
Memorandum

To: Setiati Sidharta and Mark Wong, Center for Science Excellence
From: Valeria Romero & Ying-Fang Chen, The Research and Impact Group, The Lawrence Hall of Science
Re: Center for Science Excellence Formative Feedback Spring 2018
Date: June 13, 2018

An end of the spring 2018 semester, a survey was administered to Center for Science Excellence (CSE) participants, including Scholars and non-scholars. The survey captured students' attitudes and interests in Science, Technology, Engineering, or Math (STEM) fields of study and careers. In addition, survey questions asked participants to share their perspectives about their experiences and features of the program. Twenty-four students completed the survey, though given students were able to skip any question there is variation in number of responses for some of the questions. Throughout this summary, we use "they" to refer to individual or groups of students in an effort to use language that is gender-neutral.

The following is an aggregate summary of students' responses for select questions to help inform ongoing program development.

I. Students' Self-Reported Education and Career Goals

Educational Goals. Transferring to a 4-year institution remains the main educational goal for the majority of the CSE participants. Specifically, of the 24 students who specified their current academic goals, 92% (22) of students indicated that they planned to transfer to a 4-year higher education institution, and 33% of them planned to obtain an associate's degree (see Figure 1).

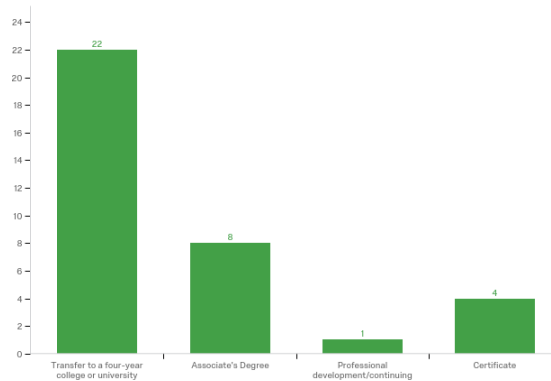


Figure 1. Students' self-reported educational goals (N=24)

CSE participants were involved or interested in a variety of STEM fields of study. The majority of students (14) were interested in pursuing a biological field of study such as biology, biochemistry, biotechnology, or molecular cell biology; five were interested in engineering fields of study including civil, mechanical and energy; and three students were interested in computer science or information technology. A few other students expressed interest in studying public health, social sciences or math.

Career Goals. Among the 24 respondents, nearly all students specified a career or job that was in the STEM field. Of students who indicated what types of jobs they were planning to pursue, ten specified a job in the medical or health related field and 13 specified a job in other STEM fields, including computer science or information technology, engineering or research.

Student Employment. Per CSE’s request, we added a question about the number of hours students work on- and/or off-campus. Out of 24 respondents, 75% indicated that they work, as illustrated in Table 1. In accordance with federal standards, the majority of those students work part time (i.e., less than 30 hours). Though, two students reported working full time, both of whom reported working over 40 hours per week. Students’ responses also suggested that there is a range in whether students work on and/or off-campus. 13 students indicated that they either work on or off campus, while 5 students indicated that they work a combination of on- and off-campus jobs. This presents important context, particularly in terms of how “accessible” programming or support services are to students. For instance, the two students who indicated that they work over 40 hours per week, also indicated that they work primarily off-campus, which may result in those students being less likely to attend seminars or pursue internships because of work obligations. Whereas students employed on campus may have more flexibility because employers know that students’ primary obligation is school, suggesting that programming, as designed, may be more accessible to students who work part-time and on-campus. This survey did not explore this specific question, however, it may be worth gathering further student perspectives in the future.

Table 1. Students’ self-reported employment (approximate number of hours per week)

	Doesn’t work	Less than 10 hours	10-20 hours	21-40 hours	Over 40 hours
# of students	6	7	5	4	2

II. CSE Program Expectations and Satisfaction

Top Reasons Students Applied to CSE

Students indicated some reasons they were interested in applying to CSE, from a list provided in a survey. The top four reasons students indicated wanting to be part of CSE include (1) academic advising, (2) internship opportunities, (3) transfer support, and (4) scholarships. Other reasons mentioned are included in Figure 2.

