

# Questioning Strategies: AEES Central

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SUSAN CAPLOW MAY 03, 2021 07:02PM

## Participant Materials

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### Tips for a Good Conversation

- Acknowledge one another as equals
- Stay curious
- Recognize that we need one another's help to become better listeners
- Slow down so we have time to think and reflect
- Remember that conversation is a natural way humans think together
- Expect it to be messy at times
- Take responsibility for our impact on others
- WAIT (why am I talking or why am I (not) talking?)

*Adapted from the National Equity Project and The Art of Conversation*

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### Session Agenda

1. Introducing Questioning
2. Describe the Object
3. Discussing Broad and Narrow Questions
4. Broad Questions in Action
5. Wrapping Up

## Breakout Room Discussion 1 Questions

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### Read the Broad Questions and Narrow Questions Handouts, then discuss:

- What are some situations or goals for which narrow questions might be appropriate?
- What are some situations or goals for which broad questions might be appropriate?
- Any questions that come up for you while reading the handouts.

## Broad & Narrow Questions—Handouts

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### Broad Questions

- What affects the water quality where you live?
- How might inter-tidal organisms survive living in and out of water?
- Should we use pesticides?
- How are these young insects similar to and different from their adult stage?
- What do you think has caused the shapes of the landscape we're seeing?

#### Broad questions can be about specific topics and about science:

- Broad questions can focus on a specific topic. The name "broad" might make it seem like broad questions can only be about broad topics. But what makes them broad is that they have multiple acceptable answers, while narrow questions have only one acceptable answer. Broad questions can be about either general or specific topics.
- Broad questions can be about science content. Many instructors use broad questions about feelings, values, and opinions, but broad questions are also an important part of instruction about science content. Teaching science is not just delivery and recall of information. Asking students broad questions gives them the opportunity to engage in higher level thinking and productive struggle with science content, leading to deep learning and understanding.

#### Broad questions encourage exploration and curiosity:

- Broad questions encourage exploration and curiosity. Asking a broad question about something found in the field, such as, "What do you notice about this plant?" tends to encourage deeper and longer exploration than a narrow question, such as, "What is this plant called?" Our curiosity tends to decline once we hear the name of something. Names and facts are useful, but it's better to share them after encouraging observation and exploration using broad questions.

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### Broad\_Questions.pdf

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### Narrow Questions

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QUESTIONING STRATEGIES: HANDOUT

NARROW QUESTIONS

**Narrow questions (also known as “closed-ended questions”):**

- have a specific answer
- help instructor know if students know a specific piece of information.
- require recall of information.
- encourage group response and convergent thinking
- tend to be overused by instructors

**Narrow Question Examples:**

- Is this an insect or a spider?
- What is the definition for decomposition?
- What is a marine mammal that has ear flaps, flippers, and barks like a dog?
- What is this called?
- What kind of animal is that?
- What gas do plants take in that we breathe out?
- Do animals photosynthesize?
- What time is high tide?
- What is a consumer?
- How many legs does it have?
- Is an oil spill bad for a river?
- What causes U-shaped valleys?

Narrow\_Questions.pdf

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QUESTIONING STRATEGIES: HANDOUT

SKIT #2

**Scene:** A group is hiking with their instructor, with student #1 at the front, when they come across a large scat in the trail.

