

Supplemental Material

CBE—Life Sciences Education

Andrews *et al.*

Supplemental materials for

**Exploring the relationship between teacher knowledge and active learning implementation
in large college biology courses**

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Table S1. Participant characteristics, including course details, professional position and experiences, and gender.

Pseudonym	Course studied	Class size	Semesters teaching experience	Position	40+ hrs of teaching PD	Led teaching PD	Gender
Greg ^a	Intro, majors	165	1	Lecturer	Y	Y	M
Gail	Intro, non-majors ^b	232	21	Lecturer	Y	N	F
Gina	Upper-division, majors	100	10	Lecturer	Y	N	F
Ginger	Intro, majors	200	13	Lecturer	Y	Y	F
Gloria	Intro, majors & non-majors	330	30	Lecturer	Y	Y	F
Amy	Intro, majors	133	5	Lecturer	Y	N	F
Amanda	Intro, majors & non-majors	250	6	Lecturer	Y	Y	F
Alan	Intro, majors	100	20	Lecturer	Y	N	M
Adam	Intro, non-majors	160	6	Lecturer	Y	Y	M
Alora	Intro, majors	78	12	Lecturer	Y	Y	F
Al	Intro, non-majors	160	42	Associate professor	Y	N	M
Amelia	Intro, non-majors	160	26	Lecturer	Y	N	F
Arlo	Intro, majors	100	9	Assistant professor	N	Y	M

^aPseudonyms starting with the letter “G” designate “generative instructors” and pseudonyms starting with “A” designate “active instructors.”

^bNon-majors are not pursuing a degree in life sciences, but may be in other STEM fields

Appendix A
Pre-instruction Interview Protocol

The goal of this interview is to get a read on how you are **thinking** about the lesson we are going to film. There are no right or wrong answers to the questions I'm going to ask. I want to hear everything that comes to mind so I can understand the **inner-workings of your teaching**. Feel free ask questions at any time.

1. What work are students responsible for doing prior to class?
2. Why do you ask them to do this before class?
3. What goals/learning objectives do you have for students in this class period?
 - a. What do you want students to learn in this class period?
4. Why did you choose these learning objectives?
 - a. Why are those topics/skills important for students to learn?
5. What do you think students already know about this topic?
 - a. Where did they learn that?
6. How will you know if students have met the learning objectives?
 - a. How do you know what your students are thinking during class?
7. What difficulties do you expect student to have with the key topics/skills for this lesson?
 - a. What will be relatively easy for students to achieve and what do you expect to be harder?
 - b. PROBE to cover all or most objectives/topics.
8. Why do you expect them to have this difficulty?

The interviewer personalized questions 9 – 12 to ask participants about the type of work that students would be asked to do during class. In posing question 9, the interviewer described the class activities as she understood it based on slides and other class materials sent to ahead of time. The interviewer could then modify the description to echo the words of the participant in questions 10-12. As an example, the questions below are taken directly from the interview with one participant, and the parts that would be variable across interviews are underlined.

9. Class seems to be structured as mini-lectures interspersed with students working on questions. Talk to be about the rationale behind this approach.
10. Talk to me about how or why the specific questions on the activities help students learn.
11. How do these questions help students overcome the difficulties you anticipate?
12. How do you communicate to students why you are asking them to work on questions like this during class?
13. Switching gears a little bit now, more generally speaking, how do you typically interact with students during class?
 - a. What is your thinking or approach to in-class interactions?
 - b. WHY/what is the reasoning behind thoughts?
14. What motivates your students to engage and participate during class?
 - a. What about to complete the pre-class work?
 - b. Are there ways your course is set-up, maybe from day 1, that keep students motivated to work and learn?
 - c. What do you see as your role in motivating students to work during class?
15. What else do you think I should know about this class period?

Appendix B Post-instruction Interview Protocol

Questions used to elicit PCK. The interviewer asked instructors a minimum of five questions from the list below, and each was selected to align with the video clips from their classroom. The same questions were sometimes asked more than once in reference to different video clips. The median number of questions asked from this list was 8.

1. What was this student thinking/struggling with? How are students doing on this question?
2. Are those fairly typical ideas that you get when you have students talk about their initial ideas?
3. Is that something that students often confuse?
4. Can you talk a little bit about how you interpret that student's comment?
5. Do you have any insight into why that might be difficult for students?
6. Did you anticipate that line of thinking from students?
7. Did you learn anything about how students think about topic X during these interactions with students?
8. What were you thinking at this moment about whether students are [getting topic X/achieving the learning objective]?
9. What was going well for students and where were they struggling at this point in the lesson?
10. In what way is this [question/activity/discussion] particularly useful in helping students learn the concept of _____?
11. What were you thinking as you [said this to a student/tried to help a student]?
12. What were you thinking at this moment about how to help students learn topic X?

Questions used to elicit PK. The interviewer asked instructors a minimum of three questions from the list below, and each was selected to align with the video clips from their classroom. The same questions were sometimes asked more than once in reference to different video clips. The median number of questions asked from this list was 5.

1. What are you trying to achieve as you respond to students' questions?
2. What do you think of as your role in these interactions?
3. In what way is this strategy particularly useful in helping students learn?
4. What were you thinking as you facilitated this class discussion/posed questions to the class?
5. What were you thinking when you [directed students to talk to a neighbor/ask if there are any more questions]?
6. Tell me about what you were thinking as you were giving students directions here.
7. Now that you have used this activity, how do you think [describe activity] helped them learn compared to listening to you explain [topic X]?
8. You developed this [activity] to [stated goal]. How did it work?
9. How are you thinking about what you want from students here?
10. What did you want students to do as they answered this question?