Materials Connection REU Site (MacREU R'Side) Evaluation, 2014*

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Abstract

This is the evaluation for the first year of the REU site. Overall, the program performed very well in exposing students to science and engineering, building their scientific skills and encouraging them to pursue a PhD. Students reported a number of organizational challenges that we will address for the program's second year.

1 Introduction

"Materials Connection REU" (MacREU R'Side) was a 10 week REU site in which 15 undergraduate students from nearby colleges had the opportunity to conduct research in science and engineering labs on the UCR campus in the summer of 2014. The students came from demographic groups that are under-represented in STEM fields, and were carefully selected among applicants as those who were at risk of not pursuing a career in science.

This evaluation draws on four data sources 1) a survey of participating students based on the REU template available on the "Student Assessment of Learning Goals" website (http://salgsite.org); 2) responses participating students provided orally in a end of program meeting; and 3) responses from a faculty member who participated in an end of program meeting.

Overall, the first year of the program well met its academic goals of exposing students to research, building their academic research skills, and gaining their interest in pursuing science and engineering as a career at the PhD level. The participating students and the faculty member offered many suggestions on how to improve the organization of the program and we will incorporate those suggestions in year 2.

2 Student Assessment of Learning Goals Survey Results

In this section, we present the results of a survey we administered to the 15 participating students. All of these students filled out a survey. The survey comes from a template for REU evaluations available at the Student Assessment of Learning Goals website. We used this website to administer the survey.

Overall, the program well met its goals of introducing students to scientific research as a career and helping them to build capacity for conducting scientific research. This can be seen for example in Figure 1. In this section of the survey, students were asked to rate their own gains from the program in learning how to think scientifically and work like a scientist, and to apply scientific knowledge to research. On average, students report good to great gains in skills such as analyzing data for patterns, formulating a research question and understanding theory and concepts. While there is some variability in responses, in no case did the confidence interval around these averages include a rating of only "moderate gain."

Gains in THINKING AND WORKING LIKE A SCIENTIST: APPLICATION OF KNOWLEDGE TO RESEARCH WORK.

1. How much did you GAIN in the following areas as a result of your most recent research experience?	1:no gains	2:a little gain	3:moderate gain	4:good gain	5:great gain	9:not applicable	Mean	N
1.1 Analyzing data for patterns.	0%	0%	13%	33%	53%	0%	4.4	15
1.2 Figuring out the next step in a research project.	0%	0%	20%	33%	47%	0%	4.3	15
1.3 Problem-solving in general.	0%	7%	27%	33%	33%	0%	3.9	15
1.4 Formulating a research question that could be answered with data.	7%	7%	27%	13%	47%	0%	3.9	15
1.5 Identifying limitations of research methods and designs.	0%	0%	27%	40%	33%	0%	4.1	15
1.6 Understanding the theory and concepts guiding my research project.	0%	0%	13%	27%	60%	0%	4.5	15
1.7 Understanding the connections among scientific disciplines.	0%	0%	13%	40%	47%	0%	4.3	15
1.8 Understanding the relevance of research to my coursework.	0%	0%	27%	13%	60%	0%	4.3	15

Summary of scale results
The graphic below lists the mean and confidence interval (±3 times the standard error) for each item.

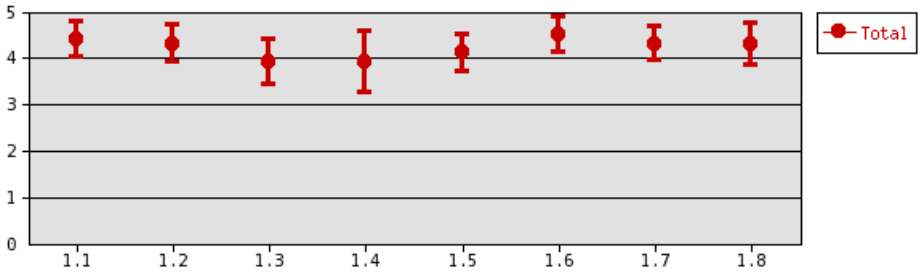

Figure 1: Gains in Thinking and Working Like a Scientist

Likewise, in figure 2 students reported considerable personal gains in their own capacity to do research, in areas such as their own ability to contribute to science, their confidence to do well in future science courses, and understanding what everyday research is like. Like in Figure 1, in no case did a confidence interval around a question mean include only a moderate gain response.

