

# Supplemental Material

*CBE—Life Sciences Education*

Lane *et al.*

## Focus Group Protocol

### Introduction:

Thank you for your participation in this discussion. The reason we invited you to participate in this discussion is so that we can learn about your experiences at Jefferson State University and in the Comprehensive STEM Program. When responding to the questions try not to talk over anyone. Be courteous when responding. If you disagree with something, do so in a respectful manner. Remember everything you say will be completely confidential and that you can stop whenever you want.

### General Experiences

- What has been your experience attending JSU?
- What do you like about attending this institution?
- How would you describe CSP?
  - What is the program doing for you?
  - What is the program lacking?

### Expertise Model of Student Success

- What challenges have you experienced since you have been at JSU?
  - Possible Probe: What problems did you have to overcome in order to be successful at JSU?
- What kind of information did you need to know to deal with these challenges?
  - Possible Probe: What did you have to learn/find out in order to deal with these challenge(s)?
- How have you dealt with these challenges?
- Did anything change for you? If so, what?
  - Possible Probe: What did you do to overcome those challenges? What were the outcomes?
- How has the Scholars Program helped you to deal with these challenges? Specifically, how has program staff or participants helped you to deal with these challenges?

### Sense of Belonging

Some students talk about knowing what it feels like to belong; they describe belonging as fitting in, feeling cared about, accepted, or valued by or important to a group.

- Can you tell me about times when you have felt like you “belong” at Jefferson State University?
- Are there times you felt like you did not belong? Please describe.
- Thinking about CSP, has it helped you to feel like you belong (or possibly not)? If so, what ways? If not, why not?

### Science Identity

Some students talk about science identity as the attributes or characteristics that make up a scientist/engineering or emerging scientist/engineer. Some of these attributes may include feeling competent, being able to perform in math/science settings, or being recognized as a scientist/engineer.

- Do you identify with this definition of a science identity? If not, is there something missing?
- Have you come across people who have a strong science identity? Why do you say so?
- Do you think being a part of this program helps you develop this science identity? If so, how?

## Program Participant Interview Protocol

### *Introduction*

Thanks for talking to us again. The purpose of this interview is to talk with you more about some of the things we talked about in the large group, but also to get your viewpoint on some things.

### *Focus Group De-brief*

- First, let's talk about the focus group. What were some of the important things you think came out of that conversation?
- Is there anything you've thought about more since that conversation? Tell me about it.
- Is there anything you want to add to what we talked about, now that we're alone and you've had some time to think about it?
- Are there any questions you had left over from that conversation?

*Artifact* (Ask students to bring an artifact in advance that represents their experiences/interactions with the STEM enrichment program.):

- What artifact did you bring that represents your experiences with the program? Tell me about this artifact? Why did you select this artifact?

### *Personal Experiences*

- What do you like about attending this institution?
- What has contributed to your success at this institution?
- How do you know you will earn your STEM degree from this university?
- Some students talk about knowing what it feels like to belong, can you tell me about times when you have felt like you "belong" at Jefferson State University. Are there times you felt like you did not belong? Please describe.
- Thinking about CSP, do you feel like it has helped you to feel like you belong (or possibly not)? If so, what ways? If not, why not?
  - *Possible Probes:* In what ways, did the program help you make a smooth transition from high school to college (e.g., communicating with instructors outside of class, finding academic help when it was needed, forming study groups, getting to know peers, making new friends, navigating financial aid)?
- How do you spend time with different groups of people?
  - *Possible Probes:* To get at the frequency of time spent with peers (within the program): How many of your college friends are STEM students? How much time do you spend with them hanging out or studying? In what ways, does the time you spend with them (college friends in STEM) make you feel like you "fit in" or "belong" in STEM?
- Tell me about the first time you had an interest in science, technology, engineering, or math. How old were you? What happened? What motivated your interest?
- How has your involvement in CSP helped you to develop as a (an emerging) scientist or engineer?

