EXTERNAL EVALUATION MEMO

MERCEDE NAMATERIALS CENTER FOR ENERGY AND SENSING (MACES) Undergraduate and Graduate Student Surveys

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I. INTRODUCTION

This memo summarizes the external evaluation activities undertaken for Merced Nanomaterials Center for Energy and Sensing (MACES) in Summer 2018. During this period, the following evaluation activities were completed:

- Developed and distributed an online survey for undergraduate students who participated in the Undergraduate Research Fellowship
- Developed and distributed an online survey for undergraduate and graduate students who participated in the NASA Summer Internship Program
- Developed and distributed an online survey for mentors of the students who participated in the NASA Summer Internship Program

II. UNDERGRADUATE RESEARCH FELLOWSHIP

Ten students participated in the MACES Undergraduate Research Fellowship in summer 2018, which seeks to provide undergraduates with an opportunity to conduct research in a MACES faculty research lab and to further their training through professional development workshops.

The external evaluator, with input from MACES project staff, created an online survey of students who participated in the research fellowship in order to collect data about their perceptions of the program. Names and email addresses for ten students were provided by the MACES team to the external evaluator.

The external evaluator sent emails to students to invite them to complete the online surveys in August 2018. In addition to the invitations, the external evaluator sent two reminders and MACES staff also sent a reminder to complete the survey. Of the ten students invited to the survey, eight students (80%) responded.

Results

All interns who responded to the survey “strongly agreed” their research lab was supportive and friendly, and that they were treated with respect by their research group members, faculty mentor, and graduate student mentor (Figure 1). Five of eight students “strongly agreed” that their faculty mentor was available when they needed help and the remaining three students “somewhat agreed.” Regarding graduate student mentors, seven of seven respondents “strongly agreed” that they were available when the undergraduate student needed help. Students reported that their faculty and/or graduate student mentor helped them understand the goals of the summer research project, with six “strongly agreeing” and two of the eight respondents “somewhat agreeing.”
Undergraduate Research Fellowship students who completed the survey found that their mentors provided constructive feedback, with seven of eight “strongly agreeing” with the statement related to their faculty mentor and eight of eight “strongly agreeing” related to their graduate student mentor (one student did not answer this question).

Regarding research, all students who participated in the survey indicated that the summer research experience helped them improve their research skills, the research topic was interesting and engaging, and they had a good understanding of the strategy to attack their research problem (Figure 2).
Overall, students indicated that the summer research program was very effective in raising their awareness of opportunities in a STEM career and graduate school, and all survey participants would recommend the program to others.

Feedback and Recommendations

Students provided a variety of recommendations and feedback, particularly about the program schedule, presentation topics, and communication with mentors:

“This research program is a great opportunity for undergraduates. I believe the workshops that were held are helpful but sometimes can conflict with the schedule as students are working 40+ hours a week. Minimizing the meeting time to maybe 1 or two times a week might be helpful.”

“I believe that the program is structured very well and the presentations that took place on Monday mornings were very useful to obtain knowledge of different fields.”
“In the meetings weekly meetings more chemistry talks or just a greater variety in the talks would be nice. It got boring learning about the same research every week.”

“It may be helpful to provide more information to the professors and graduate mentors regarding dates for my assignments, as it gives them a better timeline on how to organize things.”

III. NASA SUMMER INTERNSHIP PROGRAM

In partnership with NASA, MACES students were chosen through a merit-based selection process to participate in a 10-week summer internship at NASA. Students were provided with an opportunity to learn about the research being conducted at NASA, enhance their research and technical skills, learn about careers at NASA, and establish connections with NASA scientists and engineers that may lead to future collaborations.

To collect data about the NASA summer internship experience of the interns and the mentors, two online surveys were developed (one for mentors and one for interns). The external evaluator and MACES staff sent emails to students and mentors to invite them to complete the online surveys in August 2018. In addition to the invitations, the external evaluator and MACES staff each sent three reminders to students and two to mentors.

A. NASA Interns

Nine students participated as interns at NASA in the Summer of 2018. Of the nine interns, three were female and six were male, and the racial and ethnic makeup included five white students, two Hispanic, and two Asian.

Six of the nine students (two undergraduates and four graduate students) completed the online survey to inform the evaluation.