PERSONAL GAINS RELATED TO RESEARCH WORK

2. How much did you GAIN in the following areas as a result of your most recent research experience?	1:no gains	2:a little gain	3:moderate gain	4:good gain	5:great gain	9:not applicable	Mean	N
2.1 Confidence in my ability to contribute to science.	0%	0%	27%	20%	53%	0%	4.3	15
2.2 Comfort in discussing scientific concepts with others.	0%	13%	13%	20%	53%	0%	4.1	15
2.3 Comfort in working collaboratively with others.	0%	13%	13%	13%	60%	0%	4.2	15
2.4 Confidence in my ability to do well in future science courses.	0%	7%	20%	20%	53%	0%	4.2	15
2.5 Ability to work independently.	0%	0%	27%	20%	53%	0%	4.3	15
2.6 Developing patience with the slow pace of research.	0%	7%	20%	33%	40%	0%	4.1	15
2.7 Understanding what everyday research work is like.	0%	7%	7%	20%	67%	0%	4.5	15
2.8 Taking greater care in conducting procedures in the lab or field.	0%	7%	13%	0%	80%	0%	4.5	15

Summary of scale results

The graphic below lists the mean and confidence interval (±3 times the standard error) for each item.

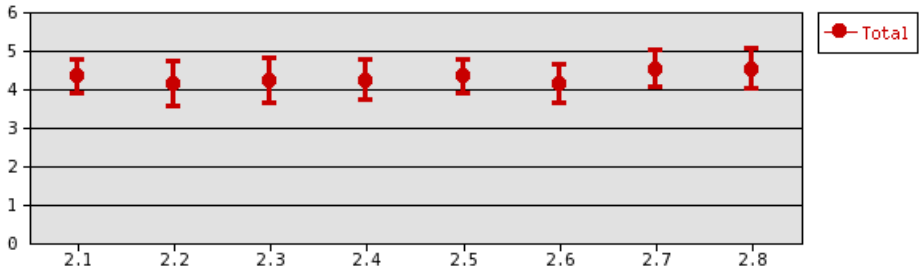

Figure 2: Personal Gains Related to Research Work

Figure 3 also presents considerable evidence that students improved their professional skills such as how to prepare a scientific poster, keeping a detailed lab notebook and understanding journal articles. Students gave slightly lower responses to questions regarding their gains in writing scientific papers, making oral presentations and defending research orally (questions 3.1 to 3.3). It is not likely that undergraduates in a 10 week program will learn to write academic papers, but we do intend for students to improve their oral presentation and interaction skills, so we will work to ensure that students get more training and experience in that regard.

Gains in SKILLS

3. How much did you GAIN in the following areas as a result of your most recent research experience?	1:no gains	2:a little gain	3:moderate gain	4:good gain	5:great gain	9:not applicable	Mean	N
3.1 Writing scientific reports or papers.	7%	0%	33%	20%	20%	20%	3.6	12
3.2 Making oral presentations.	13%	13%	20%	20%	27%	7%	3.4	14
3.3 Defending an argument when asked questions.	13%	13%	33%	20%	20%	0%	3.2	15
3.4 Explaining my project to people outside my field.	0%	7%	27%	20%	47%	0%	4.1	15
3.5 Preparing a scientific poster.	7%	0%	20%	27%	47%	0%	4.1	15
3.6 Keeping a detailed lab notebook.	7%	7%	33%	20%	33%	0%	3.7	15
3.7 Conducting observations in the lab or field.	0%	7%	13%	27%	53%	0%	4.3	15
3.8 Using statistics to analyze data.	7%	13%	20%	27%	20%	13%	3.5	13
3.9 Calibrating instruments needed for measurement.	0%	7%	20%	27%	40%	7%	4.1	14
3.10 Working with computers.	13%	13%	7%	20%	33%	13%	3.5	13
3.11 Understanding journal articles.	0%	7%	20%	33%	40%	0%	4.1	15
3.12 Conducting database or internet searches.	0%	7%	33%	27%	33%	0%	3.9	15
3.13 Managing my time.	0%	0%	33%	27%	40%	0%	4.1	15

