



Professional Development Program for Improving the Diversity of Faculty in Electrical and Computer Engineering (iREDEFINE ECE)

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Abstract

Improving the Diversity of Faculty in Electrical and Computer Engineering (iREDEFINE) offers an innovative model for improving diversity at the ECE postdoc and professorial levels. As a field, Electrical and Computer Engineering (ECE) suffers from a lack of participation of women and underrepresented minorities (W-URM) at the undergraduate, graduate, and professorial levels, even compared to other engineering disciplines. iREDEFINE is a collaborative effort among ECE leaders which aims to proactively motivate and prepare some W-URM PhD students to consider tenure track faculty or postdoc positions in ECE departments of USA universities. The iREDEFINE project capitalizes on a unique opportunity to bring together ECE department heads with W-URM graduate students. Funded by the National Science Foundation and supported by the ECE Department Heads Association (ECEDHA), the project includes an annual workshop held in conjunction with the ECEDHA Annual Conference and Expo and follow up mentoring activities. Over fifty applications were received for the first iREDEFINE cohort. Fourteen were funded by NSF and others were funded by their institutions to form a cohort of 46 individuals. The number of applicants demonstrates the need for such a program. The first iREDEFINE workshop offered in 2017 provided professional development on negotiation skills, a glimpse of the life and career of ECE faculty members, information on different types of schools, tips on how to prepare for a successful academic position interview, and opportunities for networking with over 300 department heads and 40 peers. In response to a post-workshop survey, students reported that they particularly valued the networking opportunities with department heads and peers provided by this unique opportunity to bring students and chairs together at the ECEDHA conference. Participants' interest in postdoc and faculty positions increased after the workshop with more of an increase in interest in faculty positions. Those who responded to a second survey six months later reported that they particularly valued gaining clarity about the job search process and application materials and the networking. Ten participants responding to this survey had applied for postdoc or faculty positions. One had obtained a faculty position and one a postdoc. Those who attended mentoring teleconferences on topics such as mock interviews, found them to be very useful. Participant suggestions for improvements are being incorporated into the second iREDEFINE workshop in 2018 including a panel of junior ECE faculty and a longer poster session.

Diversity in Electrical and Computer Engineering

As a field, ECE suffers from a lack of diversity, even when compared to other engineering disciplines. For example, data from the American Society for Engineering Education (ASEE) shown in Table 1 shows that the percentages of women receiving BS and PhD degrees in the USA in Computer (CE), Electrical (EE), and Electrical and Computer Engineering (ECE) are lower than the percentages for engineering as a whole [1]. In fact, the representation of women in these fields is among the lowest for the 23 fields of engineering studied. For BS degrees, the percentage of women was 20th for EE, 22nd for ECE, and 23rd for CE. For PhD degrees, the percentage of women was 17th for EE, 19th for ECE, and 18th for CE

Table 1: Degrees awarded to women in USA in 2015 (Source: ASEE)

	BS	PhD
	% Female	% Female
Electrical Engineering (EE)	13%	15%
Electrical & Computer Engineering (ECE)	14%	17%
Computer Engineering (CE)	11%	15%
Engineering (all)	20%	23%

Trajectories of EE and CE students vary by race [2]. In a multi-institution longitudinal study of undergraduate students, Black men and women were reported to be strongly attracted to EE and CE compared to other engineering majors but not retained at high rates particularly in CE [2]. Compared to students in Mechanical, Civil, Industrial, and Chemical engineering, EE students had the lowest “stickiness” defined as the number of students graduating in a major divided by the number ever declaring that major [3, 4].

At the professoriate level, the percentage of female faculty lags behind the percentages of females obtaining PhD degrees in all engineering fields. ECE continues to have lower percentages of women than engineering overall. ECE ranks 17th out of 21 engineering disciplines considered in the percentage of female faculty with 12% females compared to 16% for engineering overall [1]. The percentages of African American and Hispanic faculty are low but similar for ECE and Engineering as a whole at 3% and 4%, respectively. The percentage of Asian American faculty is higher in ECE (31%) than Engineering (27%).