- What changes or differences have you noticed in your interest, competencies to do math or science, your performance in your courses (or STEM-related co-curricular activities; e.g., Baja Formula Racing Team)?
- Do you recognize yourself as a scientist or engineer? In what ways, please explain or provide examples. (Tell me more.)
- Do your friends, faculty mentor, professors, or others recognize you for your performance in science, math, or engineering? In what ways, please explain or provide examples.
- What's been hard for you at this institution?
- Have you ever felt discouraged about continuing in STEM? If so, why? (*Possible Probe*: What was going on? What were you thinking? How did you overcome that feeling?) If not, why not? (*Possible Probe*: Other students have experienced times of self-doubt or feeling like giving up? Why were you different or what made your situation different?)
- Tell me about a time that you were struggling with a STEM course? What did you do? Where did you go for help?
- Tell me about a time you thought about being a [race/ethnicity] in the your [STEM] program. (*Possible Probe*: What was that like?)
- Do you think it would have been different if you attended another institution (i.e., community college, U of M or equivalent)? (*Possible Probe*: What other institutions did you get admitted to? Do you think it would have been different if you went to X institution?)
- Did you feel like you were prepared to attend this institution? In what ways did you feel prepared? In what ways did you not feel prepared? How do you feel about your ability to complete your degree? What has helped you to feel more/less comfortable about completing your STEM degree?
- How has the program helped you?
- Is there anything else you think it's important for us to know?

## Alumni Interview Protocol

Thank you for agreeing to participate and provide your thought, ideas, and reflections about your experiences in college, and specifically your interactions with the Comprehensive STEM program. I am conducting this study because I am interested in how Science, Technology, Engineering, and Mathematics (STEM) enrichment programs help students of color persist in STEM disciplines. My background is in the sciences, and I was often concerned when my friends or peers were not successful in STEM. So, I am interested in knowing how students are successful throughout their college careers with the help of university services and programs.

Your participation, and the overall results of this study, will be used for my doctoral dissertation, presentations at conferences, and in publications. Please remember that your participation in this interview is completely voluntary and that any information you provide will be confidential. With your permission, this conversation will be recorded. All identifying information will be kept confidential.

- What are some of the things STEM students of color need to know to be successful at the institution?
- What are some of the things STEM students of color need to do to be successful at the institution?
- What did you like about attending this institution?
- Why do you think you were successful at this institution?
- What were some of the challenges you faced earning your STEM degree? Do you think it would have been different if you went to another type of institution (community college, more prestigious institution)?
- Who were your role models or mentors while at the institution?
- How did you know you would earn your STEM degree from the institution?
- Some people talk about knowing what it feels like to belong, can you tell me about times when you felt like you belonged at Jefferson State University. Were there times you felt like you did not belong? Please describe.
- Thinking about the CSP, did you feel like it helped you to feel like you belonged, or possibly not?
  - *Possible Probes:* In what ways, did the program help you make a smooth transition from high school to college (e.g., communicating with instructors outside of class, finding academic help when it was needed, forming study groups, getting to know peers, making new friends, navigating financial aid)?
- How do you spend time with different groups of people while at Jefferson State University?
  - *Possible Probes:* To get at the frequency of time spent with peers (within the program): How many of your college friends were STEM students? How much

time do you spend with them hanging out or studying? In what ways, did the time you spend with them (college friends in STEM) make you feel like you “fit in” or “belong” in STEM?

- Tell me about the first time you had an interest in science, technology, engineering, or math. How old were you? What happened? What motivated your interest?
- How did your involvement in CSP help you to develop as a scientist or engineer?
  - What changes or differences did you noticed in your interest, competencies to do math or science, your performance in your courses (or STEM-related co-curricular activities; e.g., Baja Formula Racing Team)?
  - Do you recognize yourself as a scientist or engineer? In what ways, please explain or provide examples. (Tell me more.)
  - Do your friends, faculty mentor, professors, or others recognize you for your performance in science, math, or engineering? In what ways, please explain or provide examples.
- Did you participate in a STEM research project with a faculty member? If so, what was that experience like? How did it make you think differently about yourself as a STEM student? future STEM professional?

*Artifact* (Ask alumni to bring an artifact in advance that represents their experiences/interactions with the STEM enrichment program.):

- What artifact did you bring that represents your experiences with the program? Tell me about this artifact? Why did you select this artifact?

## **Administrator Interview Protocol\***

The purpose of this study is to understand how the strategies, practices, and policies employed in a STEM enrichment program facilitates the retention of underserved students of color in STEM, I would to ask you some questions about how the STEM intervention programs that you are involved with operates on your campus and how you view its effectiveness.

I will discuss your STEM enrichment program and its design, implementation, impact on students, and its benefits. I will use this information, along with data on STEM enrichment programs, to ultimately illustrate how such programs are designed, implemented, change over time, and affect underrepresented students in the STEM fields. If at any time, you feel that these questions could be answered by any reports or evaluations you have conducted on the program, please feel free to refer us to those documents.