Summary of scale results

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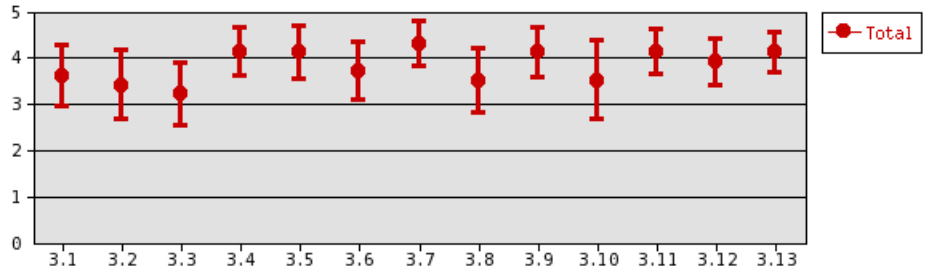

Figure 3: Gains in Academic Skills

Figure 4 continues to support the view that students gained in their self-efficacy for conducting research, where students typically indicated their gained a fair amount or a great deal in their own feelings of efficacy in engaging in real-world science research, feelings of responsibility for their research project, and feeling part of the scientific community. Students indicated relatively lower gains in their own ability to try out new ideas or procedures on their own and interacting with scientists from outside of the school, but neither of these were core or realistic objectives for a 10 week summer program for undergraduates.

The following questions ask about your overall research experience and about any changes in your attitudes or behaviors as a researcher.

4. During your research experience HOW MUCH did you:	1:none	2:a little	3:some	4:a fair amount	5:a great deal	9:not applicable	Mean	N
4.1 Engage in real-world science research	0%	13%	0%	20%	67%	0%	4.4	15
4.2 Feel like a scientist.	7%	0%	0%	20%	73%	0%	4.5	15
4.3 Think creatively about the project.	0%	13%	7%	27%	53%	0%	4.2	15
4.4 Try out new ideas or procedures on your own.	20%	7%	7%	20%	47%	0%	3.7	15
4.5 Feel responsible for the project.	0%	7%	0%	27%	67%	0%	4.5	15
4.6 Work extra hours because you were excited about the research.	7%	7%	20%	7%	60%	0%	4.1	15
4.7 Interact with scientists from outside your school.	20%	20%	0%	27%	27%	7%	3.2	14
4.8 Feel a part of a scientific community.	13%	0%	13%	20%	53%	0%	4.0	15

Summary of scale results
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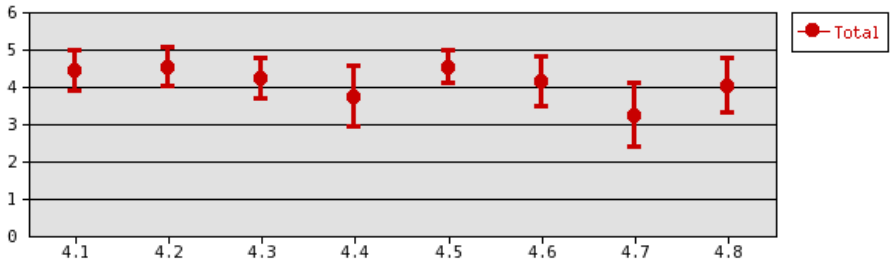

Figure 4: Attitude and Behavioral Changes

Overall, students rated the quality of their research experience as very good, including their working relationships with their research mentor, the amount of time doing meaningful research and the overall experience. Students indicated relatively lower scores for the amount of time spent with their mentors and getting advice from their mentors about graduate schools. These latter two items are core elements of the summer program so we will address these in year two, both by involving more appropriate lab personnel as mentors (and in particular focusing on building relationships with graduate students in the lab, and with additional training for mentors). The questionnaire also give students an opportunity to add more thoughts on the quality of their research experience and they wrote as follows.

- My mentor during the MACREU program was unaware of the agenda of the program and was therefore not able to communicate with me in regards to the program. The graduate students in which I worked with were more aware of the MACREU program but only due to my communication to them NOT the program's doing.