**Cast:** 1 instructor and 4 students

**Note:** Stage directions are in parenthesis and italics

**Student 1:** *(points at scat in the trail)* Oh, my God!

**Instructor:** Check it out! Look at the scat *[Student 1]* just found.

**Student 2:** It's humongous!

**Instructor:** What do you notice about it?

**Student 2:** Why is the scat hairy?

**Instructor:** What do you mean by it being hairy?

**Student 2:** I mean it looks like it has hairs in it.

**Instructor:** Those of you who are up close, can you tell us more about whether those look like hairs?

**Student 1:** They look like hairs to me.

**Student 2:** It's like made of hair.

**Instructor:** Can you describe the hairs for us? Color? Length?

**Student 1:** They look sort of gray.

**Student 2:** And twisted. It's almost like rope. Scat rope!

**Student 1:** It looks like a little bone in there too.

**Student 2:** Yeah!

**Student 3:** Yeah, it does look like gray hairs and it does look rope-y.

**Student 4:** I see the bones too.

**Instructor:** Anyone have an explanation for why there are hairs in the scat? What do you all think?

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# Skit Transcripts

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## Skit 1 Transcript

**Instructor:** *(maybe coyote, maybe domestic dog).*

**Student 1:** Dog doesn't start with the letter "C."

**Student 2:** It could be a mountain lion.

**Instructor:** That's not a mountain lion scat. At least I don't think it is.

**Student 3:** Cat starts with a "C."

**Instructor:** It's not a cat scat. It's too big for a cat. Think about how big cats are. This scat is too big for a cat. So the reason you're seeing hair in the scat is because the animal can't digest the hair, so it comes out in its scat. Pointing at scat. Hey look, there are bones in there too. And of course, the dog or coyote couldn't digest the animals' bones either, so there they are. The bones in there look pretty small. Guess what kind of animal that might have been.

**Student 1:** A mouse?

**Instructor:** Yeah, I think those are mouse bones, and they're from an unlucky mouse that got eaten by a dog of some kind.

**Student 4:** A squirrel?

**Instructor:** No, I don't think it's from a squirrel. So, mountain lion scat is segmented, like it's got different parts to it, though they are still connected. The ends of mountain lion scat are usually blunt, not pointy. The ends on this scat are pointy.

**Student 2:** I don't get what you mean by segmented.

**Instructor:** Kind of like on that part there – that looks kind of segmented.

**Student 2:** But I thought you said it wasn't mountain lion scat cause mountain lion scat is segmented.

**Instructor:** I know, well dog scat can be segmented kind of too sometimes, but cat scat is even more segmented. It's confusing and they can be hard to tell apart sometimes. I think this is coyote or dog scat, but I may be wrong.

**Student 2:** Where would a dog live around here?

**Instructor:** If it was a domestic dog, it could live in a house nearby, like farther up this hill. But if it was a coyote, coyotes live in burrows dug out of the ground. Coyotes are nocturnal animals, but they used to be more diurnal. But because people hunt them sometimes, they have become more nocturnal. So this coyote probably ate the mouse last night and then pooped it out here in the darkness.

**Instructor:** Now you know how to look at scat like a naturalist. OK, let's move on. Everybody who couldn't see very well take a look at it as you walk by.

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## Skit #3

QUESTIONING STRATEGIES: HANDOUT

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SKIT #3

**Scene:** A group is hiking with their instructor, with student #1 at the front, when they come across a large scat in the trail.

**Cast:** 1 instructor and 4 students

**Note:** Stage directions are in parenthesis and italics

**Student 1:** *(points at scat in the trail)* Oh, my God!

**Instructor:** Hey everybody!

**Instructor:** *(singing/chanting)* "It starts with an "S" and ends with a "T." / It comes out of you and it comes out of me./ I know what you're thinking, and you can call it that, but let's be scientific and call it SCAT!!! Check it out you guys! We've got a humongous awesome scat here to explore. Now let me give you the scoop on poop, because I'm a bit of a scatologist. And the first question I have for you is—is it scat of the cat, or doo-doo of the dog?

**Student 2:** That's too big to be from a cat. My cat's poop is a lot smaller.

**Instructor:** I actually meant whether it's from the dog family or the cat family. Your cat is a distant cousin of bigger cats that might live around here: the beautiful bobcat and the magnificent mountain lion.

**Student 1:** Is it mountain lion scat?

**Instructor:** No, it's not. Scat from the cat family is segmented and has blunt ends like a tootsie roll. Dog scat has pointier ends. I remember it because dogs have pointier heads, and their scat has pointy ends. Cats have more blunt heads, and their scat has blunt ends.

**Student 4:** My pug has a blunt head.

**Instructor:** Well, most dogs anyway. So what kind of dog do you think might live around here?

**Student 1:** A wolf?

**Instructor:** *(makes game show buzzer sound--bzzzt)* Not a wolf. There used to be wolves around here a long time ago. But not anymore. Sorry, try again.

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# Activity Lab Materials

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## Activity Lab Instructions

QUESTIONING STRATEGIES: HANDOUT

Activity Lab: Instructions

1. In a group of 4, decide on a scenario to focus on. It should involve an object, organism, or ecosystem that each of you commonly use or encounter in your program and that could involve more student explorations.

2. Split up into pairs.

3. Take 2–3 minutes to write down a “normal” sequence of questions, content, or activities you’ve used or heard used to explore this scenario in the past.

4. Decide on the primary exploration goals and content goals.

Remember to situate this scenario within the context of a group’s entire time at your program—you may have different goals if this scenario takes place at the beginning or the end.