### **HISTORY AND GOALS OF THE PROGRAM:**

- I'm now going to ask you a number of questions regarding the history and goals of the program.
- Can you tell me a little bit about the program? For example...
  - When did the program begin?
  - Why was the program developed? What prompted the program's creation?
  - What is the mission or primary goals of the program?
  - How is the program structured?
  - What specific services does the program provide? (*Possible probe:* For example, does the program offer academic or mentoring services?)
- What ideas guided the design and implementation of the services offered in the program? (*Possible probe:* Did you see that students needed better opportunities for mentoring, a need to improve the climate in order to improve persistence, etc.?)
- Has the goal or the mission of the program changed since its inception, and if so, what precipitated the change?

I'm now going to ask you a number of questions specifically about the students the program serves.

- What population of students do you serve or target?
- How do you recruit prospective students to participate in the program?
- How do you determine eligibility?
- How do you advertise the program?

### **OUTCOMES OF THE PROGRAM:**

The following questions are related to outcomes of the program. I am interested in determining how well the design of the program meets its stated goals and the needs of the students.

- Does the program meet its mission and stated goals?
- How successful is the program at achieving its stated goal(s)? By what criteria is success determined? To what do you attribute its success or lack of it?



- Has the program been formally evaluated (i.e., internally or externally)? What was the focus of the evaluation and what were the results? Would you be willing to share a copy of the evaluation(s) with me?
- What do you see as the immediate and long term impacts of this program on students? (*Possible probes: Why do you feel that this program is beneficial to students? How do you feel that this occurs? How do you measure the impacts?*)
- What component(s) appear to be most beneficial and useful to students? Why?
  - Sense of belonging is defined as perceived social support on campus, a feeling or sensation of connectedness, the experience of mattering or feeling cared about, accepted, respected, valued by, and important to the group (e.g., campus community) or others on campus (e.g., faculty, peers). Do you help students feel a sense of belonging in your program? If so, in what ways?
  - Science identity encompasses three components: performance, competence, and recognition. Do you help students develop their science identities in your program? If so, in what ways?
- Do you follow-up with program participants after receiving services? For how long and how frequently?
- Have there been any modifications or adjustments to the program? If so, how has the program changed? What informed these changes? (*Possible probes: Did you collect and analyze data, conduct focus group interviews, or gather any other data that informed your decisions? In other words, were these modifications based on research?*)
- Is there is an area of the program you would like to expand or improve upon? If so, what would it be? (*Possible probes: Would you like to create a greater sense of belonging among the students who participate in the program? Why or why not? Would you like to intentionally cultivate the science identities of program participants? Why or why not?*)

**WRAP UP:**

- What else is important for me to understand about the operation and impact of your intervention program on your campus?
- Is there anything else that you would like to add regarding your intervention program?

**\*Note:** Some questions were taken from the STEM Trends In Enrollment & Persistence for Underrepresented Populations (STEP-UP) at the University of Illinois-Urbana Champagne and adapted to fit the context of this study.

## **Instructor Interview Protocol**

### **General**

- What has been your experience working at JSU?
- How would you describe the Engineering and Science Summer Academy and the Diversity Programs Office Scholars Program (Scholars Program)?
  - What about the program works?
  - What is the program lacking?

### **Expertise Model of Student Success**

- Since you've been at JSU, what kinds of challenges have you seen students having to overcome?
  - Possible Probe: Everyone faces challenges to success in transitioning from high school to college or differences between high school and college. Have you seen other students of color struggle with these transitions or differences? Has anything like that happened to the students you've encountered?
- What kind of information do you think students need to know in order to be successful in college?
- How has the Scholars Program helped students to deal with those kinds of challenges?
- How has the program helped students obtain information to overcome challenges in college?
- While working with the program, have you personally helped students overcome challenging circumstances? If so, can you provide an example(s)?

### **Sense of Belonging**

- Some students talk about knowing what it feels like to belong; they describe belonging as fitting in, feeling cared about, accepted, or valued by or important to a group.
- Did you help students feel a sense of belonging with you or in your classroom? If so, in what ways? (Possible Probe: What were the strategies and practices that you implemented in your classroom?)
- Do you think the program encouraged instructors to create a sense of belonging with students or in their classroom? If so, in what ways?

### **Science Identity**

- Some students talk about science identity as the attributes or characteristics that makeup a scientist/engineering or emerging scientist/engineer. Some of these attributes may include feeling competent, being able to perform in math/science settings, or being recognized as a scientist/engineer.
- Did you come across students who exhibited a strong science (or engineering) identity? If so, what was different about them in comparison to other students?
- Were there ways that you tried to help students reflect upon their (emerging) science identity? If so, in what ways?

- Do you think being a part of this program helps students to develop their science identity? If so, in what ways?