- I feel I may have learned much more if I was paired with a graduate student instead of a staff scientist. It was hard to communicate with him at first and I wasn't able to understand the big picture of my research until the very end.

These questions ask about your research experience.

5. Please rate the following:	1:Not applicable	2:Poor	3:Fair	4:Good	5:Excellent	:	Mean	N
5.1 My working relationship with my research mentor	0%	13%	20%	20%	47%		4.0	15
5.2 My working relationship with research group members.	0%	7%	7%	27%	60%		4.4	15
5.3 The amount of time I spent doing meaningful research.	0%	7%	7%	40%	47%		4.3	15
5.4 The amount of time I spent with my research mentor.	7%	7%	40%	0%	47%		3.7	15
5.5 The advice my research mentor provided about careers or graduate school.	27%	13%	13%	13%	33%		3.1	15
5.6 The research experience overall.	0%	7%	20%	13%	60%		4.3	15
5.7 Please comment on any of these aspects.	Enter codes for text answers						--	7

Summary of scale results

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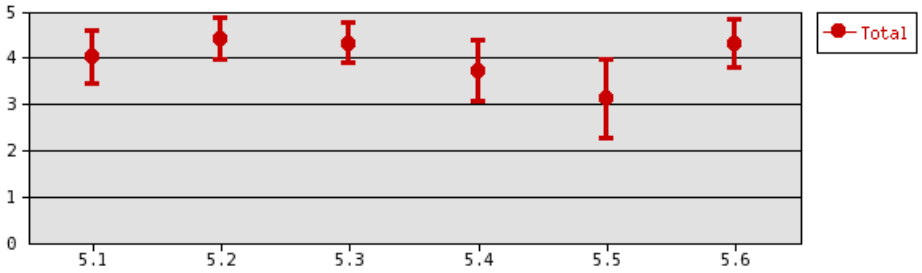

Figure 5: Quality of Research Experience

- My research mentor was always around to answer my questions, he encouraged me to ask questions and explained why this research is important.
- My research experience at UCR went extremely well and I am happy with the accomplishment.
- I am so grateful this opportunity was available to the community college district.
- I wish I could have had more interaction with my mentor.
- By research mentor, I mean my grad student that I worked it.

Research experience

6. As part of my most recent research experience...	1:yes	2:no	:	:	:	:	Mean	N
6.1 I presented a talk or poster to other students or faculty	80%	20%					--	15
6.2 I presented a talk or poster at a professional conference	27%	73%					--	15
6.3 I attended a conference	27%	73%					--	15
6.4 I wrote or co-wrote a paper that was published in an academic journal	7%	93%					--	15
6.5 I wrote or co-wrote a paper that was published in an undergraduate research journal	0%	100%					--	15
6.6 I will present a talk or poster to other students and faculty	80%	20%					--	15
6.7 I will present a talk or poster at a professional conference	60%	40%					--	15
6.8 I will write or co-write a paper to be published in an academic journal.	33%	67%					--	15
6.9 I will write or co-write a paper to be published in an undergraduate research journal.	33%	67%					--	15
6.10 I won an award or scholarship based on my research	13%	87%					--	15

Figure 6: Research Activities

Figure 6 summarizes the research communication activities students participated in. The program expected students to prepare a scientific poster as a part of the program, and most of them indicated that they either presented the poster or planned to present it. The program did not provide students an opportunity to prepare a talk, and most report not doing so, but it might be worth considering adding this opportunity for students even if the talks were only internal to each other.

Research experience

7. Rate how much you agree with the following statements.	1:Strongly disagree	2:Disagree	3:Agree	4:Strongly agree	: :	Mean	N
7.1 Doing research confirmed my interest in my field of study.	7%	7%	53%	33%		3.1	15
7.2 Doing research clarified for me which field of study I want to pursue.	0%	20%	47%	33%		3.1	15
7.3 My research experience has prepared me for advanced coursework or thesis work	7%	20%	47%	27%		2.9	15
7.4 My research experience has prepared me for graduate school.	7%	20%	47%	27%		2.9	15
7.5 My research experience has prepared me for a job.	7%	20%	40%	33%		3.0	15

