

Module 2: Advanced Module on the Science Seminar

This advanced module on scientific argumentation focusing on the science seminar can be executed as four sessions that are each 45-minutes, or fewer sessions that are longer (e.g. one 3-hour session). If held as four sessions, the agenda includes a “Try it with your students!” section to encourage teachers to implement some argumentation aspect before the next session. The following session then begins with time for teachers to share their experiences, as well as artifacts of their students’ argumentation (e.g. writing, video). These sections are optional.

The agenda below contains descriptions about the various activities that make up the module, as well as estimated lengths of time for each activity.

The goals for this advanced module on the science seminar include:

- Teachers will learn another activity, the science seminar, which engages students in argumentation.
- Within the context of a science seminar, teachers will apply the four elements of argumentation that students need extra support with: 1) Evidence; 2) Reasoning; 3) Student Interaction; and 4) Competing Claims).
- Teachers will learn how to prepare students to apply their content knowledge during the science seminar.
- Teachers will learn how to establish expectations for student interaction during the science seminar.
- Teachers will learn 9 strategies for implementing science seminars in their classroom, including:
 1. Allow for awkward silence.
 2. Let students lead the discussion.
 3. Chime in at the right moment.
 4. Make a safe space.
 5. Communicate norms.
 6. Set up chairs in concentric "u-shapes."
 7. Include mixed ability levels in circles.
 8. Encourage students to project supports.
 9. Establish a hot seat.
- Teachers will learn how to evaluate student written arguments based upon the quality of the organization of the argument, the quality of connections across ideas, and accuracy.

Materials

- Argumentation Elements Handout (Session #1)
- Glowing Cats Science Seminar Transcript (Session #1)
- 3 Atacama Desert Data sheets (Note: print maps in color) (Sessions #2 & 3)
- Preparing for the Science Seminar Handout (Sessions #2 & 3)
- Peer Feedback Checklist: Scientific Argument Handout (Session #4)
- Rubric for Writing a Scientific Argument (Session #4)
- Sample Student Arguments Handout (Session #4)

Session 1: What is a science seminar?

Activity	Description	Time
<p>Video: Introduction to Module</p>	<p>Introduce teachers to the module by watching the video Activity, Science Seminar- http://www.argumentationtoolkit.org/student-interaction.html Discuss the following questions:</p> <ul style="list-style-type: none"> • How similar and different in the science seminar are teacher and student roles compared to your previous science instruction? • How might a science seminar support student learning of science content? • (If participants completed intro module) During the intro module, we covered four elements of argumentation that students may require extra support with. Which of these do you think a science seminar supports? Why? <p>Explain this first session is going to focus on how the science seminar may address these four elements and requires a shift in teacher and student roles as compared to a traditional science classroom.</p> <p><i>Materials: Argumentation Elements Handout</i></p>	<p>10 min.</p>
<p>Activity: Analyze transcript of a science seminar, elements of argumentation</p>	<ul style="list-style-type: none"> • Provide context for this science seminar from which this transcript as taken. This is the second science seminar the students have participated in. Students are debating 3 claims about the pedigree of glowing cats: <ol style="list-style-type: none"> 1: The allele for fluorescence is dominant – cats need only one copy of it in order to glow. 2: The allele for fluorescence is non-dominant– cats need two copies of it in order to glow. 3: The allele for fluorescence is incompletely dominant – cats will glow with either one or two copies, but cats will glow more brightly with two alleles for fluorescence. • Hand out the transcript to all teachers. Watch the video of the science seminar Extended Classroom Videos, Science Seminar- http://www.argumentationtoolkit.org/resources.html (~11:00-15:23) • Have teachers work in pairs or small groups to analyze the selected transcript to identify student use of the 4 elements of argumentation 	<p>20 min.</p>

	<ul style="list-style-type: none"> • Have a whole class discussion around the questions: <ol style="list-style-type: none"> 1. Were the four “challenging elements” of argumentation visible in this student discussion? How? 2. How do you envision a science seminar working in your classroom? <p><i>Materials: Transcript of Glowing Cats Science Seminar, Argumentation Elements Handout</i></p>	
Activity: Analyze transcript of a science seminar, teacher role	<ul style="list-style-type: none"> • Have teachers work in pairs or small groups to analyze the same transcript to identify the role of the teacher (strategies or cues used by the teacher). • Have a whole class discussion around the questions: <ol style="list-style-type: none"> 1. What did the teacher do/say during the science seminar? How did students respond? 2. What worked well about this strategy? 3. How can you envision yourself leading a science seminar with your students? What would you do well? What do you think would be a challenge for you? 	10 min.
Session Takeaways	<ul style="list-style-type: none"> • Reiterate the key points from this session: <ul style="list-style-type: none"> ○ A science seminar allows students to grapple with the four challenging elements of argumentation. The science seminar prompts students and teachers to take on new roles in the classroom. ○ The science seminar provides students with opportunities for argumentation and a deeper understanding of the content. 	5 min.
Extension: Try it! *If the module is held as multiple sessions	<ul style="list-style-type: none"> • Before the next session, ask teachers to do one of the following: <ul style="list-style-type: none"> ○ Reflect on current practice: If you have an opportunity, video tape a normal discussion in your classroom, bring in 5 minutes to review how interactive it is. (Note: Depending on the number of teachers participating in the next session, you may only ask teachers to discuss and not share the video due to session time constraints.) <p style="text-align: center;">OR</p> ○ Brainstorm: Is there anywhere in your curriculum/unit where you can see an opportunity to discuss potential claims in a science seminar? Bring in and share. 	Optional

Session 2: How do you prepare students for a science seminar?

