carefully to the approaches being shared by colleagues.* *You might draw out the idea that one approach to solving this problem is to generate a series of progressively larger problems (i.e., borders around pools that increase in size) in order to find a pattern that leads to a generalization.*

Detailed description of activity	Comments & other resources
Invite a participant to share their method and solution to the problem and explain why it works. If available, use a document camera to facilitate the sharing. Invite participants to share their responses to the focus questions after each method and solution is shared. Repeat with a second method.	
2. Have participants watch a subset of *Videos A-C*. Videos should be selected to showcase a method not already shared and/or a different way of explaining a particular method. Invite participants to respond to the focus questions after each video. Consider distributing the *Math notes* document so that participants can read more about the task.	*You may want to remind participants why they are watching these videos of other teacher learners, namely that they enrich consideration of the main ideas and also give participants a chance to make sense of mathematical ideas in new ways (which is part of the work that teachers do every day).* *For Videos A – C, provide copies of the notebook pages of the teachers in the videos so that participants can follow along more easily with the videos.* *Video A: Approach 1 – Perimeter + 4* *In this video, a teacher uses examples to show how she counts the squares in one side, multiplies by 4 (for the 4 sides) and adds 4 for the 4 corners. When discussing this video, you may want to note that:* • *While the word "perimeter", which is used in the explanation, implies the use of a linear measurement, the perimeter in this case actually indicates the number of square tiles (units of area) that are placed along the sides of the pool.* • *The 4 that is added to the perimeter is a measure of area; it represents four square tiles.* • *The expression P + 4 is a measure of area because it represents the total number of square tiles in the pool border.* *Video B: Approach 2 – Square root of area x 4 + 4* *In this video, a teacher shows how she made a table to record pool sizes and pool border sizes. She noticed that the square root of the area of the pool times 4 plus 4 always produced an answer that was the same as the number of tiles in the pool border, but she did not know how to explain why that worked. When discussing this video, participants may note that:* • *The approach does work for any size pool* • *The square root of the area of the pool equals the side length, which, when multiplied by 4, equals the perimeter of the pool. Thus, this expression is equivalent to the expression (P + 4) used in Video A.*

Detailed description of activity	Comments & other resources
	Video C: Approach 3 – A″ – A′ *In this video, a teacher explains that she tried to find the pool border by subtracting the area of the smaller square (i.e., the pool) from the area of the larger square (i.e., the pool and the border). If participants do not understand how this method works for finding the number of tiles in the border of any size pool "without having to count", help them understand how to find the areas of the "smaller" and "larger" squares.*

Part 3: Reflecting on what makes an explanation convincing (~15 minutes)

Goals	***Instructional sequence***	***Resources***
• Participants will develop an understanding of the role that shared knowledge plays for a community in their work on reasoning (illustrated through agreed upon language, shared understanding of representations, and logic). • Participants will begin to identify mathematical practices that are a part of their work, but will not yet tie those practices to the CCSS.	1. Introduce Part 3 and debrief the discussion with a partner. 2. Watch Videos A-C and discuss the focus question for each video.	• Video A (00:54): Teacher insight – Value of different approaches • Video B (02:00): Teacher insight – Geometric and numerical explanations • Video C (00:47): Teacher insight – A kindergarten perspective

Detailed description of activity	Comments & other resources
1. Introduce Part 3: This part continues work on the mathematics element of the module, which focuses on reasoning and explanation. Have participants briefly debrief the discussion with a partner using the following three focus questions: • What features of the explanations supported your understanding? • What features of different approaches to recording did you find helpful or not as helpful? • What did you notice about the use of language, representations, and logic in the explanations? 	*The focus questions are designed to surface aspects of mathematical practices—both the mathematical practices articulated in the Common Core State Standards and the ways of doing mathematics named in the process standards of the National Council of Teachers of Mathematics Principles and Standards document (2000). Mathematical practices in the Common Core will be formally introduced in Session 3.*
2. Have participants watch *Videos A-C* in which teachers in the professional development course respond to the focus questions. As participants watch each clip, have them consider the focus question for the clip, as well as whether the comments in the clip provide any new insights or questions. • *Video A*: What are your ideas about the value of—and potential difficulties associated with—sharing novel approaches? • *Video B:* What does it mean for an approach to be focused on "the geometry" of the problem? What does the (geometric) approach help to reveal, and what is harder to see with each approach? • *Video C:* How can "algebraic" formulas be used to generalize geometric and arithmetic approaches? What are the advantages and disadvantages of generating formulas? After watching the three clips, have participants discuss any additional insights or questions.	*Through considering different approaches, participants will have opportunities to consider how different approaches about the solution need to equivalent results (i.e., equivalent expressions for determining the number of tiles needed to cover the border of any sized square pool).* *Video A: Teacher insight – Value of different approaches* *Participants may say that hearing different approaches can be helpful because people naturally approach problems differently. While it can be enlightening to see math problems from different peoples' perspectives, it can also be challenging to understand the approaches that other people use. Providing people with time to explain their approaches and answer clarifying questions about them is important*