Summary of scale results

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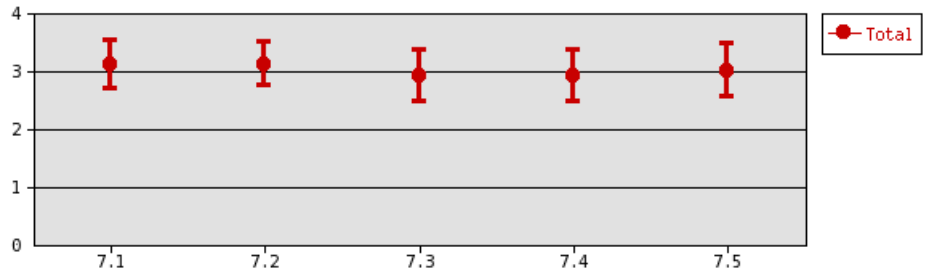

Figure 7: Effects of Research Experience on Personal Advancement

Figure 7 continues to lend support to our belief that the program enhanced students' interest in science and engineering as a career, typically indicating that the program confirmed and clarified their scientific career interests.

Research experience

8. Compared to your intentions BEFORE doing research, HOW LIKELY ARE YOU NOW to:	1:not more likely	2:a little more likely	3:somewhat more likely	4:much more likely	5:extremely more likely	9:not applicable	Mean	N
8.1 enroll in a Ph.D. program in science, mathematics or engineering?	13%	13%	20%	13%	33%	7%	3.4	14
8.2 enroll in a masters program in science, mathematics or engineering?	27%	0%	13%	13%	33%	13%	3.3	13
8.3 enroll in a combined M.D/Ph.D program	47%	0%	7%	20%	20%	7%	2.6	14
8.4 enroll in medical or dental school?	73%	0%	0%	7%	7%	13%	1.5	13
8.5 enroll in a program to earn a different professional degree (i.e. law, veterinary medicine, etc.)	67%	7%	0%	7%	7%	13%	1.6	13
8.6 pursue certification as a teacher?	53%	7%	13%	13%	7%	7%	2.1	14
8.7 work in a science lab?	13%	13%	20%	13%	33%	7%	3.4	14
8.8 Other. Please state your intended degree and, compared to your intentions BEFORE doing research, HOW LIKELY YOU ARE NOW to enroll in a graduate program leading to an advanced degree.	Enter codes for text answers						--	9

Summary of scale results
The graphic below lists the mean and confidence interval (±3 times the standard error) for each item.

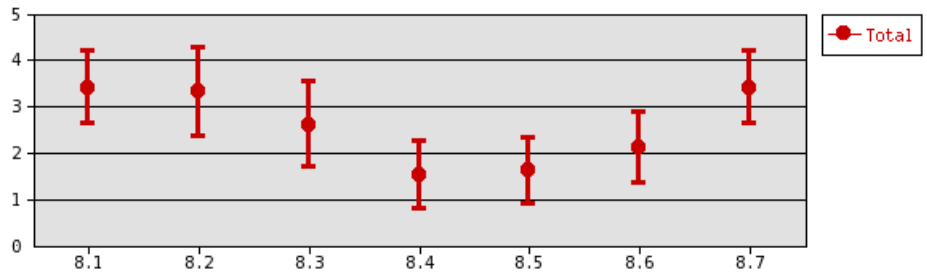

Figure 8: Effect of Experience on Entering the Pipeline

Figure 8 also confirms that the program enhanced students' expectations and interests in pursuing research and science as a career, indicating gains in interest in enrolling in a STEM PhD or masters' program and working in a science lab. The program did not enhance students' interest in medical, dental or law school which is expected. This figure overall indicates both the effectiveness of the program in enhancing students' interest in science and also that the program did not typically select students already on the science track, since if students entered program on a science career track they also would have indicated no gains.

The questionnaire also asked them to type in their intended degree and, "compared to your intentions BEFORE doing research, HOW LIKELY YOU ARE NOW to enroll in a graduate program leading to an advanced degree."

- I had original intentions of continuing schooling for a Masters in Chemical Engineering. Now I am thinking about pursuing a Ph.D. in Chemistry.
- I went into this program intending to gain an internship experience to prepare me

for industry after college. I originally did not want to go to graduate school, and after this program I still would like to go straight to industry.