Activity	Description	Time
<p>Extension Discussion: Try it!</p> <p>*If the module is held as multiple sessions</p>	<ul style="list-style-type: none"> • If you asked teachers to reflect on current practice or brainstorm, encourage teachers to share. (If time allows, and participants have brought a video clip, you can lead this as a discussion around videos OR just have a discussion.) Lead a discussion around the following questions: • If you asked teachers to reflect on current practice: <ol style="list-style-type: none"> 1. What went well with the discussion? 2. What challenges do you think your students will face? • If you asked teachers to brainstorm potential opportunities in their curriculum: <ol style="list-style-type: none"> 1. How could this unit incorporate argumentation? 2. What challenges will you face? 	<p>Optional</p>
<p>Warm up: Analyze a discussion</p>	<ul style="list-style-type: none"> • Project an excerpt from a science seminar about the Atacama Desert. Allow teachers several minutes to read the seminar independently. Then, have a whole class discussion guided by the following questions: <ol style="list-style-type: none"> 1. What role does the teacher play? 2. How are students demonstrating their knowledge of the content in this discussion? 3. How do students interact with each other in this discussion? 	<p>5 min.</p>
<p>Activity: Analyze Data for the Atacama Desert</p>	<ul style="list-style-type: none"> • Provide context for this activity. Project the 3 claims and describe the goal of this activity is to analyze data about the Atacama Desert and determine which claim is best supported. Direct teachers to work in small groups to analyze the data and complete the worksheet in preparation for the science seminar. • After working in small groups to complete the activity, have a whole class discussion addressing the following questions: <ol style="list-style-type: none"> 1. What would it be like to do this type of activity with your students? 2. How would this type of activity support student participation in the science seminar? 3. What challenges would your students have with this type of activity? 	<p>25 min.</p>

	<i>Materials: 3 Atacama Desert Data sheets (note: print maps in color), Preparing for the Science Seminar Handout. You will also use these materials in Session 3.</i>	
Video: Student Interactions in the Science Seminar	<ul style="list-style-type: none"> • Watch the video Strategy: Promoting Student Interaction in the Science Seminar- http://www.argumentationtoolkit.org/student-interaction.html • Discussion questions: <ul style="list-style-type: none"> ○ Which of these strategies do you think will be most useful to your students? ○ Which of these strategies do you think will be most challenging for you to implement? • Emphasize key points from video: <ul style="list-style-type: none"> ○ Set up norms for student interaction ○ Support students in critiquing peer thinking ○ Encourage use of sentence starters 	10 min.
Session Takeaways	<p>Reiterate key points from this session:</p> <ul style="list-style-type: none"> • In order to effectively engage in the science seminar, students need to know the content and expectations for interacting with their peers. • Prepare students for the science seminar by giving them the opportunity to analyze data. • Teachers can support student interaction in the science seminar by establishing norms for student interaction, supporting students in critiquing peer thinking, and encouraging the use of sentence starters. 	5 min.
Extension: Try it with your students! *If the module is held as multiple sessions	<p>Before the next session, ask teachers to engage students in a classroom discussion utilizing these strategies for promoting student interaction</p>	Optional

Session 3: How do you conduct a science seminar?

Activity	Description	Time
Extension Discussion: Try it with your students! *If the module is held as	<ul style="list-style-type: none"> • If you asked teachers to use the strategies covered in the last session, lead a discussion around the following question: <ol style="list-style-type: none"> 1. What went well? 2. What was challenging for students? For you? 	Optional

