New Orleans JAZZED about Engineering Education

Paper ID #16913

Targeted Recruiting and Home Institution Mentor Model for REU Sites

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Zachary Domire completed his B.S. (Honors), M.S., and Ph.D. in Kinesiology at The Pennsylvania State University. Following completion of his Ph.D., he took a faculty position in The Department of Kinesiology and Health at The University of Wyoming. After three years in this position, he decided to pursue a more research intensive career path and undertook postdoctoral training in Biomedical Engineering at The Mayo Clinic. In 2009, he began a faculty position in the Department of Health, Exercise, and Sport Sciences at Texas Tech University. In January 2012, Dr. Domire joined East Carolina University as an Associate Professor in Department of Kinesiology. Dr. Domire's work focuses on the impact of tissue material properties on physiological and mechanical function. He also conducts research on computer simulation of human movement.

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Introduction

Student interaction with faculty is key to promoting learning at the university level.[1] The quality of this interaction is a strong predictor of student learning, particularly for African American and Native American students.[2] Specifically, research-related faculty interaction is a predictor of GPA and aspiration for an advanced degree, particularly for African American students.[3]

Unfortunately, many students do not get enough or high-quality faculty interaction. For instance, only 35% of women and 24% of men have had faculty provide frequent encouragement for graduate school, and 32% of women and 23% of men have had faculty frequently provide letters of recommendation.[4] Less than 20% of students have had research related interaction with faculty, with African American students having particularly bad rates of participation.[3]

Undergraduate research programs are an excellent way to promote high-quality student-faculty interaction. Participation in undergraduate research programs has been shown to increase the likelihood of pursuing a STEM graduate degree.[5] Programs such as the Research Experience for Undergraduates (REU) funded by the National Science Foundation (NSF) offer excellent opportunities for students to participate in research programs. However, these programs typically enroll students from outside universities. Therefore, the students do not gain additional interaction with faculty from their home institution.

To attempt to improve overall student-faculty interaction, we developed a home institution mentor model in combination with our REU program. This study presents early findings related to the efficacy of this model.

Recruitment and Mentoring

Based on the above research, we have developed a mentorship model that provides mentoring beyond the summer REU experience and connects the student, REU faculty mentor and mentor at the student's institution (home institution mentor). Because of the nature of this model, it is important to establish relationships with partner institutions. Our partner institutions include four universities (Table 1); three historically black universities (73-78% African-American) and one serving a large Native American population (16%). All of these institutions have a Carnegie Classification of Master's level or lower and are within three hours of the REU site. We have identified key faculty at the targeted institutions to help advertise the program and serve as home institution mentors to students from their respective schools.

Table 1. *Partner Institutions*

Partner Institution	Student Population	Carnegie Classification	Minority Population
North Carolina Central University	7,687	Master's University: Larger Programs	78% African-American
UNC at Pembroke	6,269	Master's University: Larger Programs	16% American Indian 31% African-American
Fayetteville State University	5,899	Master's University: Medium Programs	73% African-American 69% female
Elizabeth City State University	1,867	Master's University: Small Programs	~73% African-American

While we recruit nationwide through various mechanisms (email campaigns, flyers at conferences, and website), we target recruitment at our partner institutions. This target recruitment includes educating the partner mentors about our program so they can be spokespeople, sending program information for distribution, and presenting the program in person during a campus visit. Communication with partner mentors occurs through both email and telephone conversations. Campus visits can take the form of informal informational meetings with a few students or larger formal programs on summer opportunities. For students not enrolled at a target institution, home mentors are identified upon acceptance.

The objective of the home institution mentors is to engage participants for longer than the 10-week summer research experience. The mentors provide initial pre-program mentoring on literature review, research process, and program expectations. After acceptance, students are electronically introduced to their home institution mentors and asked to schedule a face-to-face meeting. The REU faculty mentor is asked to send a few journal articles to their respective students which the students should discuss with their home mentors. This serves two purposes; 1) engage and prepare the students prior to arrival and 2) engage and inform the home institution mentors. A secondary goal of this REU site is to encourage collaboration with the partner institutions to expand research opportunities at all locations.

Approximately half way into the summer program, home institution mentors are updated on their student's progress. Those within a reasonable distance are notified of the end of program poster session date and invited to a lunch following. Students are also encouraged to stay in contact with their home mentors throughout the summer program. Following the program, home institution mentors continue mentoring by helping to reflect on the summer experience and prepare for conference presentations. The REU faculty members continue to mentor their REU students after the program, but students have direct access to their home institution mentors. To encourage collaboration with the home institutions, we submitted press releases with a short student biography and information on their REU research and national presentations. These releases were well received.

Assessment

Interactions with home institution mentors are self-reported by students in a pre-program survey and include mode and frequency. Students are requested to meet with their home institution mentor after the program to discuss the experience and prepare for conference presentations. These interactions are captured in follow-up surveys.

