Supplemental Material

CBE—Life Sciences Education

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Supplemental Materials

A. **Interview Protocol**
B. **Codes and Themes with representative quotes.**

A. Interview Protocol

My first question is intended to help me get to know you and your aspirations. The questions I ask will be open-ended like this one and I may follow up with additional question to clarify your answer.

1. Imagine yourself 10 years in the future. Imagine what you have hoped for your future has come true. What will you be doing and what will you be like? Try to be as detailed as you can.

As a country, we have to make decisions that impact other people's lives. Science research and discoveries can sometimes impact our perspective on these decisions. We call these decisions "socioscientific decisions". Socio because the decision impacts society and scientific-because science can inform the decision. So, socio-scientific.

2. Describe a few "socio-scientific decisions" that you think knowledge from biology could help address. Can you think of any others?
    a. Follow-up if students don't know how to answer:
        i. *If seems confused or unsure*: interviewer gives an example of an issue they see science informing (something outside of biology to not guide interviewee)
        ii. *If they don't think they have the knowledge to answer this question, then broaden the question to*: What about societal decisions that the fields of biology or medicine can contribute to?

3. Tell me a little about a time you discussed a socio-scientific decision with someone who is not in science. What did you discuss? Who was it with? Did you agree or disagree? That kind of thing.
    a. Is this type of conversation typical for you?
    b. How did you feel when you were having this conversation?

4. Can you tell me a little about a time when you wanted to discuss a socio-scientific decision with someone not in science, but didn't. You know, what was the situation? Who was it with? Did you agree or disagree?
    a. Is this a typical experience for you?

So, if say no to socio-scientific (3&4), then ask if they discussed "science". If they say no to "science" than ask about school.

5. Who are you likely to discuss these topics with using your biology knowledge?
    a. Why this person or these people?

    b. As they bring people up, follow up with: And do you talk with anyone beyond XX?
6. Who is it challenging to discuss these topics with using your biology knowledge?
    a. Why is this person (these people) more challenging?
    b. As they bring people up: And do you find anyone else challenging?

7. Why, if at all, do you think these types of conversations (about socio-scientific decisions) are important?

8. Do you think biology students commonly discuss these sorts of topics with people who are not scientists or not students in their classes? Why or why not?

9. Have you received any training in how to communicate science with the general public?
    a. Please describe this training.
        i. Who did the training?
        ii. Where did you receive the training?
        iii. How did you feel about talking to non-scientists after the training?

10. What might a biology instructor do to help you or other students feel more capable in having these conversations?

11. How, if at all, do you think science communication training might be valuable to you in the future?
    a. Would you like to see (more of) opportunities like these in your science classes?

B. Codes and Themes with representative quotes.

Supp. Table 1. Quotes supporting the characterization of student conversations about science from Theme 1.

	Codes for Theme 1	Representative quotes in support of code
1	Affinitive trust	*Student 14*: "I mean it depends on the level of... trust or something, level of connection because I wouldn't talk about it with a random stranger..." [103-104] Student 11: "Because they're more understanding. I'm talking about mostly my friends, even if they reject or they try to roast me or something, I know they're my friends."
2	Don't talk to strangers about science	*Student 3*: "It was more when I was surrounded by people that I don't know…. I just felt like I'd rather not give my input this one time. I'd rather just sit this one out."
3	Talk about science related to career goals	*Student 7* [career goal: dentist]: "So I was able to share that information with my sister who is not pre-health, anything like that. But I was able to tell her, okay, every six months you need a cleaning."
4	Talk about science related to interests	*Student 8*: "I try to teach everyone along the way too. I always tell people interesting things about biology so that they can probably get interested...All those things are things I learned to appreciate and to talk people about …."
5	Questioning/Correcting Others	*Student 18*: "I feel like most of the time I can change their mind because I'm presenting them with facts. Like this new paper came out, this new study came out…"

Supp. Table 2. Quotes supporting the characterization of student conversations about science from Theme 2.

	Codes for Theme 2	Representative quotes in support of category
1	Translating behaviors	*Student 11*: "Science can be very complex, it's like another language, so you really have to decrypt it for someone who's not a scientist."
2	Translating is challenging	*Student 16*: "To you, if you're in bio every day, that's your field, yeah, it's common sense. But to someone else, I guess, I don't want to say it's hard to do it, but sometimes you don't realize that you're saying a word and like, "Oh, yeah", thinking the person knows the word, but it's like, "Oh, no", you have to backtrack… [530-535]…. it's information that we know, I've taken so many tests on this information, but yet explaining it to someone else and especially children, it was 10 times more difficult."
3	Need to translate is a barrier to conversations	*Student 5*: "I feel like sometimes, it's hard to communicate these ideas…. Parents that don't have an educational background, they might not understand. And if we try to explain them, we're just going to tell them our jargon then we're going to tell them things that they might not understand, and it's hard for them to get it."