Detailed description of activity	Comments & other resources
	when multiple approaches are being shared in a group. *Video B: Teacher insight – Geometric and numerical explanations* *Participants may say that a geometric approach to the Pool Border Problem involves making diagrams to symbolize the pool and the pool border. The geometric approach may help reveal general expressions for the area of the pool and border $(s + 2)^2$ and the area of the pool (s^2), but it may be hard to see how these expressions relate to finding the <u>number</u> of tiles in the pool border (if one is not thinking of the tiles as square units).* *Video C: Teacher insight – A kindergarten perspective* *Participants may say that algebraic formulas are helpful because they can provide concise ways to represent geometric and arithmetic approaches. They can also help show how different approaches relate to one another. However, sometimes it can be challenging to see how an algebraic expression that has been generated relates to the original problem.*

Part 4: Simulating a video workshop (~30 minutes)

Goals

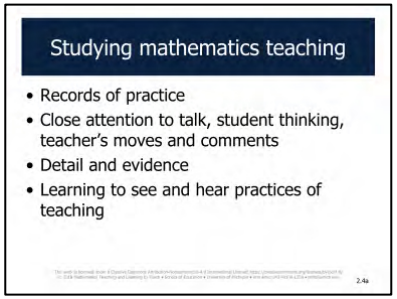
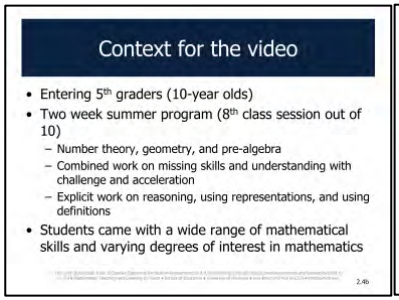
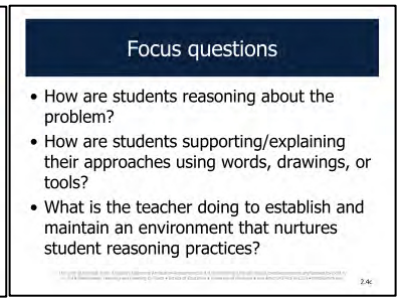
- Participants will begin to notice how students reason about a problem.
- Participants will begin to notice what a teacher can do to establish and maintain an environment that nurtures mathematical practice.
- Participants will begin to use video evidence to notice and discuss how students support and explain their approaches using words, drawings and/or tools.
- Participants will engage in an early experience with a video workshop.

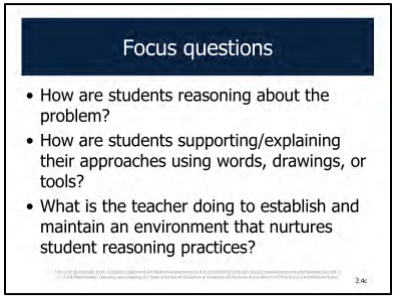
Instructional sequence

1. Introduce Part 4 and watch Videos A-C.
2. Discuss open-ended question.
3. Discuss focus questions about classroom video.
4. Discuss focus questions about the discussion.

Resources

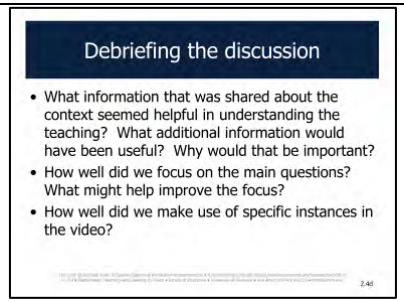
- Video A (01:51): Using classroom video – purposes and norms
- Video B (02:47): Setting the context for the video
- Video C (05:20): Classroom video – Pool Border Problem
- Transcript: Classroom video – Pool Border Problem