Results

In the 2014 and 2015 application cycles, 17% and 9% of applicants, respectively, and 25% of final participants were from targeted institutions. This sample only includes applicants who meet the qualifications (rising junior or senior). Demographics from the 2014 and 2015 application cycles were 30% and 27% under-represented minorities, and 58% and 54% female, respectively. In both cycles, final participants were 37.5% minority and 50% female. Applicant demographics can be seen in Table 2.

Table 2. *Applicant Demographics*

	2014			2015		
	Count UR**	Percent UR	Total Applicants	Count UR	Percent UR	Total Applicants
Gender	35	58%	60	78	54%	144
Ethnicity	18	30%	60	39	27%	144
Carnegie Classification	35	58%	60	46	31%	144
Partner Institution	10	17%	60	13	9%	144

**UR=Underrepresented defined as female, non-white and non-Asian (African American, Latino, American Indian), universities that *are not* very high/high research classification. Not all applicants reported each demographic characteristic.

In our first year, applications opened at the end of March 2014 and participants were finalized in early May. Due to this accelerated time frame, there was limited time for pre-program preparation. Due to exams and students leaving campus only one student met with their home institution mentor. However, REU faculty mentors were in communication with the students, supplied journal articles, and answered questions. For students who were not from our partner institutions, home institution mentors were easily identified. In a follow-up survey for the 2014 cohort conducted six months following the program, 3 of 6 respondents continued to interact with their home institution mentor reporting frequencies of 2-7 times per month.

The 2015 cohort had greater time for pre-program preparation, 89% interacted with their home institution mentor through multiple avenues (in person, email, phone – see Figure 1) and 86% of those students rated the interaction as good or very good (Figure 2). The follow-up survey for this cohort has not yet been completed.

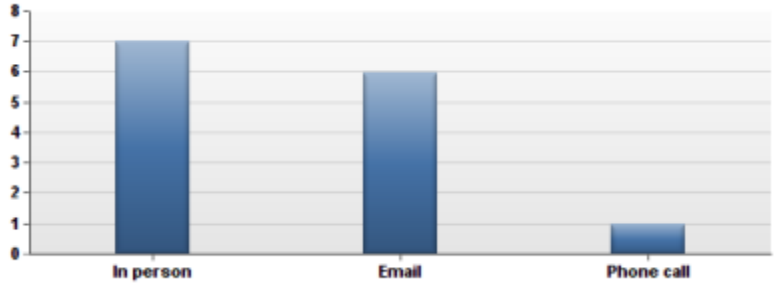

Figure 1. 2015 cohort modes of communication with their home institution mentor prior to the program.

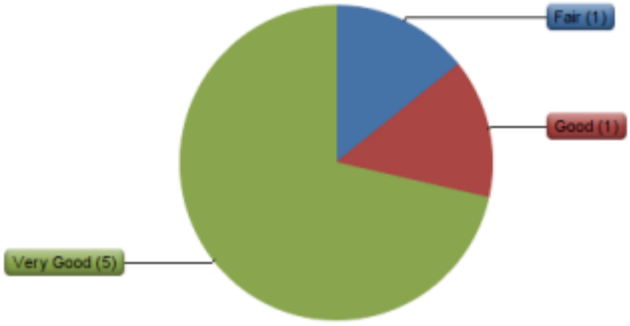

Figure 2. Rating of home institution mentor interactions

Evaluation and Path Forward

The majority of our applicants are coming from our national campaign. To improve applications from our targeted institutions we are planning recruitment visits for each school, which has worked well in the past. For the 2016 summer, we have visited three partner institutions and the fourth one is being scheduled. As seen in Table 2, the drop in the percentage of applicants from our partner institutions can be explained by the increase in applicants in 2015. The actual number of partner institution applicants is similar.

The preliminary data on home institution mentors is promising as students have found it beneficial and have continued interactions beyond the summer program. Even though the 2014 cohort had limited pre-program interactions, the quality of the mentoring relationship can be seen by the post-program response (three students interacting 2-7 times per month). The 2015 cohort had a longer time for pre-program preparation and highly rated their home institution mentor interactions. Seven of these students presented at the Biomedical Engineering Society annual meeting and it was clear that the students had discussed their presentations with their home institution mentors.

The described mentoring model raises several interesting research questions such as linking frequency and mode of home institution mentor interactions, along with specific advice given, to

changes in GPA, additional research experience sought, and application to graduate programs. However, addressing these questions will require partnerships among REU Sites.

Tangential benefits to partner institution relationships include research and university collaborations. We are in the process of finalizing a 3+2 program with one of our partner institutions which will allow students to transfer and receive two bachelor's degrees. This opens up an alternative pathway to engineering.

To increase the mentoring reach of REU sites, we encourage sites to adopt the home institution mentor approach. Although we present results from a limited sample size, data from year 2 with full home institution mentor implementation shows this model has increased student-faculty interactions. Future research with collaborations from multiple REU sites and thus a larger sample size is needed, however, the results are promising encouraging adoption of this mentoring model.

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