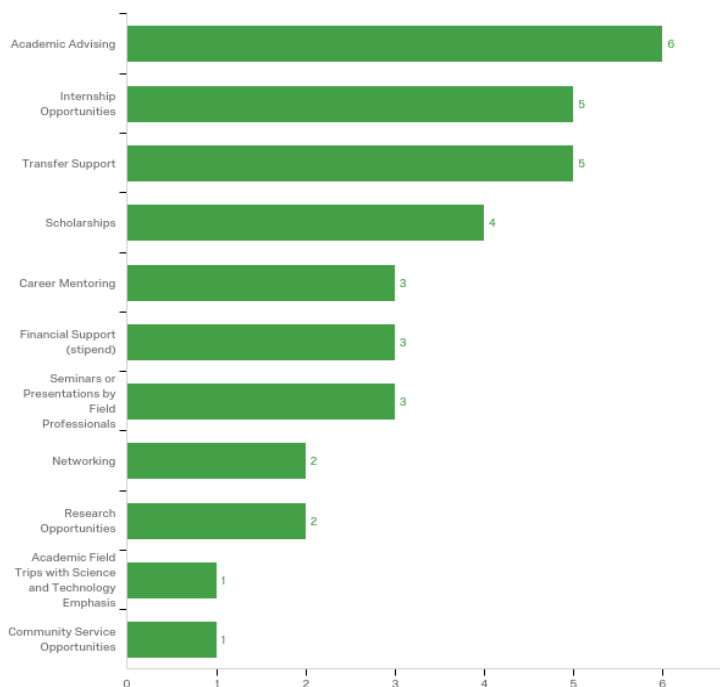


Figure 2. Students' self-reported reasons for applying to CSE (Count)

Students' Experiences and Perceptions of Participating in CSE Program Activities

Frequency of use. Students reported how frequently they used each of the CSE program activities on a 5-point scale (i.e., often, sometimes, rarely, never, I do not know what this is) during the Spring 2018 semester. Table 2 illustrates the top program activities in which students most frequently participated (indicated by “often” or “sometimes”) including (1) Seminars or presentations by STEM Professionals (95.7%); (2) Faculty Mentoring (91.3%); (3) Academic Advising (87.0%); (4) Faculty-led science workshops, Mentoring groups with students who have common majors/courses and Networking events (73.9% each); and (5) Transfer support services (77.78%).

Table 2. Most frequently used CSE program activities, indicated by “Often or Sometimes” (N=23)

CSE Program Activity	“Often” or Sometimes”
Seminars or presentations by STEM Professionals	95.7%
Faculty Mentoring	91.3%
Academic Advising	87.0%
Faculty-led science workshops	73.9%
Mentoring groups with students who have common majors/courses	73.9%
Networking events	73.9%
Transfer support services	69.6%

Students’ feedback from the survey and focus group interviews supported these activities as the most frequently used. Differences in frequency of use likely reflects the perceived values students place on each of the activities and/or how applicable the activities are for students at a particular point in time.

For instance, 69.6% of students reported using transfer support services “often” or “sometimes”. Students who may not be transfer-ready may be less likely to use these support services as frequently since they focus more on completing the various requirements for the applications such as statement of intent or letters of recommendation. Whereas, a higher percentage of students reported participating in the Seminars by STEM professionals and Faculty mentoring because, according to students, they provide opportunities for students to learn about various pathways in STEM as well as access more individualized support and mentoring. More feedback about the value of activities is described in the “Perceived usefulness” section of this summary.

Table 3 illustrates the six least used program activities, indicated by “rarely” or “never”. The majority of students reported rarely or never using the faculty-led math workshops (69.6%) or math jam (60.9%). A little less than half of students also reported rarely or never using the supplemental instruction sessions, peer-led team learning, academic field trips and alumni events. Since the Spring 2017, evaluation surveys seem to suggest that the math-focused program activities continue to be underutilized among CSE students. Given that the Math Jam was proposed as a new program offering for CSE students, it would be worth further exploring how CSE can further encourage students to take advantage of these opportunities, perhaps through increased outreach. In previous focus groups students noted that they were not aware of math jam and while it is not clear based on the survey responses this year whether this continues to be the reason students were not taking advantage of Math Jam, specifically, open-ended survey responses suggest that students were not always aware of all the program activities that were available to them.