Detailed description of activity	Comments & other resources
1. Introduce Part 4: In this part, work continues using the Pool Border Problem with a focus on studying both student thinking and mathematics teaching. Watch *Video A* in which Dr. Ball introduces the purpose of watching a classroom video in this part.  Watch *Video B,* which provides context for the classroom video.   Introduce the focus questions: 1) How are students reasoning about the problem? 2) How are students supporting/explaining their approaches using	*This segment is designed to provide participants with a video workshop-like experience before being formally introduced.* *Video B models providing context for a video. Participants will need to learn to do this work when sharing a video segment in their video workshop group. Providing context should include: sharing the grade, task, lesson goal, what class has been working on, and what has happened immediately before the start of the selected segment.* *Watching a video of teaching in a professional development context may be a new experience for some participants. Some participants may think that the teaching in the video is intended as an example of "good teaching" to be emulated. Try to make clear that the videos of teaching in the module are not intended to model "good teaching," rather the videos are being used to study the practice of teaching mathematics.* *You may need to help participants navigate between noting ideas in the transcript and attending to the video. The video includes more information than the transcript, so it is important to watch the action. However, making some notations in the transcript will help participants in the next part when they are asked to refer to specific examples in the video to support their ideas.* *This video, like others in the module, is text tracked. To see the text tracking, move your cursor off of the video so that the tool bar disappears.*

Detailed description of activity	Comments & other resources
words, drawings, or tools? 3) What is the teacher doing to establish and maintain an environment that nurtures student reasoning practices? Distribute transcripts and then view *Video C: Classroom video – Pool Border Problem.* Tell participants to think about the focus questions as they watch the video and suggest using the transcript to keep track of things that stand out to them in the video.	
2. Pose an open-ended question: What did you notice or wonder about the teaching and learning in the video? Have each participant share with a partner. Then, elicit a few questions in whole group.	*The open-ended question provides participants with an opportunity to briefly share their initial impressions of the video so that they can then focus the discussion on the focus questions. Don't spend much time discussing the open-ended question; the bulk of the discussion time should be devoted to the focus questions. Focusing a discussion of a classroom video on particular questions can enable it to be a more productive learning experience than a discussion that is completely open-ended.*
3. Have participants discuss the focus questions in small groups. Then, discuss the focus questions in whole group. Encourage close attention to the record of practice (e.g., the classroom video and transcript), student thinking, teacher's moves and comments.  	*Often, participants will immediately want to discuss the teaching practices they noticed in a classroom video. For this discussion, consider trying to focus mainly on the student reasoning in the video instead.* ***How are students reasoning about the problem?*** • *Sarah's method: add one to the side length and then multiply by four (lines 56-62, 84-85).* ***How are students supporting/explaining their approaches using words, drawings, or tools?*** • *Tools—pre-prepared, grids of different sizes (e.g., 2x2, 4x4) to represent pools, and magnetic tiles to represent pool border tiles.* • *First, Sarah explains her method by referring to a 2x2 grid that is surrounded by border tiles on all sides (lines 23-34).* • *Then, Sarah uses a 4x4 grid to explain why she adds 1 to the side length. In her demonstration, she adds border tiles to only one side of this "pool" (lines 63-64, 81-83).* • *Sarah adds six tiles to one side of the 4x4 grid to show that "you can't do six all the way around" (lines 78-79).* ***What is the teacher doing to establish and maintain an environment that nurtures student reasoning practices?*** • *The teacher explains why she is asking Sarah to present her method to the class—to model what it means to have a method (lines 7-11).*

Detailed description of activity	Comments & other resources

	• *The teacher emphasizes that there are multiple methods for solving the problem and explains that the class will discuss and compare different methods (lines 11-14).*
	• *The teacher stops periodically to check for class understanding of Sarah's explanation; she asks students to ask questions (lines 21-22, 36-43, 86-91).*
	• *The teacher asks Sarah to explain key aspects of her method:*
	  ○ *"So explain to them why for the four by four you would count fives" (lines 60-61).*
	  ○ *"Okay, and why do you multiply that by four?" (line 84).*
	• *The teacher summarizes Sarah's method for the class – "if you know the side length, you would add one to the side length. And then you would multiply by four to go all the way around." (lines 86-89).*
	• *The teacher asks other students to check Sarah's method using bigger squares (lines 101-103).*

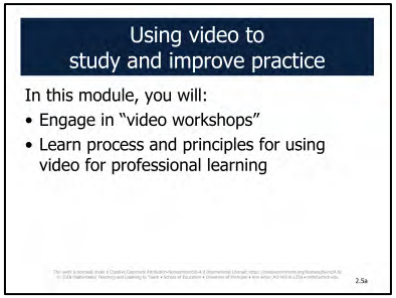
4. Debrief the discussion using the following three focus questions: • What information that was shared about the context seemed helpful in understanding the teaching? What additional information would have been useful? Why would that be important? • How well did we focus on the main questions? What might help improve the focus? • How well did we make use of specific instances in the video? 	*Debriefing the discussion is useful because it makes explicit some of the processes of learning with colleagues in "video workshops" that will be used throughout the module. You might consider mentioning to participants why debriefing the discussion is being done.* *Participants might notice that it was helpful to understand how the video segment fit in with the larger lesson, and it was helpful to understand the learning goals that were underlying the discussion observed in this video. They might also note that it would have been helpful to know what materials the students in the class had available to them at their tables as they worked on the problem.*