- B.S. in Mechanical Engineering and now Masters in Biomedical Engineering.
- Before doing research I was strongly leaning towards only pursuing a masters degree, as opposed to now after I have completed this program and being able to perform research for an entire summer, I now want to enroll in a Ph.D program.
- Before doing research at UCR, my goal was to pursue up to a Master's degree. However, now I would love to earn a PH.D.
- I feel more versed in the possibilities of my degree, this experience makes me feel more empowered and proactive about how I intend to help the world with chemical engineering.
- I want to do research in the future still, however I think I am going to take a year off from school to work in industry hopefully or get more internships to further clarify what I really want to dedicate my time to in Grad school.
- I was always an engineering major and will stick to engineering. STEM field is the field i would like to study.

The questionnaire included an open-ended question asking students to reflect on how their research experience influence their own thinking about future career and graduate school plans. The students wrote,

- This was a good experience in that the program allowed me to glimpse the research hardships that come along with pursuing a higher academic degree.
- I plan on going straight to industry and maybe get an MBA in the future. Otherwise I have no other plans to advance further in academia
- I want to learn more so I can be better prepared for more research.
- My research experience has changed the way I think about graduate school, strongly motivating me to want to attend graduate school to obtain a Ph.D. Material Science is something I want to pursue now in graduate school.
- Before doing research at UCR, my goal was to pursue up to a Master's degree. However, now I would love to earn a PH.D.
- Graduate school seems like a good option, and I realize how important it is to have good personable relationships with the members of my group.
- I am looking into chemical and environmental engineering now as a career.
- This program showed me what graduate school is like and to be honest, I am not sure I am cut out for it
- Opened eyes to a different field, even though I am still an engineer major. Realizing how different each engineering field is.

The questionnaire also asked students to reflect on other ways the program enhanced their interest in science as a career and led to personal gains, and they wrote,

- It taught me how science in general is done in a professional setting.
- I gained in other skills such as using software that readily used in my field.
- Other gains that I made during this summer research program were opportunities to see other fields of research, opportunities to interact with researchers in other fields, and an opportunity to experience what it is like to be a graduate student.
- While doing research, I learned to work with others and adapted into the environment. Also, the program provided training on the GRE which is extremely useful for my future.
- Connections with peers and learning about other research was gained.
- I gained amazing connections with faculty

The following questions ask about aspects of the research program.

11. How satisfied were you with the following aspects of the research program?	1:Not applicable.	2:Very dissatisfied	3:Somewhat dissatisfied	4:Somewhat satisfied	5:Very satisfied	: Mean	N
11.1 The application process.	0%	7%	0%	40%	53%	--	15
11.2 Support and guidance from program staff.	7%	33%	13%	13%	33%	--	15
11.3 Support and guidance from my research mentor.	7%	7%	13%	13%	60%	--	15
11.4 Support and guidance from other research group members.	0%	0%	13%	33%	53%	--	15
11.5 Research group meetings.	7%	0%	20%	27%	47%	--	15
11.6 Financial support.	0%	7%	13%	27%	53%	--	15
11.7 Group social activities.	7%	20%	27%	13%	33%	--	15

Figure 9: Satisfaction with the Program

Figure 9 indicates mixed views from students on the organization and structure of the program itself. In particular, students gave relatively low marks to support and guidance from the program staff, few research group meetings and lack of social activities. The mixed reviews on the organization of the program are disappointing but not entirely surprising in that the first year of the program also was a learning experience for the PIs. This feedback from students is invaluable as we plan the activities for year 2, which will include better training and involvement with lab personnel, more staff attention to the group training and activities, and more planned social activities including movie night, a MacREU facebook page and other improvements.

Training Sessions

12. How MUCH did the following activities support your learning?	1:Did not do this activity	2:Not at all	3:A little	4:A good amount	5:A great deal	:	Mean	N
12.1 Workshop(s)on science writing and presentation.	0%	0%	47%	27%	27%		--	15
12.2 Training in library/internet/database search methods.	0%	7%	33%	20%	40%		--	15
12.3 Safety training	0%	0%	13%	40%	47%		--	15
12.4 Ethics seminar(s)	13%	7%	27%	33%	20%		--	15
12.5 Training in human or animal subjects regulations.	20%	7%	20%	27%	27%		--	15

Figure 10: Gains from Professional Training

Figure 10 also indicates mixed views of the training offered, although in each case students typically report at least gaining a little learning from each program element.

