

# **Supplemental Material**

*CBE—Life Sciences Education*

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**Appendix A**  
**First Interview Protocol**

*STEM knowledge & Research Experience*

- 1) Now that you have spent some time in a research lab, what has your experience been like working with your faculty mentor?
- 2) Would you say your primary mentor is the faculty member, a post-doctoral researcher, a graduate student, or an undergraduate student?
  - a. To whom in the lab do you direct your questions?
  - b. In what ways have you felt prepared or unprepared for doing research?
- 3) What, if any, have you learned from your research experience thus far?
- 4) Has working in a lab helped you learn about science content and scientific practice (doing research)? If so, how?

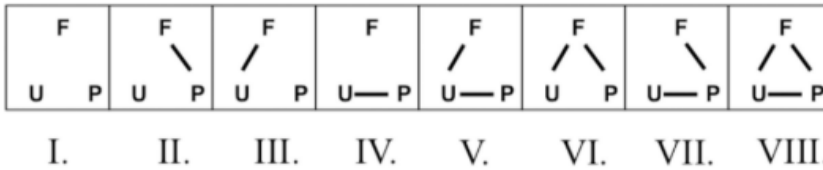
*STEM experience & Major declaration*

- 5) What have been the most positive aspects of your STEM learning experience(s) thus far?
- 6) What have been the most negative aspects of your STEM learning experience(s) thus far?
- 7) Have the SUSTAIN activities helped you be successful in your STEM courses? If so, how? If not, why not?
- 8) Have the SUSTAIN activities affected the major you intend to declare? If so, how?
- 9) Have your career goals changed over the course of your first year? If so, how, and what factors contributed to this change?

**Appendix B**  
**Second Interview Protocol**

*Science identity & Research Experience*

- 1) In which lab were you in during your freshman and sophomore years?
- 2) Approximately how many hours a week did you spend in the lab?
- 3) What was your role/responsibility in the lab in your first year/second year? Tell me about your research. Describe some of these things you did.
  - a. How is your second year similar to or different than your first-year research experience?
- 4) What have you learned that you might not have learned without your research experience(s)?
- 5) What have you learned about the difficulties of doing research? Was there a challenge you faced during your experience?
- 6) Do you think you have grown or changed as a result of this experience? If so, how? What experiences contributed to this growth and change?
- 7) To whom in the lab do you direct your questions?
- 8) Would you say your primary mentor is a faculty member, a postdoctoral researcher, a graduate student, or an undergraduate student?
- 9) Please look at the diagram and indicate which structure best represents your relationships with the postgraduate and faculty members with whom you worked.



- 10) How frequently do you interact with your faculty mentor?
- 11) What kind of support, if any, do you think was provided to you in the lab?
- 12) How satisfied are you with your research experience?
  - What has contributed to your level of satisfaction (or dissatisfaction) with your research experience?
- 13) How valuable was this experience for you?
- 14) Has your research experience changed, confirmed, or enhanced your ideas about your career?

**Appendix C**  
**Mid-semester / End-semester Progress Report**

Please submit one or two-page progress report regarding the progress in your research study. While writing your progress report, please answer the questions listed below and use one or two key aspects provided in Table 1.

1. Before you begin your research experience, what did you think the lab experience would be like?
2. What did you think participation in the lab would be like?
3. Has your experience differed from your assumptions? If so, are these differences positive, negative or a combination of both?
4. How valuable, if at all, was this experience for you?

Table 1. Effective mentoring to promote knowledge integration (Linn et al., 2015, p. 2)

		<b>Elicit ideas</b>	<b>Add ideas</b>	<b>Distinguish ideas</b>	<b>Reflect</b>
<b>M E N T O R I N G</b>	<b>Develop practices</b>	Identify or formulate a question in the context of the lab's research goals	Conduct experiments, collect and organize data	Analyze and interpret data Evaluate evidence Critique conclusions	Make final conclusions and plan next steps
	<b>Expand content knowledge</b>	Articulate hypotheses and questions about the research topic	Read literature, attend seminars, discuss with the research team	Consider the quality of evidence and relevance to the argument	Synthesize experimental results
	<b>Understand the nature of science</b>	Express expectations for science research experience	Attend lab meetings, experience experimental failure	Present progress reports and compare ideas in group settings	Consider how discoveries emerge from iterative processes
	<b>Develop identity in science</b>	Share goals for the undergrad. research experience relative to personal and career aspirations	Participate in the social network of the research team	Experience how the process of criticism contributes to research progress; share ideas as a team	Recognize strengths related to career aspirations