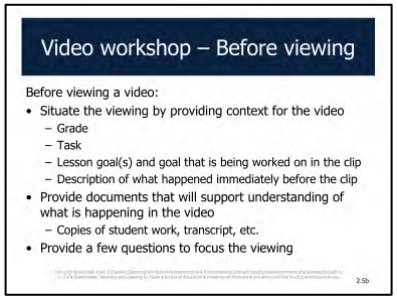
Part 5: Identifying steps of the video workshop process (~10 minutes)

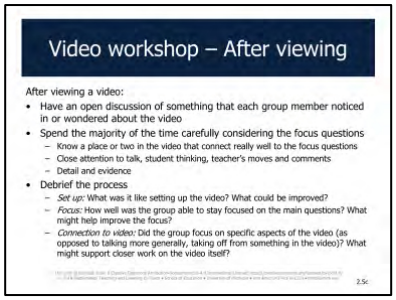
Goals	***Instructional sequence***	***Resources***
• Participants will understand the purposes of video workshops and the processes and expectations for participating in them.	1. Introduce Part 5 and watch the video.	• Video (02:59): Introducing video workshop • Handout: The video workshop process

Detailed description of activity	Comments & other resources

1. Introduce Part 5: Video of one's own teaching and the teaching of colleagues can be used to study and improve teaching. Watch the *Video* in which Dr. Ball introduces video workshops as a means for studying and improving teaching and describes the process of participating in a video workshop.





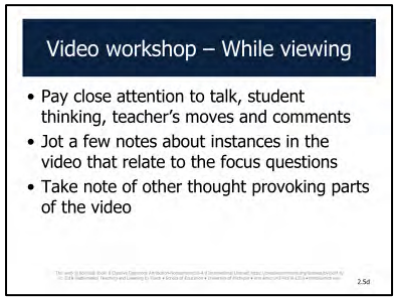


Distribute *Handout: The video workshop process* as a resource for participants. Discuss the handout with participants, reviewing each step in the video workshop process.

Help participants to see that they engaged in a video workshop-like experience with the classroom video in the previous part.

There are 5 video workshop experiences in this module. The first experience is a simulation of a video workshop and is led by a facilitator. The second through fifth instances engage participants in small group video workshops in which participants share video and student work samples from classroom teaching focused on common mathematics problems. Throughout the module, activities support participants in understanding the process of video workshop, analyzing teaching and learning, and building productive norms for engagement in video workshop. All participants are expected to share video and to participate in discussions of others' records. By the end of the module, participants will have the tools to continue to engage in this method of learning from practice in the future.

If you would like to provide participants with more information about what they can focus on while they are viewing a video during video workshop, show and discuss the slide included in the supplements section.



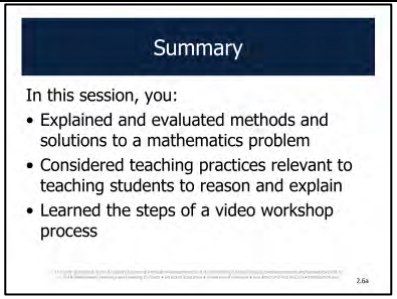
While viewing a video, participants should:

- *Pay close attention to talk, student thinking, and the teacher's moves and comments.*
- *Jot a few notes about instances in the video that relate to the focus questions.*
- *Take note of other thought-provoking parts of the video.*