Research has shown that the percentages of women undergraduate science and engineering majors and graduates is associated with the percentage of women on the faculty [5]. Increasing the percentages of women and underrepresented minorities (W-URM) on the faculty may increase the W-URM enrollment in ECE departments, as more diverse faculty will be better positioned to serve as role models and mentors [6, 7, 8].

To address the lack of diversity among ECE faculty, a group of ECE department heads decided to take action and collaborate on a program to proactively motivate and prepare some W-URM PhD students to consider tenure track faculty or postdoc positions in ECE departments of USA universities. This addresses a weakness of ECE, the lack of diversity in the faculty, with a strength of ECE, a strong community of department heads who meet annually. “Improving the Diversity of Faculty in Electrical and Computer Engineering” (iREDEFINE ECE) is supported by the National Science Foundation (NSF) [9].

Note that a series of workshops with similar aims to iREDEFINE is RISING STARS in EECS (held at UC Berkeley in 2014 [10], MIT in 2015 [11], and Carnegie Mellon in 2016 [12], which aims to connect female graduate students with the most prestigious research institutions. However, iREDEFINE is broader as it addresses academic careers at the wide variety of institutions represented by ECEDHA members including those focused on teaching as well as research institutions. In addition, iREDEFINE aims for a broader range of participants including underrepresented men of color as well as women.

iREDEFINE Team

ECEDHA traces its roots to a first meeting of EE department heads in 1963 and maintains an active membership of nearly 300 chairs from across the USA and Canada. The four-day annual conference brings together prominent figures from academia, government, and industry to deliver presentations and facilitate discussions on emerging key technologies, teaching innovations, and pressing issues facing ECE, such as lack of diversity and shifting enrollment trends. [13]

The inaugural iREDEFINE program committee included nine chairs of ECE departments across the USA, a representative from industry, and the Executive Director of the Electrical and Computer Engineering Department Heads Association (ECEDHA). Prof. A. Petropulu, a past ECE chair and past president of ECEDHA, is the project director. The iREDEFINE team includes two women chairs and two male chairs from underrepresented racial groups. Chairs came from a variety of types of institutions including include large public schools, a Historically Black College and University (HBCU), a Hispanic Serving Institution (HSI), and primarily undergraduate institutions. The diversity of the program committee was helpful for designing the program and providing advice to the diverse group of participants.

iREDEFINE Project

The project includes the iREDEFINE annual workshop and follow up mentoring activities. The iREDEFINE Workshop is held in conjunction with the ECEDHA Annual Conference and ECExpo and provides a glimpse of the life and career of an ECE faculty, information on different types of schools, tips on how to prepare for a successful academic position interview, and opportunities for networking with department heads and peers. The unique opportunity arises due to the high concentration of ECE department chairs attending the event, many of whom are investing great efforts on increasing the diversity of their faculty, and who are interested in helping with the goals of the project.

iREDEFINE Cohort 1

Invitations to apply for the first iREDEFINE cohort were sent to all ECEDHA members. There was an enthusiastic response of 54 applications. The NSF grant provided travel funding for 13 students, referred to as *iREDEFINE Fellows*. The Fellows were selected from a pool of applicants by the project organizing committee, based on their potential to be an academic as gleaned from their academic accomplishments and personal statements about an academic career. In addition to targeting students who are already seeking academic positions, the project also includes junior students, in an effort to motivate them to think about a career in academia. The selected 2017 iREDEFINE Fellows included 10 women and 3 men from 13 institutions. Most fellows came from large public institutions with one private school.