Table 3. Least frequently used CSE program activities, indicated by “rarely” or “never” (N=23)

CSE Program Activity	“Rarely” or “Never”
Faculty-led math workshops	69.6%
Math Jam	60.9%
Supplemental instruction sessions	47.8%
Peer-led Team Learning	43.5%
Academic field trips	43.5%
Alumni events	43.5%

Survey responses also suggest that academic field trip continues to be a support service that not everyone participated in. In focus groups, students acknowledged that there were a couple field trips organized to Chevron and the Lawrence Hall of Science during the CSE Friday seminar hours and added that it would be great if CSE could continue providing field trip opportunities during those times. Students also shared that they would love to have an opportunity of field trips that are more project- or research-based. For example, during one field trip, a faculty mentor took students to collect soil samples that would undergo a nutrient analysis. One student shared that it was great to participate in an activity that was contributing to a research experience. Such a comment suggests that field trips could serve as an opportunity for students to gain new skills. Similar sentiments were shared during the Winter 2018 focus groups, where students suggested that field trips could also provide more opportunities for networking and learning about job opportunities. With these suggestions in mind, for the coming year, it may be worth planning a few field trips locally where students could attend conferences or visit research labs in some of the local universities or other institutions. In addition, another student suggested that there could be an opportunity to take a field trip to a nearby University of California campus since their semester often starts before Contra Costa’s. Students could then have an opportunity to shadow CSE

alumni to get to get a sense of what the experience at a four-year is like. While this could be a highly beneficial experience, it would be important to consider reaching out to students who are in their fourth or fifth year so not to burden or overwhelm new transfers who are acclimating to their new campus.

It is worth reiterating that in the context of field trips, students noted that information about field trips (and other program activities) is primarily distributed via email and consisted of various program updates. Students shared that solely relying on email or in-person as a source of communication makes it difficult to stay attune to what is happening. Students suggested that having a bulletin board with a calendar of events in combination with emails and announcements could enhance outreach efforts, not just for field trips but all program activities. In other contexts, text message reminders, using programs like *Remind* (<https://www.remind.com/>), have been a useful tool in supporting increased communication with students. Students, further, requested that in addition to the orientation, having a documented handbook of all program activities (and expectations) would be a helpful resource.

Perceived Usefulness of CSE program activities. Students were asked to report how helpful each of the program activities was. The program activities that students found “helpful” or “very helpful” are illustrated in the Table 4. In summary, “Seminars or presentations by STEM Professionals” (100%), “Faculty Mentoring” (86%), “ Science conferences” (82%), and “Study Groups” (82%) were the four program activities that most students found helpful; whereas the least students benefited from “Math Jam” (41%).

Table 4. Students’ perceived usefulness of CSE program activities, indicated by “very helpful” or “helpful”

CSE Program Activity	Very Helpful or Helpful	N
Seminars or presentations by STEM Professionals	100.0%	22
Faculty Mentoring	86.4%	22
Science conferences	81.8%	22
Study Groups	81.8%	22
Transfer support services	77.3%	22
Academic Advising	77.3%	22
Peer tutoring sessions	77.3%	22
Faculty-led science workshops	72.7%	22
Academic field trips	72.7%	22
Mentoring groups with students who have common majors/courses	68.2%	22
Career planning/advising workshops	71.4%	21
Community service opportunities	63.6%	22
Networking events	59.1%	22
Peer-led Team Learning	59.1%	22
Supplemental instruction sessions	47.6%	21
Alumni events	45.5%	22
Math Jam	40.9%	22

As in previous summary reports, the seminars continue to be a positive experience for students because they provide opportunities for students to hear directly from people working in the field about 1) their pathway and 2) what type of work they do. Focus group participants particularly pointed to seminars where alumni came back to share their current work because their narratives and lived experiences often resonated with many of the students. Students shared that they could see themselves in the speakers and that hearing about alumni's pathways provided them with a confidence boost that one day they could be in a similar place. In response to feedback shared in the Winter 2018 focus groups, students in the focus groups acknowledged, and appreciated, that this semester there was a wider range of professionals in terms of the sectors they represented. Though, one student suggested that it would be great to see guest speakers that represented more "diverse" backgrounds, specifically they would like to see more women of color share their experiences. Again, recognizing that many of the guest speakers are drawn from personal connections and/or alumni in the local area, it may be worth identifying other ways to engage professionals/alumni. As shared in the Winter 2018 summary, web-based videoconference platforms can be a useful tool to engage alumni that are outside of the Bay Area. Many of these platforms, such as Google Hangouts and Zoom, have features that can support more interactive opportunities. However, it would be important to carefully consider that number of people that participate, as it would not be as effective in a typical seminar setting where 20-50 people are present. In addition, CSE can continue to play a role in sharing ongoing events on campus or in the community to support students' networking opportunities.