For the purpose of this activity, you need at least 1 exploration goal, but you don’t necessarily need a content goal.

5. Identify opportunities to include more broad questions into what you have been doing.

What specific parts of the lesson could benefit from more broad questions? What are your specific goals for those parts?

6. Create an outline of a sequence of broad questions and narrow questions/content delivery that improves this lesson.

You may want to significantly restructure what you initially wrote down.

7. Return to your original group of 4.

8. Present your ideas and new sequence. Discuss and provide feedback.

a. How similar and different are your new sequences?

Activity-Lab-Instructions

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## BFF Questions

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QUESTIONING STRATEGIES: HANDOUT

BFF QUESTIONS

Questions that will be your Best Friends Forever to encourage wonder, exploration, discussion, and reflection.

Invitation Questions

What have you heard about \_\_\_\_\_?

Describe an experience you’ve had with \_\_\_\_\_?

Exploration Questions

What do you notice?

What do you wonder?

What does it remind you of?

How might you explain this?

How is that similar/different than \_\_\_\_\_?

and...

Any question you (the instructor) don’t already know the answer to!

Discussion Questions

What makes you think that?

Can you say more about that?

What’s your evidence?

How can you be more sure?

BFF-Questions

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## Goals & Prompts for Encouraging Exploration

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QUESTIONING STRATEGIES: HANDOUT

GOALS AND PROMPTS FOR ENCOURAGING EXPLORATION

So you want to help guide your students to explore? You’ll need: (1) an interesting organism/object that students can see and explore, (2) goal(s) in mind and (3) questions that match your goal(s).

Goals and Example Prompts

GOAL ONE: HELP STUDENTS MAKE BETTER OBSERVATIONS

1. Making Observations

“What do you notice?” “What observations can you make?”

“What color is it? What shape? What texture? What size? How many are there? Where is it? What are surroundings like?”

GOAL TWO: HELP STUDENTS ASK QUESTIONS ABOUT OBSERVATIONS

2. Asking Questions

“What does that make you wonder?”

“Can you think of questions we can ask that we can answer through observations?”

GOAL THREE: HELP STUDENTS CONNECT PAST IDEAS AND CURRENT EXPERIENCES

3. Recalling Prior Knowledge

“How is this the same or different from...?”

“Can you compare this to something else?”

“Have you heard anything about this before?”

GOAL FOUR: HELP STUDENTS MAKE EXPLANATIONS BASED ON EVIDENCE

4. Making Explanations

“What do you think is the explanation for...?”

“What do you think caused it to be like that?”

“What happened here?” or “What is happening here?”

“What type of animal do you think it was? What makes you think that?”

5. Including Evidence

“What’s your evidence for that?”

Goals-and-Prompts-for-Encouraging-Exploration

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## Questions and the Learning Cycle

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QUESTIONING STRATEGIES: HANDOUT

Questions and the Learning Cycle

Investigations to make explanations—help students draw conclusions, and make connections.

What did you notice? What questions do you have? What are some possible explanations for that?

What did you find out about...?

How is this the same or different from...? Can you compare this to something else?

What do you think is the explanation for...?

Can you explain what makes you think that? What is your evidence?

What might another explanation be?

Application phase: Use broad questions to encourage reasoning and analysis—involve students in authentic problem-solving situations and critical thinking—help students to generalize their knowledge and test their hypotheses.

What do you now know about the characteristics of...?

What other factors do you think might be involved?

Can you find a way to...?

What does it remind you of?

How can we use what we found out to solve a problem?

How could you be more sure about...?

Reflection phase: Use questions to encourage students to think back on what they have done and how they have made sense of what they have explored.

What surprised you?

How did you arrive at your solution or conclusion?

Did you change any of your initial thinking?

What caused you to see things differently?

How did you figure out...?

Questions-and-the-Learning-Cycle

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## Session Handouts & Follow Up Resources

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## Session Materials

Link to access session script, slides, handouts, and materials.

**Science and Teaching for Field Instructors**  
**How Questions Impact Teaching and Learning** This session focuses on how to use questions to encourage student exploration and discourse. Part of the session delves into how an instructor's different prompts and behaviors may encourage or discourage student exploration and learning.

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## Thought Swap

Science and Teaching for Field Instructors  
Many field instructors have found this simple routine to be transformative for their field experiences with students because it sparks discourse. Thought Swap is easy to implement and encourages student participation by focusing on one-on-one di-



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