In response to very strong interest in attending the workshop by a large number of applicants, 30 additional students were invited to attend, and the project director invited their chairs to cover their students' expenses. The majority of the chairs responded positively; 27 chairs supported one or more of their students. It is interesting to note that one student, whose chair did not have funds for her, came with her own funding. However, when this was brought to the attention of

the NSF program director, he committed additional support for that student increasing the total number of NSF-supported students to 14. In total 28 schools were represented by one or more graduate students each including a mix of types of universities. The following departments provided support for students to attend the workshop:

Auburn University
Florida Atlantic University
Georgia Institute of Technology
Mississippi State University
Ohio State University
Rutgers, the State University of New Jersey
University of Delaware
University of Houston
University of Illinois at Chicago
University of New Mexico
University of North Texas
University of Texas at Austin
University of Texas at Dallas
University of Washington

iREDEFINE Workshop

The first iREDEFINE workshop was held on March 17-18, 2017 as part of the 2017 ECEDHA Annual Conference and Expo, in Miramar Beach, Florida [14]. The workshop provided students with a glimpse of the lives and careers of ECE faculty members, helpful tools for an academic job search, and opportunities to network with their peers and the ECE chairs. The workshop started with a 3-hour course on basic negotiations, problem solving and conflict resolution delivered by a professional company with experience in supporting women scientists and engineers [15]. In the remainder of the first day, the program featured sessions on teaching methods for active learning by Prof. John Booske of University of Wisconsin-Madison, funding agencies and how to seek funding by Dr. Elliot Douglas, Program Director of Engineering Education at NSF, and unconscious bias by Prof. Nayda Santiago of the University of Puerto Rico at Mayaguez. This was followed by a panel discussion on different types of schools by Profs. Stella Batalama, University at Buffalo, John Booske, University of Wisconsin-Madison, Susan Lord, University of San Diego, and Miguel Velez-Reyes, University of Texas at El Paso. A diverse group of chairs participated in the panel to allow for a variety of perspectives on issues related to work-life balance and succeeding in academia as a W-URM. There was also a presentation on building ties with industry. Throughout the day, there were networking breaks, and in the evening there was a networking reception for workshop attendees and ECE chairs. During the second day, the workshop attendees had the opportunity to attend the sessions of the ECEDHA conference, and also presented posters on their work to ECEDHA attendees.

Note that several features of this program were specifically designed to support W-URM graduate students. These sessions focused on issues that are not typically incorporated into professional development workshops but would be valuable for all workshops for ECE graduate students, specifically unconscious bias and negotiations.

“Unconscious bias” or “implicit bias” refers to preconceived attitudes and feelings based on a person’s culture and experiences that they are not aware of and have an impact on their decisions and actions [16]. Becoming aware of implicit bias and the fact that everyone has bias is an important first step for overcoming it [17]. At the iREDEFINE workshop, Dr. Santiago presented information from The National Center for Women & Information Technology (NCWIT) about how these biases affect the careers of women in technology [18, 19, 20]. Researchers believe that unconscious bias can be addressed and eliminated in industrial and academic settings [21, 22]. Thus it is helpful to educate people about these issues to begin to eliminate unconscious biases in hiring, evaluation, promotion, and workplace culture. Raising the awareness of female and male graduate students to these issues can help to create a more equitable workplace in ECE.

Based on their research and years of experience, COACH have identified areas where women can particularly benefit from targeted professional development training including those addressed in the “Basic Negotiations, Problem Solving and Conflict Resolution” delivered during the iREDEFINE workshop. The iREDEFINE team worked with the facilitators to insure that this seminar was relevant for graduate students and men of color as well. Although negotiations occur daily in the academic workplace, most graduate students do not receive training in these areas and W-URM may feel particularly challenged or vulnerable early in their careers as minorities. The workshop was interactive including role playing by participants as well as case studies as springboards for discussion of issues faced by graduate students or early career faculty relating to authorship, space, supplies, and peer interactions [23]. More information on these workshops and research on their effectiveness is available on the COACH website and in sources such as [24].

iREDEFINE Mentoring

To establish a community of support and reinforce the lessons learned at the workshop, iREDEFINE also has a mentoring component, which extends beyond the workshop to include quarterly post-workshop e-meetings. The mentoring committee includes members of the original project team as well as other ECE chairs from departments across the USA. In order for the e-meeting to provide a meaningful experience, a list of topics is distributed to the student participants ahead of time. Students are asked to share their thoughts on each topic. The e-meetings are monitored by the Project Director and members of the mentoring committee, who comment on the student responses and provide additional information as needed. Examples of topics of discussion include:

- Preparing application materials for a faculty position tailored to the particular opportunity
- How to prepare for an interview
- Understanding the differences between various types of institutions
- Mock interview for a faculty position
- Preparing a research proposal
- How to navigate the NSF website, look for solicitations on a specific topic, how to check for projects funded under a specific program
- Guide on funding agencies
- Guide on new teaching approaches and technologies

In addition, topics are solicited from the students.