Focus groups and survey responses also affirm that faculty mentoring is one of the more useful programmatic aspects. Students shared that the faculty have a wealth of information and resources, and are always willing to support and guide students. Focus group participants described the faculty mentors as "college parents" noting that they are always looking out for students, trying to identify resources and opportunities that will help students grow and succeed. Students shared that for first-generation college students this is particularly valuable.

One new programmatic activity that emerged amongst students this year was the semester-project. A number of students described working together to build a model rocket that they programmed to measure the earth's atmosphere. Students shared that the project was primarily for engineering students. Students that participated in this project explained that this experience was valuable because it provided them with an opportunity to transfer things that have learned in their courses to a real-world application-based project, which they then presented in a research symposium. Through the experience, students reported gaining new skills, such a programming, learning how to work collaboratively, and developing confidence in communication. It is unclear based on student feedback whether this experience was part of CSE, however given students feedback that they would like more opportunities to engage in opportunities to develop research or other professional skills, it may be worth thinking about how to create similar kinds of connections for all CSE students.

Students also added that the advising and scholarships are a valuable aspect of CSE. Students noted that at Contra Costa College, advisors generally tend to be less familiar with STEM-major requirements. Yet through CSE, students have access to faculty and advisors that can provide more tailored guidance. Students also mentioned that this year there was a new STEM-advisor but that the advisor had limited available. A couple students further noted that they had learned about the STEM advisor until the end of the academic year. While students noted that faculty tend to be an additional helpful resource in this area, they would like to see CSE offer additional mentors or advisors with more specialized expertise particularly in math and computer science. Students noted that Contra Costa has a new computer science

program but that the support systems are not yet well established, so this could be an area that CSE can further support.

In regards to scholarships, a number of students who receive scholarships share that this is a highly valuable resource. One student shared that the scholarship enabled them to decrease the number of hours they had to work, resulting in having two additional days to study. Though, it is important to note that not all students are eligible for scholarships. Because the scholarships are funded through the National Science Foundation, students must be eligible for the Pell grant. This has critical implications for students who are not eligible due to a number of reasons such as immigration status or financial dependency. One student shared that even though they did not financially rely on parents, they were still considered dependent and did not qualify for financial aid. While CSE is limited in their ability to offer students in these circumstances a scholarship funded through this grant, there is a question about what role can CSE play in helping students identify additional sources of financial aid. This, of course, is a question that many within higher education institutions continue to struggle with.

Interestingly, there were six programs activities that at least one-third of students identified as “not applicable” (see Table 5). Students did not offer explanations as to why these activities were not applicable, though it is likely that students did not participated in these program activities or did not know what these activities were. However, if these are programmatic activities that CSE deems as integral to its approach, then it may be worth exploring why these activities continue to be underutilized and/or undervalued in future surveys or focus groups.

Table 5. Program activities reported “Not Applicable”

CSE Program Activity	Not Applicable	N
Supplemental instruction sessions	47.6%	21
Alumni events	40.9%	22
Faculty-led math workshops	40.9%	22
Math Jam	36.4%	22
Networking events	31.8%	22
Peer-led Team Learning	31.8%	22

Perceived confidence.

Students were presented with a list of statements that reflected their perceived confidence related to a range of skills and outcomes that CSE aims to foster. Students rated on a four-point scale (1= Not at all confident, 2= Somewhat confident, 3= Confident, 4= Very Confident). Students were asked to reflect on their confidence levels in the set of skills and outcomes at the beginning of the semester retrospectively and on how their confidence levels were at the end of the semester as a result of participation in the CSE.

The paired-samples *t* test analysis shows (see Table 6) that except for two skills, students’ confidence levels in the rest set of skills and outcomes have grown statistically significantly from the beginning of the program to the end of the program, suggesting that students perceive the program overall to be positively influencing their confidence levels. Specifically, after one semester of participation in the CSE, students were more confident in writing a person statement/resume, finding and interviewing for a job, intern, or scholarship, mentoring young people who are interested in science, communicating with peers/faculty/science professionals, working in a team in school and professional settings, doing well in math, transferring to a 4-year institution, and completing an associate or bachelor’s degree.

Students had relatively high perceptions of their confidence in being a leader in community and doing well in science at the beginning of the semester. And students' confidence on these 2 skills at the end of semester did not differ from that at the beginning of the semester.

It is important to note that this analysis was performed based on small sample sizes (N = 13 to 14), meaning that there might be some degree of biases in the results. It is important to aware of this limitation when interpreting results.