Detailed description of activity	Comments & other resources
Briefly foreshadow the activities participants will do in the fourth session with video workshop. Reassure participants that, in their video workshops: • They will be in small groups. • One person will share a 3-5 minute video clip and a few student work samples that go with the video. • The small group will discuss the teaching and learning associated with the problem, more specifically, thinking together about how students are reasoning and the teacher is supporting reasoning (and what could be done to enhance that). Other points • The person who shares video will rotate among the members of the small group. The small group will stay together for the rest of the professional development sessions. • Remind participants that, as a routine, videos of their teaching will not be shared with the whole group. Explain that, if you would like to share a participant's video with the whole group for some reason, you would first have a private conversation with the participant to see if he or she would be willing to do that.	*Video workshop groups should consist of 3 members, if possible, because there are three opportunities in which an individual will share his/her teaching in a workshop session. The final video workshop in Session 10 is designed to allow all participants to share. You will need to make decisions about the composition of the groups. For instance, the groups could be grade-level or site focused.* *Another important element of using video workshop in the professional development is developing a system for taking turns sharing video in the groups. It is important to determine who will share in each video workshop in advance. For the workshop in Session 4, you might encourage potential volunteers to talk to you at the end of this session or to send a quick email if they are willing to share first.* *You might consider signaling to participants that they will be able to select the short segment of video that they will share.* *Participants who teach in primary grades may want to take photographs of their students' work or capture it on video because students may be using manipulatives to work on the problem resulting in not having written artifacts to examine later.* *Regardless of whether a participant will share at a particular workshop, all participants are expected to engage in the classroom teaching activity and accompanying analysis.*

Part 6: Wrap up (~10 minutes)

Goals	***Instructional sequence***	***Resources***
• Participants will understand ways of connecting the session content to their classroom.	1. Summarize the work of the session. 2. Discuss the Ferrini-Mundy article. 3. Explain and distribute the Classroom Connection Activities.	

Detailed description of activity	Comments & other resources
1. Summarize the session by emphasizing that participants: • Continued work on the Pool Border Problem with a focus on evaluating different explanations • Discussed features of explanations that support understanding • Analyzed a classroom video with a focus on noticing students' reasoning and the work that a teacher does to establish and maintain an environment that supports and nurtures student reasoning practices • Learned the steps of a video workshop 	

2. Discuss the Ferrini-Mundy et al. article from the Session 1 CCA that describes how the Pool Border Problem can be used in different grade levels. Ask participants for a few thoughts on how the article made them think about the relevance of the problem for their own grade level. As a part of the CCA for this session, participants will try variations on the Pool Border Problem in their classrooms.
 	
Ask participants questions such as:
• Which variations on the Pool Border Problem did you find interesting?
  ○ What caught your attention about that version?
  ○ How did the mathematics of that version compare with the mathematics of the version we worked on together in our last session?
• How did the authors adjust the problem so that it would be appropriate for students at different grade levels? How did the following shift across the problems:
  ○ the ways students were expected to work on the problem
  ○ what the students were expected to produce
  ○ the numbers or examples that were used
  ○ the representations that were used.
	It might be helpful to explain that the reason participants are going to work on "scaled" versions of the same problem in different classrooms is to enhance what they are able to learn together from this work in classrooms.

3. Distribute the handout you customized with selected Classroom Connection Activities and accompanying documents described below. Required: • Spend 15-20 minutes working on a version of the Pool Border Problem with your students. Video record the entire activity. Collect written samples if available. • Watch the classroom video that you recorded. Using the focus questions provided, write a reflection on the student thinking and teaching moves that you saw in the video. Optional: • Read the "Pool Border Problem" Math Notes document. Consider: a) example approaches that you had not yet considered or seen; b) the connection between specific examples and a generalized expression; c) which mathematical practice seems most strongly connected to this problem. Try describing why this connection is stronger than others. • Read Sherin's article "Viewing Teaching on Videotape" to support your thinking about the benefits of studying videos of teaching with colleagues.	*Note that the Ferrini-Mundy et al. article that was just discussed connects with the modified versions of the Pool Border Problem in this CCA.* *The video recording and student work samples that teachers collect will be used for their own reflection. As you approach Session 4, help participants begin to think about which short examples from those materials they would like to share with colleagues in their small video workshop groups.* *Emphasize that having the participants begin recording their videos now gives some time to work on issues related to video recording and sharing video before the participants need to share their work.* *It may be helpful to ask participants to try out the method you have selected for sharing videos and work samples with the videos they record for this week's CCA. You might ask them to upload their responses or materials to a learning management system or bring their materials to you. By encouraging participants to share materials related to this session's Classroom Connection Activities, you can:* • *review what participants have been thinking and trying so that you can prepare to facilitate the video workshop in Session 4* • *continue to develop norms reinforcing the importance of engaging in CCAs* • *begin developing norms that will allow participants to easily share their teaching and ideas with each other.*

List of Common Core State Standards Mathematical Practices

1) Make sense of problems and persevere in solving them.
2) Reason abstractly and quantitatively.
3) Construct viable arguments and critique the reasoning of others.
4) Model with mathematics.
5) Use appropriate tools strategically.
6) Attend to precision.
7) Look for and make use of structure.
8) Look for and express regularity in repeated reasoning.