ECEDHA staff facilitate the quarterly teleconferences (via GoToMeeting). They set up convenient dates, send e-mails with the discussion topics, send reminders and take care of e-meeting logistics. Each meeting is 1.5 hours long and covers 1-2 of the above topics. The first 15 minutes of each e-meeting are for the Director and mentoring committee members only, to discuss any changes/additions in agenda, or evaluate any new developments.

The first iREDEFINE teleconference was held on October 11, 2017 and focused on mock interviews. There were 34 student participants and 10 faculty participants. Volunteers to be interviewed were solicited before the call, and during a pre-call, the faculty participants discussed and came up with a set of questions to ask the volunteers. During the call, the coordinator of the teleconference (A. Petropulu) introduced each student to be interviewed and called the faculty to ask their questions. Following the questions, feedback was given to the student. During the entire time, students could submit comments using a chat feature of the teleconference tool. At the end, the questions were answered by the faculty participants.

Evaluation

Plan

The iREDEFINE project was funded by NSF for two years. To evaluate the impact of the workshop on the participants' attitudes towards and ability to obtain a faculty or postdoc position, the project team is administering three online surveys to each iREDEFINE attendee. IRB approval was obtained for this study. Survey 1 is given immediately following the iREDEFINE workshop and its goal is to collect demographic information and determine participants interest in an academic position before attending the iREDEFINE workshop and after attending the workshop. The survey also solicits feedback on the structure of the workshop, most valuable aspect, effectiveness of the training provided, and suggestions for improvement. Survey 2 is conducted 6 months after Survey 1. Its goal is to determine the interest of the attendees in an academic position, number of applications for post-doc and tenure track positions, number of interviews for post-doc and tenure track positions, number of offers for post-doc and tenure track positions, and feedback on how helpful the provided training in the workshop and teleconferences was during the job search process. Survey 3 will be conducted one year after Survey 2. Its goal is to determine the interest of the attendees in an academic position, the number of applications for post-doc and tenure track positions, number of interviews for post-doc and tenure track positions, number of offers for post-doc and tenure track positions, feedback on how helpful the provided training was during the job search process. For those attendees who are already in academic positions, we will ask about their experiences so far including what they wished they had known before starting the position.

Results from Survey 1

Overall, students were enthusiastic about the benefits of the first iREDEFINE workshop. Thirty-five of the forty-six attendees (76%) completed Survey 1 including 30 women and 5 men. Participants self-reported race/ethnicity was 18 Asian/Pacific Islander, 13 White, 5 Hispanic or

Latino, and 3 Native American or Other. Note that participants could choose more than one category.

As shown in Table 2, participants reported increased interest in applying for both postdoc and faculty positions after the iREDEFINE workshop. There was stronger interest in faculty positions compared to postdoc positions before and after the workshop. Participants reported more increase in faculty positions compared to postdoc positions after the workshop.

Table 2 Survey 1 results for interest in applying for postdoc and faculty positions before and after coming to iREDEFINE workshop

How strongly were you interested in applying for a _____ position _____ coming to the iREDEFINE workshop?	No interest											Strong Interest	Average
	0	1	2	3	4	5	6	7	8	9	10		
Postdoc BEFORE	4	2	0	3	1	4	5	6	5	5	0		5.5
Postdoc AFTER	5	0	0	1	3	6	1	4	6	3	6		6.1
Faculty BEFORE	0	0	0	2	6	5	4	5	5	4	4		6.6
Faculty AFTER	0	0	0	0	1	3	5	3	8	6	9		7.9

As seen in Table 3, among the topics presented at the workshop, participants rated the Negotiations workshop highest followed closely by Different Types of Schools and the Contacts with Industry lowest. This is consistent with the open-ended responses about the most valuable aspects of the workshop and the suggestions for improvement.