Results

Four of the six interns who responded to the survey “strongly agreed” and two “agreed” that the internship provided the opportunity to sharpen their research skills, increased their knowledge of NASA-related research, and provided the opportunity to establish connections that may eventually lead to future collaborations and/or a job at NASA (Figure 3). The internship also provided students with the opportunity to learn what skills they would need to develop to pursue a career at NASA. Most students also reported the internship increased their confidence in their STEM abilities and increased their interest in pursuing a career at NASA.
Students reported very positive experiences with their NASA mentor (Figure 4). In particular, the level of agreement was highest with statements that their mentor offered a research project for them to work on and that mentoring strengthened their confidence as
STEM researchers. Interns also agreed that their mentor welcomed their research ideas and that mentoring strengthened their interest in a career in STEM. Five of the six students agreed that their mentor provided valuable feedback; one student did not respond. There was slightly less agreement with the statement that their mentor was accessible: five students agreed, but one student neither agreed nor disagreed. And while five students agreed that their mentor provided timely feedback, one student disagreed with the statement.

In terms of overall satisfaction, five of six students were “extremely satisfied” or “very satisfied” with the mentoring they received, research they participated in at NASA, skills and knowledge gained, and the internship as a whole (Figure 5).
Several students shared details about what they most gained by participating in the NASA internship, for example:

“I learned to use my critical thinking skills to determine how to do experiments. I also learned how to write in an organized manner and use a lab notebook to record my data.”

“Experience and connections.”

“An understanding of NASA and the aerospace industry as well as excitement for research and graduate school.”

**Feedback and Recommendations**

In other open-ended comments, students shared suggestions for improvement, including better information prior to the internship, more networking opportunities, and input into the research project assigned to the student. One intern also noted that it was difficult to get the mentor to sign off on timesheets.

Overall, the internship program is received very favorably by students. One participant stated, “It was an incredible summer!”
B. NASA Mentors

Five NASA researchers served as mentors for the interns. All mentors completed the online survey to provide feedback about their experiences as mentors.

Results

All five mentors “strongly agreed” or “agreed” that they were satisfied with the mentoring experience (Figure 6). Four of five “strongly agreed” the interns learned new knowledge during the internship, and all “agreed” or “strongly agreed” that interns learned other skills such as time management, communication, and/or literature survey.

Three of the five mentors “strongly agreed” and two “agreed” that the intern(s) had an adequate base of knowledge and skills to participate in the research. This result contrasts with last year’s survey in which one mentor “disagreed” with that statement and two mentors made comments related to the need to increase the skillset of the interns. There were no such comments or responses this year.
Feedback and Recommendations

Rather than describing specific ways that the program could improve, mentors used open-ended comments to echo the overall positive feedback shown in the survey responses:

“[The interns] are independent and work hard. They have good motivation to do research.”

“Keep up the great program!”

IV. Summary

The Undergraduate Research Fellowships and NASA Summer Internships helped advance the MACES goals to enhance student learning experiences, increase their interest in STEM, and prepare them for careers in STEM fields.

Students in both programs agreed that the experience helped improve their research skills, and NASA interns agreed that the internship provided an opportunity to learn what skills they would need to pursue a career at NASA. NASA mentors also all agreed that interns gained knowledge and skills through the experience. In a possible sign of improvement since last year, this year no mentors mentioned the need for the interns to increase their skillset prior to joining the program.

In terms of future plans, all undergraduate fellowship participants strongly agreed that the activities of the summer research program raised their awareness of opportunities in a STEM career and graduate school. Similarly, all of the NASA intern participants agreed that the internship increased their interest in pursuing a career in STEM and confidence in their STEM abilities, and most agreed that it increased their interest in pursuing a career at NASA.

Both the research fellows and the NASA interns viewed their mentoring experiences as constructive. Undergraduate Research Fellowship students all agreed that their faculty and graduate student mentors provided constructive feedback, was available when they needed help, and treated them with respect. The majority of NASA interns reported their mentors welcomed their research ideas, provided valuable and timely feedback, and were accessible. In addition, NASA interns reported that mentoring strengthened their confidence as STEM researchers and their interest in a career in STEM.

Students in both programs and the NASA mentors expressed satisfaction with the program overall. All of the Undergraduate Research Fellowship participants strongly agreed that they would recommend the program to others, and all NASA interns and mentors strongly agreed or agreed that they were satisfied with the experience as a whole.

1 One student did not respond to the statement, “My graduate student mentor is available when I need help.”