

APPLYING SESSION TO INSTRUCTION

The session is not over! A critical phase of learning is applying new knowledge and instructional strategies to authentic teaching situations. There is some application included in each session, but as with all professional learning, the rubber meets the road (or trail) when the instructors apply what they've learned to their own teaching. If you want your instructors to try out new activities and teaching approaches, they must keep thinking about and discussing these ideas with their peers. It's crucial for program leaders to create supported opportunities for these kinds of reflective discussions. Even if staff are excited by new ideas for teaching, it is easier, particularly for veteran instructors, to keep doing what they have been successfully doing already, without incorporating new practices. Below are a variety of follow-up activities and discussion ideas to dig deeper into the topic of this session. This guidance is provided to help you facilitate thoughtful implementation of research-based instructional strategies and practices with your staff.

Other BEETLES professional learning sessions help instructors develop exploration & discussion leading "chops." The BEETLES professional learning session *Making Observations* helps instructors guide students in exploration. *Questioning Strategies* helps instructors build skills for leading exploration and discussion. The *Promoting Discussion* session provides more experience with discussion-leading, including many useful routines. The session *Constructing Understanding* provides instructors with more of the pedagogical theory behind the approach.

- **Lead a whole group brainstorm with staff about what can be done to encourage incorporating making explanations from evidence into their teaching.** After completing the session reflection prompt, your staff will have written ideas for implementing these ideas into their instruction. You can build on these, and add other ideas through a group brainstorm generating concrete actions for what they plan to do, and how you can support them to incorporate these teaching approaches.
- **Reflecting on and discussing implementation of making explanations.** Assign your staff to try out making explanations from evidence with students, either by leading *NSI: Nature Scene Investigators*, or through informal discussion, during the next student program. Make sure they reflect on how it went, and write in their journals about their successes and challenges. After everyone has had a chance to lead an explanation-focused activity and reflect on it, then lead staff in a reflective discussion at the end of the student program. Here are some suggested questions/prompts for focusing your discussion:
 - How did you incorporate the scientific practice of making explanations from evidence into students' other field experiences (e.g., explorations, journals, sit spots etc.)? Did the activity inspire your students to notice nature mysteries, make explanations, and to engage with nature?
 - What was successful about the activity?
 - What might you do differently the next time you lead this type of activity and why?
 - What ideas do you have about incorporating this scientific practice in the future?
- **Instructor observations focused on strategies from the session.** If you routinely do observations of instructors, discuss how you might incorporate elements from this session into what you look for during a teaching observation.



- **Continue a discussion topic from the session.** If there was anything interesting that came up during the session, but discussion was cut short due to time constraints, consider picking up on the topic afterward. If it seems that your staff is engaged in the topic and would benefit from continuing the discussion, you can set aside some time to do so.
- **Practice Leading an *NSI* Routine with staff.** Bring in an intriguing natural object and ask a volunteer to lead your staff in an *NSI: Nature Scene Investigation*, so they can practice and receive feedback on leading the routine. You can also go to an interesting find on your site, such as a carcass or a wood rat nest, and have a volunteer practice outdoors. Be sure to have some participants observe and provide feedback to the volunteer, focusing on “moves” made by the instructor and how they affected the “learners” in the investigation.
- **Lead a discussion on guiding student explanations.** Once instructors have started incorporating more student explanations into their teaching, many will find that it can be a challenge to redirect students who come up with far-fetched explanations. Have your staff share any stories of this challenge occurring, then have them brainstorm various instructor moves, questions, activities, statements, etc., that might help gently redirect students.
- **Assign your staff a reading related to the ideas in this session.** Tell them to use active reading strategies like underlining important points, writing out questions and connections in the margins, and asking critical questions like who wrote this, who is the audience, etc. Have them pair up with someone else and compare their notes and ideas, then bring this discussion into the whole group. Here are some suggested readings:
 - **The section title, *How to Think Like a Naturalist and Scientist*, from *The Laws Guide to Nature Drawing and Journaling* by John Muir Laws.** Ask, What thoughts or ideas stood out to you? Did anything in this passage surprise you? When was the last time you changed your mind about something significant? As instructors, what are some ways that we can create a culture in which it is OK—or even encouraged—to admit when you’re wrong?
 - **The following sections from the Framework for K–12 Science Education (the document on which the Next Generation Science Standards is based).** Lead an open-ended discussion with staff about the topic you’ve selected, and how they might bring it into your program’s curriculum and instruction. Where are opportunities to provide students with experiences in doing science? Note that the practices are not called “Science Practices,” but “Science and Engineering Practices.” You might choose to only discuss the science aspect of the practices, or include engineering as well.
 - Scientific and Engineering Practices (pages 41–53).
 - Practice #1: Asking Questions (pages 54–56).
 - Practice #6: Constructing Explanations and Designing Solutions (pages 67–71).
 - Practice #7: Engaging in Argument from Evidence (pages 71–74).

Some other BEETLES student activities focused on explanation from evidence in addition to *NSI: Nature Scene Investigators*, include: *The Case of the Disappearing Log*, *Bark Beetles Exploration, Structures & Behaviors*, and *Tracking*.

Download a free PDF of the Framework at:
http://www.nap.edu/catalog.php?record_id=13165

See full citation for *Mountain Time* in references list. Mountain time is only available from lulu.com in both print or digital editions.

Print and pass out copies of these quotes to lead discussion using the final prompt. Ask instructors to choose one to discuss in pairs, then have the whole group discussion.

– Chapter 2, pages 33–40, from *Mountain Time* by Ken Norris.

Ken Norris was an influential scientist, conservationist, teacher, “professor of wonderment,” and former Professor of Natural History at the University of California, Santa Cruz. This chapter is about how naturalists make observations, ask questions, and come up with explanations for what they see. It includes insights by the author into how naturalists operate as well as examples of how to lead (university) students to engage in a naturalist mindset, much of which is also applicable to younger students. Facilitate a discussion of the chapter using the following prompts: What are some points/quotes you found interesting? What are some questions and/or connections you made? Summarize in your own words the author’s perspective on what a naturalist does, as described in the chapter. Discuss your interpretation of what the author means by each of the following quotes:

<p>“To many scientists, what the naturalist does seems like guesswork. Yet truths keep emerging from the naturalist’s hands anyhow, because he begins by taking in the natural world on its own terms.”</p> <p>“This <i>gestalt</i> of a wild world provides what I rather irreverently call my ‘baloney filter.’ After a time, it’s hard to fool a naturalist or country kid about a stream bottom like this.”</p> <p>“My ‘throwing-away muscles’ must be just as good as my ‘asking muscles.’ I call this whole process, ‘spinning the wheel.’”</p> <p>“Spinning the wheel always generates more questions than get answered.”</p> <p>“No wonder our national parks are just scenery to most people. Not many people ‘spin the wheel.’”</p> <p>“But you can also be blinded by what you think you know... Not infrequently the child’s wide-open eyes will see what no one else sees.”</p> <p>“Will what I learn be real?”</p> <p>“We humans live and see within our own limited time frame, while other creatures live in time-worlds nearly separate from ours.”</p> <p style="text-align: center;">Quotes from <i>Mountain Time</i> by Ken Norris</p>
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