How did you find out about research opportunities on campus?

14. I found out about research opportunities from:	1:yes	2:no	:	:	:	:	Mean	N
14.1 I knew this institution offered research opportunities to undergraduates before coming here	27%	73%					--	15
14.2 in class	27%	73%					--	15
14.3 an academic advisor	67%	33%					--	15
14.4 an announcement (flyer, poster, email, website, etc.)	27%	73%					--	15
14.5 a presentation given by professors or students about their research	27%	73%					--	15
14.6 Other (please specify):	Enter codes for text answers						--	3

Figure 11: Ways to Learn about Research Opportunities on Campus

Figure 11 indicates that students learn about research opportunities such as MacREU from a variety of sources. Students also indicated other sources for this information in an open ended question:

- Professor Robert Haddon recommended me for this position.
- A student that personally asked to join research at this institution extended to me this opportunity by letting me know about this application. only by very close connection.
- NSF website

The questionnaire provided students an open-ended question to report motivations they have to do research. Not many students responded to the question, but the ones that did respond wrote as follows:

- I want to do research because I am motivated to enhance my knowledge in the Material Science world.
- I hope this opportunity is extended to the community college and is given more of a voice to schools everywhere! There were still spaces available and I think it is a shame that was not taken advantage of.
- Gain overall knowledge in a variety of fields in engineering.

Students were also given the opportunity to reflect on how the program impacted their career plans, and they wrote as follows (some of the responses seem that they would be a more appropriate response to the next question about how to make the experience better, but I am keeping these responses here). Typically the on-point responses were quite positive.

- We as students of MACREU were promised during our first orientation meeting that a MACREU representative would be present for every future activity but this was NOT the case. The MACREU program was thrown into other research programs not associated or meant for us but meant for different research programs on the UCR campus. This was frustrating because we were not included nor did all the information give at these sessions were relevant to us. On top of this sign-in sheets for MACREU were not present at the sessions and we as students of the program had to on several occasions create our own sign-in sheet.
- The activity was very informative and gave me a first hand look at what it would be like to be in grad school doing research. I'm still deciding but I couldn't ask for a better experience that can help me decide.
- The graduate student panel was extremely helpful in giving insight into other research fields. The session on how to make a poster was also extremely helpful.
- It helped me understand the amount of work and dedication graduate school requires
- This gave me more of a deciding factor to go to graduate school.
- Our program MacREU was kind of pushed onto the activities of another program so a lot of times we felt left out in a way.
- Helpful to a certain extent. Knew most things said in the classes.

Students also were given an opportunity to write suggestions on how to make the program experience better (and in this vein we should add the first and second to last response from the previous list here).

- Organization. The program was not organized! Correlation between my adviser and the head of the MACREU program was not present. He was not aware of the ten week program and its intended goals. I felt lost and had to ask for help and find out certain information on my own. Some examples being how to go through safety certification, gain access to a lab key, and how to get a student ID for library access. Final presentations for the ten week program were not clarified for the participants of MACREU and were therefore difficult to attend to having no knowledge of what was expected.

- Getting paired with a graduate student who is willing to make the transition easier.

- It was amazing.

- What would have made this research experience better would have been the opportunity to have been here longer than 10 weeks.

- I wished if the GRE classes were not as early in the morning, however other than that, this experience was amazing and was constructed very well by the organizers

- I was extremely satisfied with my research experience at UCR, hope it was longer.

- I was very grateful for working alone (sometimes with the help of undergraduates) because I had the responsibility of reporting most of my information to my mentor. I would not mind a graduate student.

- Better stipend...

- If the program coordinators had placed more interest in us and participated more. If our mentor had interacted more with us as well.

- Overall my experience was great. However I heard from other students that they didn't like the research or the advisor; so I think a trial period is needed

- Research overall was great, very similar to the others research as well. Variety would have been better.

And students were asked an open-ended question on how to make the experience better overall.