Table 3 Survey 1 results of participants ratings of topics of iREDEFINE workshop

	Least valuable				Most valuable	Total	Average
Topic	1	2	3	4	5		
Negotiations workshop	0	2	1	14	18	35	4.37
Different types of schools	0	1	4	12	18	35	4.34
Funding agencies	0	1	8	9	17	35	4.20
Q&A	1	1	3	16	14	35	4.17
Teaching methods	0	1	11	13	10	35	3.91
Unconscious bias	1	5	10	13	6	35	3.51
Contacts with Industry	4	6	10	11	4	35	3.14

Networking was most commonly cited as the most valuable aspect of the iREDEFINE experience. About half (13 out of 27 who responded) said that the most beneficial part was networking with the ECE department heads. This supports the idea of the project committee that bringing students to the ECEDHA conference would be valuable. One participant said “the

opportunity to network with ECE faculty and discuss my PhD research. The workshop is well timed with the ECEDHA conference.”

A third of respondents cited meeting peers from other schools and networking as most valuable. This provided opportunities to see beyond their local institution, “find friends with similar interest and confusion”, and find role models.

I really enjoyed networking and meeting my cohort. The women in the program are phenomenal and they are all going to go on doing great things. Many of the attendees were either married or in a serious relationship, which really encouraged me that there are other like minded individuals who don't feel they have to sacrifice work-life-balance to achieve a career. I also enjoyed learning about my peers' research. Everyone was exceptional.

I usually stay in my school bubble and almost forget that there are other schools out there and other people who have different stories.

About 20% of respondents listed the funding presentation and learning about negotiations as the most valuable aspects. Several participants highlighted the challenges of negotiation.

I like the negotiations workshop. Specifically because I was one of those people who would not negotiate for herself. Also, knowing about the unconscious bias even ourselves have was a surprising fact that I hadn't have thought of.

I used to feel shy about asking people to return my things back. But after attending workshop, I know how to ask and got my things back successfully.

Other topics that were mentioned by two participants included Teaching Methods, Q&A, Unconscious Bias, and Different Types of Schools.

Most of us have a good understanding of how to write proposals and the percentage awarded, the various school types and many of the other topics that were discussed. However, most of us do not have the opportunity to learn how to teach. We are usually thrown into a TA position with little to no training on how to be an effective teacher unless you get a teaching certification along the way.

I thought the Q&A session was pretty valuable. It's hard to get a group of faculty to answer these questions for grad students because their [sic] often so busy.

Participants provided many suggestions for improvement of the iREDEFINE experience. Given that this was the first offering, it is reasonable that there were comments about improving the organization. There were difficulties with the logistics of the poster session. Six students suggested improvements to the poster session including making it longer, not conflict with other ECEDHA events, and letting students practice with peers on Day 1 and chairs on Day 2. Four students commented that the industry session could be more focused. Four participants recommended having junior faculty speak as their experience is closer to that of the participants. Three students suggested a more structured interaction between participants and chairs such as partnering for mentoring or incorporating chairs into activities such as CV feedback or practicing elevator pitches.

Results from Survey 2

Twenty-seven of the forty-six attendees (59%) completed Survey 2 including 22 women and 5 men. About half of the NSF Fellows responded (6/13) and 64% of the other students. Participants self-reported race/ethnicity was 12 Asian/Pacific Islander, 10 White, 6 Hispanic or Latino, and 1 Native American. Note that participants could choose more than one category.

When asked to rate their interest in a postdoc or faculty position before and after coming to the iREDEFINE workshop, most respondents' interest stayed the same or increased. Fifteen respondents' interest stayed the same. Of these, eight were strongly interested before and after (10/10). Three were very interested (one participant at 9/10, two participants at 8/10 and three at 7/10) and one was somewhat interested (4/10). Ten respondents reported an increase: two went from 8 to 10 on a scale from 0 (no interest) to 10 (strong interest) and one each went from 3 to 8, 6 to 9, 7 to 10, 3 to 5, 7 to 9, 6 to 8, 8 to 10, 7 to 8, and 9 to 10. Two participants reported a decrease: one from 10 to 8 and the other from 7 to 5.