Table 6. Growth in confidence in a set of skills and outcomes

Items	N	Mean Beginning of Semester	Mean end of Semester	Mean Difference	t	Sig
Complete an associates degree	14	2.79	3.5	0.71	-3.68	0.0*
Write a personal statement	14	2.14	3.43	1.29	-4.22	0.0*
Write a resume	14	2.14	3.36	1.21	-3.46	0.0*
Communicate with my peers	14	2.64	3.36	0.71	-2.69	0.0*
Transfer to a 4-year institution	14	2.29	3.29	1	-4.27	0.0*
Mentor young people who are interested in science	14	2.36	3.14	0.79	-2.62	0.0*
Communicate with faculty	14	2.43	3.14	0.71	-2.22	0.0*
Work in a team on school projects	14	2.29	3.14	0.86	-3.38	0.0*
Do well in my math classes	14	2.57	3.14	0.57	-2.83	0.0*
Communicate with science professionals	14	2.29	3.07	0.79	-3.67	0.0*
Be a leader in my community (e.g., as a mentor, tutor)	14	2.57	3	0.43	-1.88	0.1
Do well in my science classes	14	2.71	3	0.29	-1.17	0.3
Interview for a job, internship and/or scholarship	14	1.93	2.86	0.93	-3.24	0.0*
Work in a team in professional settings (internships, jobs, etc.)	13	2.08	2.85	0.77	-3.33	0.0*
Find an internship and/or research experience placement	14	1.71	2.79	1.07	-3.74	0.0*

Complete a bachelor's degree	14	2.5	3.14	0.64	-3.23	0.0*
Broaden my knowledge about science (e.g., research, emerging fields)	14	2.5	3.21	0.71	-2.35	0.0*
Pursue career in STEM field	13	2.69	3.31	0.62	-2.31	0.0*

* $p < 0.01$

III. Summer Internships and Research Experiences

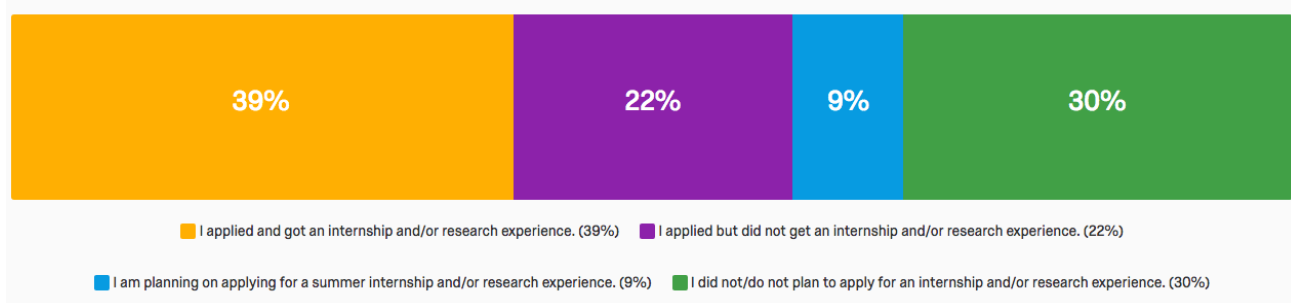


Figure 3. Students' reported plans to apply for research internships

One component of CSE is helping students to apply and obtain summer internships and research experiences. Interestingly, there was a range in responses in terms of students' intent to apply for a research internship (see Figure 3). Of 23 respondents, 39.1% of students indicated they had applied and obtained a research internship. 21.74% of students indicated they had applied but did not secure an internship and 30.4% of students indicated they were not planning on applying for an internship. Among those that reported obtaining an internship, students reported they would be working at (1) government labs such as the U.S. Department of Agriculture (USDA); (2) medical research labs such as Children's Hospital or UCSF, Health Leads; or an (3) university-based research lab, such as Georgia Institute of Technology. Among students who were not doing an internship, overall most students reported they would be working and/or taking classes. Open-ended responses do not suggest that students would not apply at all, so responses should not be interpreted as a lack of interest among students. Students did share, however, that internships (facilitated by CSE) are often targeted for students who have not had a research experience yet, which may contribute to the higher percentages of students indicating they were not planning on applying. For future surveys, we will revise this question to ensure that this information is reflective of students' overall research experience. With that said, one student in a focus group shared that they were still interested in gaining more research experience but that finding opportunities for community college students was challenging and they were not sure where to look. It may be worthwhile CSE providing a workshop about how to look for internships through other programs or directly with institutions to support students who want to continue gaining research experience.