4	Multiple forms of translation	*Student 11*: "I have an understanding of it that I wouldn't be able to explain to him in terms that he would understand. He doesn't speak English so there's a barrier…. So I would have to try to learn it again and teach it to him in Spanish."
5	Knowledge building – providing background information	*Student 18*: "I think the most challenging people to discuss this information with is probably my family. They have absolutely no background in what I'm doing, so anytime I try to explain what's going on, how school's going, there's always a step before I have to do to explain all the background information that associates with what I'm doing, and then explain what I'm doing."
6	Knowledge building – teaching others about nature of science	*Student 4*: "I've noticed that people that are in science fields tend to look at this stuff in a little bit of a different way and understand the process behind it and why studies say what they do because there's a whole years long procedure leading up to them saying that one statement. But I feel certain people don't distinguish so much between, don't understand the idea that experiments are done, data is taken and such and it's not so much an opinion, as it is as close to fact as we can get. And they just think that it's a gray area when it's really not."
7	Knowledge building hard	*Student 14*: "it's an extra step for the people who I have to teach the basics of biology, that I just can't talk… with them understanding because they won't."
8	Science classes: limited opportunities to learn how to explain	*Student 2*: "I feel a lot of the times for people in the sciences and biology, we are supposed to take in a lot of information, just remember this, remember that. But we never to actually express that information."
9	Science classes: limited exposure to science communication strategies	*Student 5*: "I feel that now, whenever we have a class, we just focus on the subject and the subject and the subject, not how to communicate it."

Supp. Table 3. Quotes supporting the characterization of student conversations about science from Theme 3.

	Codes for Theme 3	**Representative quotes in support of code**
1	Student's information accepted	*Student 20*: "…like with my mom when I told her about the stuff, then she did her own research and she's like 'Wow, it actually does sound like it could be that. I was like, 'Ok'. She did take my word for it."
2	Student's information not accepted	*Student 18*: "When I try to explain it to them, they kind of just shut me out. They have decided that the information that they already have is the most correct version of it and they refuse to really put any more thought into that."

3	Older individuals harder to talk to	*Student 17*: "…There are those, those people from work, they're around my age, they're like, they tend to be very open minded. But then there's some of the older individuals who are very like, 'Well if I did it before, I can keep doing it again'."
4	Lack of credibility: Personal experience trumps	*Student 12*: "[My parents] typically more often disagree. It comes more of their own experiences and their own opinions."
5	Lack of credibility: cultural beliefs or folk knowledge trumps	*Student 9*: "Sometimes … you're raised on beliefs that are not right. And to be able to deviate from beliefs that you've been raised to think, even if they're wrong, it's hard. It's hard when you're raised to think something to then have science kind of tell you otherwise. It's very difficult to get out of that mindset."
6	Lack of credibility: religious beliefs trumps	*Student 11*: "She's smart, but she has that belief and why would I want to be imposing?... I feel like I'm right, but my mom, the way she raised us and stuff was with that foundation, that background, that religious background. She's always been super good with us. So why would I want to tell my mom, 'Hey, that's all BS'?"
7	Tokenized based on age	*Student 18*: "A lot of the people who are in that community are very old and they're usually impressed that I'm just so young there, that I feel like they're listening to what I have to say because of my age and not because they are interested in the information I have to give…. There's some of the novelty of me just being a student and then saying, "Oh you're so cute, you're so small…."
8	Tokenized based on gender	*Student 19*: "I actually hold back because as a woman in science it's harder to gain certain respect. So when talk to certain people it's like, okay well I can give my opinion, but it still may not be... Or I can give my information that I have but it can still not be considered enough."
9	Not make people wrong because of power differences	*Student 3*: "I feel like it's difficult, too because I don't want to tell them all the time that they're wrong. I think a power sort of difference. But I'm not going to tell my dad, no, you're wrong. I don't know how to say that."
10	Not make people wrong because of affection	*Student 11*: "I feel like I'm right, but my mom, the way she raised us and stuff was with that foundation, that background, that religious background. She's always been super good with us. So why would I want to tell my mom, 'Hey, that's all BS'."