

Supplemental Material

CBE—Life Sciences Education

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Appendix 1. The student interview protocol is divided into three sections. The first section focuses on identity, the second section focuses on classroom experiences, and the third section focused on students' recommendations for creating a better classroom environment.

Part 1 - Card Sort - To center students to identity prior to other interview questions

Interviewer: Thank you for taking the time to participate in our research today. This interview will dive deeper into your classroom experiences in order for us to best understand how students perceive science and what we can do in order to create a better science classroom environment that allows students to be successful. The interview will be divided into three parts. Part 1 will focus on identity. Part 2 will focus on classroom climate and culture. Part 3 will focus on your personal recommendations on what we can do to make science classrooms better for students.

In the first part of the interview, you will participate in the card sort activity. In a moment, I will give you index cards that will have various identities listed on them. Your task is to choose the ones that you identify with and to rank them from most important identity to least important identity. You will also be given blank cards that you can write identities that we do not think of. I will take a picture of your rankings when you are finished.

*The interviewer will give students index cards that will have various identities listed on them (mother, father, son, daughter, student, science learner, female, male, White, Black, Asian, Hispanic, Latinx, first-generation college student, first born, etc.) They do not have to use all of the index cards and can have blank cards to write identities we do not think of, but they are to rank cards they identify with, starting with the most important to them. Make sure that you tell them that the ranking is general (not science-classroom specific). Ask them why they chose the identities they did and the importance of these identities to them. *Take a picture of the way they rank**

- 1) Things to pay attention to - What did student put first? Why?
 - i) I noticed that your top ranking identity is _____. Why did you decide to put this first?
- 2) Talk me through the rest of your identities and why you chose to rank them in this way.
- 3) Do they bring up science learner in the card sort?
 - i) Yes - Ask them why they placed it in the position that they did. Why did you rank science learner where you did?
 - ii) No - Ask them why they chose not to place science learner in their collection. After, ask them to place it. I noticed that you did not include science learner in your rankings - why is that? **After they respond** Can you take the science learner card and rank it?
- 4) Tell me a little bit about yourself. Why did you decide to take this class? What are your goals (short and long term)? Why are these goals important to you?
- 5) What were some previous experiences you had in science that stand out (elementary, middle, high school, outside of school)? How do you think they impacted you?
- 6) What are **your** perceptions of science in general, and how do you think **society** generally perceives science? Who is it made for, and what does being a scientist assume?
- 7) How do you think your identities affect how you participate in/experience science and science classrooms? (e.g., Does someone of your identities have a place in science - is there a tension?)

- 8) How do **you** feel people of your various identities are represented in science, and how do you think **society** influences who gets represented in science? How does this affect you?
- 9) What traits related to your identities empower you as a scientist? Why? (e.g., What aspects of your identities do you believe will make you a strong scientist/science learner? For example, someone with a mother card can say that being a mother helps her stay organized and scheduled.)

Part 2 - Current Classroom Community and Culture

Interviewer: We will now transition into part two, which focuses on classroom community and culture. I will start by asking you follow-up questions to your responses from the student survey given around midterms.

Students were given individualized questions based on their responses to the Classroom Community Scale. One example is given below:

“Specific to Yasar: Yasar, we noticed that your survey responses show mostly positive experiences and perceptions of the classroom. You feel that you are encouraged to ask questions, you rely on others, others rely on you, and that others will support you. Can you share some experiences regarding that? You also state that you feel like the course is a family, that you are not isolated, and that your contributions to group work are valued. Can you expand on that? On your survey, you checked “Neutral” for the statement, “I feel connected to others in the course” - why did you decide to mark that? Based off of your responses, I have chosen a few key words. Please describe Dr. _____ classroom regarding these keywords: comfort, learning, community.”

Questions for ALL students start up again here

- 1) What makes you feel valued or not valued in a classroom?
- 2) What is one thing that the professor does that you feel is positive/negative in creating a comfortable classroom environment?
 - i) Any particular experience that sticks out?
- 3) How does the inclusion of LAs facilitate/hinder creating a comfortable classroom environment?
 - i) Any particular experience that sticks out?
- 4) How do you think your experiences in science classrooms compare to others in your class? Do you think your experiences in the science classroom mirror those of everyone else (e.g., do you think others will answer similarly to you)? Why?
- 5) What actions do you take to create a better science classroom experience for you? (i.e., do you create groups to do activities with? Do you get to know classmates?)

Part 3 - Establishing a Positive Classroom Community and Culture

Interviewer: We will now transition into the last part of the interview, which focuses on what we can do to establish a positive classroom community for students.

- 1) What do your best professors do to establish a positive classroom culture?
 - i) Why are these practices important to you? (e.g., Do they make you view yourself as successful? Do they make a classroom seem like a family?)
 - ii) If you were a professor, what do you think you would do to help create a positive classroom culture?
- 2) What do your best LAs do to establish a positive classroom culture?

- i) Why are these practices important to you? (e.g., Do they make you view yourself as successful? Do they make a classroom seem like a family?)
 - ii) If you were an LA, what do you think you would do to help create a positive classroom culture?
- 3) What do you need in a classroom environment to help you succeed?
- 4) If you were to design a perfect classroom with a positive classroom culture, what would it look like?

Appendix 2. Twenty-one identities were pre-made and written on cards for students to choose from. Students also had to option to write identities on blank cards that we do not think of.

Family Identities	School Identities	Gender and Sexuality Identities	Race and Ethnicity Identities
Mother Father Son Daughter First Born	Science Learner Student Community College Transfer Student First Generation College Student	Female Male Gender Nonbinary LGBTQ+	Black White Asian Latino/a/x African European Hispanic Pacific Islander

Appendix 3. Items from the Classroom Community Scale (Rovai, 2002) that were referred to in the interview. We added two extra items to the administration of the Classroom Community Scale, noted in italics.

I feel that students in this course care about each other

I feel that I am encouraged to ask questions

I feel connected to others in this course

I do not feel a spirit of community

I feel that this course is like a family

I feel isolated in this course

I trust others in this course

I feel that I can rely on others in this course

I feel confident that others will support me

I feel included in group discussions with the LA

I feel my contribution within small group work is valued