multiple sessions		
Video: Stepping Back During Science Seminars	<ul style="list-style-type: none"> Introduce teachers to the topic of conducting a science seminar by watching the video Strategy: Stepping Back During Science Seminars- http://www.argumentationtoolkit.org/student-interaction.html Discuss the following questions: <ol style="list-style-type: none"> What role did the teacher play in the science seminar? What strategies do you notice the teacher using to facilitate the science seminar? What concerns do you have about running a science seminar in your classroom? What do you think students will do well? What challenges do you anticipate students having? 	10 min.
Presentation: Roles and Expectations for the Science Seminar	<ul style="list-style-type: none"> Give a brief presentation on the teacher and student roles during the science seminar. Project the seating arrangement and describe that students will be seated in two concentric rows. Review interactional norms and sentence starters. Emphasize the teacher role is to step back and take notes while students lead the discussion. The teachers will have the opportunity to be the students in the science seminar held during this seminar. 	5 min.
Activity: Science Seminar	<ul style="list-style-type: none"> Review context for the science seminar established in the last session. Project the 3 claims, and review the sheet “Preparing for the Science Seminar.” Participate in the science seminar. There are two options depending on the size of the group: <ol style="list-style-type: none"> Have one large discussion if there are 10 or fewer participants. Have two shorter discussions with approximately half the group. Set up the chairs in a fishbowl pattern. <p><i>Materials: Teachers will need the 3 Atacama Desert Data Sheets and “Preparing for the Science Seminar” sheet completed in the last session.</i></p>	15 min.
Discussion: Reflect on the Science Seminar	<ul style="list-style-type: none"> Following the science seminar, lead a discussion addressing the following questions: <ol style="list-style-type: none"> As a “student,” what worked well for you? What was challenging? What types of instructional strategies can you see your students needing to interact in a science seminar? How could engaging in a science seminar help students develop a better understanding of the science content? 	10 min.
Takeaways	<p>Reiterate key points from this session:</p> <ol style="list-style-type: none"> Allow for awkward silence. 	5 min.

	<ol style="list-style-type: none"> 2. Let students lead the discussion. 3. Chime in at the right moment. 4. Make a safe space. 5. Communicate norms. 6. Set up chairs in concentric “u-shapes.” 7. Include mixed ability levels in circles. 8. Encourage students to project supports. 9. Establish a hot seat. 	
<p>Extension: Try it with your students!</p> <p>*If the module is held as multiple sessions</p>	<p>Before the next session, ask teachers to engage their students in a science seminar.</p>	Optional

Session 4: How do you support students writing a scientific argument after a science seminar?

Activity	Description	Time
<p>Extension Discussion: Try it with your students!</p> <p>*If the module is held as multiple sessions</p>	<ul style="list-style-type: none"> • If you asked teachers to run a science seminar in their classroom after the last session, engage teachers in a discussion guided by the following questions: <ol style="list-style-type: none"> 1. What went well? 2. What strategies did you implement? 3. What was challenging? 4. What additional support do you need to run the science seminar successfully in your classroom? 	Optional
<p>Video: Writing for a Hypothetical Audience</p>	<ul style="list-style-type: none"> • Introduce teachers to supporting students in writing arguments by watching the video, Strategy, Writing for a Hypothetical Audience- http://www.argumentationtoolkit.org/reasoning.html • Discuss the following questions: <ol style="list-style-type: none"> 1. In what ways could the science seminar support students in writing convincing arguments? 2. What are some strategies from the video or your own experience to support student writing of arguments? 3. What do you see as key characteristics you would like to see in your students’ written arguments? <p>* Note: If time allows, it might be useful to have teachers write their own arguments to have the “student” experience of writing before looking at any examples.</p> 	15 min.

<p>Guided Practice: Analyze a Student Argument</p>	<ul style="list-style-type: none"> Project the guidelines for writing a scientific argument. Emphasize these are the elements students should include in their written argument. Project an exemplar student argument and use the peer feedback checklist to discuss the strengths and weaknesses of this argument. <p><i>Materials: Peer Feedback Checklist: Scientific Argument Handout.</i></p>	<p>10 min.</p>
<p>Presentation: Introduction to the Argumentation Rubric</p>	<ul style="list-style-type: none"> Project the Rubric for Writing a Scientific Argument. Explain this rubric can be used to determine the strengths and weaknesses of student arguments. The rubric includes and expands upon the categories discussed in the peer feedback checklist. This can be used to provide targeted feedback to students in their writing. <p><i>Materials: Rubric for Writing a Scientific Argument Handout.</i></p>	<p>5 min.</p>
<p>Activity: Analyzing Student Arguments Using the Rubric</p>	<ul style="list-style-type: none"> Provide teachers with four sample student arguments. In pairs or small groups, ask teachers to rate the strengths and weaknesses of each argument using the rubric. <u>Note:</u> These four examples were selected because they illustrate a range of student challenges around writing arguments. Example A mainly restates the claim, example B provides evidence but does not provide reasoning, example C provides reasoning but does not provide evidence, and example D provides inaccurate science content. Discuss the following questions: <ol style="list-style-type: none"> Which argument was the strongest? Why? Which argument was the weakest? Why? How could you use this rubric in your classroom to provide feedback to your students? <p><i>Materials: Sample Student Arguments Handout</i></p>	<p>10 min.</p>
<p>Takeaways</p>	<p>Reiterate key points from this session:</p> <ol style="list-style-type: none"> Engaging students in a science seminar can support students in writing stronger arguments. Teachers can use a variety of strategies to support student writing, such as encouraging students to consider an audience and giving them opportunities for peer critique. Tools such as the argument rubric and peer feedback checklist can be used to help students write stronger arguments. 	<p>5 min.</p>