- Stipends were late and not consistent; communication between the campus and the program directors needs to established. Orientation for the program was too vague and needs to be more extensive. Advisers (PIs) need to me informed of the MACREU intentions and goals. Representatives for MACREU should be present for each event/activity prepared for the participating MACREU students. Safety requirements both online and in lab should be clarified upfront.

- A much more structured training program allowing the student to make the transition from student to independent researcher.

- I would say more social activities. All I did was research and I was excited but also depressed. This may help those that have a hard time making friends on my own. There was a girl that didn't have any friends and looked so sad all the time. She was also not invited by those that made their own circle of friends. Program events would solve that.

- Overall, this research experience was great. Perhaps being able to split the time allotted for research in 2 labs that have similar work, will allow for a more extensive comprehension as to how similar research can be done using different methods.

- Provide better guidance for where the lessons/workshops will be held especially for students that don't attend UCR

- The undergraduate research program should expand more.

- MORE SOCIALS!!! I loved getting to know other science enthusiasts interested in education as much as I am.

- If it was more organized. More social events for the students to interact and socialize. If there was a bigger stipend because it was not enough specially because we had to pay for some of the housing.

- This program could have been better if the creators were there with the students more often.

- Throughout the entire internship, I wasn't sure were to go or what the outcome was. Basically, there needs to be more structure. Also more group activities would benefit the students to interact with each other

- More involvement and participation from the program managers. More social group activities to get to know each other better. Can be more organized as far as the calendar, directions, and the presentation overall.

3 End of program meeting with students

The PI and co-PI, along with the program administrator, met with students to get their feedback on how to improve the program. The students mentioned:

- The expectations for how they were to communicate their research were not clear and changed over the course of the program, with some indications that the students were to present a talk, then prepare a poster, and then state their research in a video. They want the expectations to be better set out in the beginning.

- The students would really value the opportunity to make an oral presentation of their research, and in particular to give a mini-conference to each other so that students can see what each other is working on and also learn about the variety of research going on in UCR labs. They also had the thought to do short informal

talks midway through the program, without results, just so that the students know each others' work while the program is underway. They also requested assistance from an editor who can help them prepare their talks.

- The students felt it important to see more of the program staff to ensure better communication in the program. For example, they suggested that we have a staff person attend each of the training sessions with a sign in sheet and who can also answer any questions they might have.

- They strongly recommend that each lab assign a graduate student as the mentor, rather than the PI, a postdoc or staff scientist. They find it much easier to approach and relate to a graduate student.

- They strongly desire more planned social activities to build friendships and collegial relations, such as hikes, visits to the botanical garden, movie night etc. They also suggested that the students set up a program Facebook page to help improve social interactions and to help with organizing social activities. The students very much enjoyed the ropes course.

- The students reported a number of bureaucratic glitches, which unfortunately are inevitable on the UCR campus, including the first payment being weeks late, issues with the payment and financial aid eligibility, getting a UCR NetID and parking infroamtion.

4 End of program meeting with faculty participant

One of the participating faculty members attended a feedback meeting and offered the opinion that the training on equipment was ill-advised, since students had to spend so much time on training they had less time to work on their projects. In addition, non-UCR students received this training and then left the lab so the skills are not especially useful to them. The faculty member proposed to have an operator help the students when they need access to equipment, or to have shorter training but then require the student to be more closely supervised by a graduate student. The exception might be that the UCR students can receive the training if they plan to continue to work in the lab after the conclusion of the program. Another suggestion was to charge a larger training fee for students who do not use the equipment within two months after the conclusion of the summer program.

5 Conclusion

Overall, the program was very successful in its goals of interesting students in a career in science and engineering, in equipping them for such a career, and providing with strong research experience and skills.

In some way, however, the first year was a learning experience for the PIs in that some organizational details can be improved in year two. These are best stated in the

section above where students offered suggestions in the end of the program meeting. These suggestions included clearer expectations on how they are to communicate their research, doing a mini-conference and a mid-program conference where students present their research orally to each other, enhanced staffing at training events, focusing on grad students as lab mentors and offering these grad students some training on the program's goals, more planned social activities, and better planning around bureaucratic glitches.