Results for details of the job application process are shown in Table 4. Four respondents applied to both post-doc and faculty positions. Three of the respondents applied only for postdoc positions and another three applied only for faculty positions. As expected, those individuals who got interviews were more likely to get offers. Two respondents had interviews for post-doc positions that resulted in offers and one had an interview but no offer. A different two respondents had interviews for faculty positions, which resulted in offers and one had an interview but no offer. One respondent had accepted a post-doc position and one had accepted a faculty position as of January 24, 2018 when the survey closed. The small number of acceptances might be related to the timing of the survey since the academic cycle typically has most offers extended in the Spring semester.

Table 4 Results for Post-doc and Faculty Position Application Process

Respondent	Post-doc Positions			Faculty Positions			
	Applications	Interviews	Offers	Applications	Phone Interviews	On campus Interviews	Offers
1	15	4	2	35	0	0	0
2	10	2	1-accepted	0	0	0	0
3	4	2	0	10	0	0	0
4	4	0	0	8	0	0	0
5	2	0	0	25	2	0	0
6	2	0	0	0	0	0	0
7	1	0	0	0	0	0	0
8	0	0	0	40	6	6	2-accepted
9	0	0	0	6	3	2	2
10	0	0	0	5	3	2	0

When asked to explain how the iREDEFINE workshop prepared them for the job search process, 18 participants responded. Nine participants described gaining clarity about the process and application materials. *"It gave me a feel for what the process looks like, what the expectations*

are and what materials are required.” One commented that the workshop was “*extremely helpful. It prepares a graduate student for academic career, the way schools usually don’t do.*” Another said

I personally benefitted a lot from this workshop and its follow-up meetings. I strongly recommend this workshop to continue and to benefit more students who are interested in an academia-related job like me. The resources provided by this workshop is very valuable. We've professors from different universities give us guidance while in the workshop that I attended on campus, it was usually the teaching and learning coach that supervise us. The advice from actual professors is more applied to academic situations that we are going to face. Also, all the professors in the workshop provided their ultimate service to us despite that they are really busy.

These comments underscore the need for this type of program.

Two participants mentioned making connections at ECEDHA. For example, “*I think making connections at ECEDHA is the most valuable. But the information about the interview process is also helpful for expectations*”. Two students appreciated learning about different types of universities. Individual students cited learning about unconscious bias, and NSF funding. One participant reported being “*years away from graduation and thus have not searched for any jobs.*”

One participant explained how the workshop had given insights into academia that led to a decision not to enter it after graduation.

Honestly, iREDEFINE helped show me that the academic route is something you just know you want to do. My research is so applied that I saw more value in developing new systems in industry than in training the future generations. ... At this time, I don’t see value in me contributing to academia. But I do want to eventually...hopefully.

Two respondents said they found the teleconferences useful. Another two participants mentioned the mock interview, which was actually held in a teleconference not the workshop. One participant even obtained an interview through this experience.

The mock interview helped in analyzing how a real interviewer would ask questions. It helped me practice well before the actual interview. One of the committee members in a school was surprised to hear that it was my first interview and they scheduled the campus interview the following week.

One student nicely summed up the iREDEFINE program.

The workshop and the periodic meetings afterwards provided a systematic approach for academic job search. The participants were exposed to the various resources for academic jobs.

Twenty-one of the Survey 2 respondents said they had attended iREDEFINE teleconferences and six said they had not. Those who attended the teleconferences found them useful. On a scale of 0 (no useful information) to 10 (very useful), nine rated the teleconferences as a 10, two as a 9, six as an 8, one as a 7, two as a 6, and one as a 5. To improve the teleconference, three respondents suggested making the teleconference more interactive, three wanted a more formal and organized roll call and structure of the session, one wanted information on how to prepare a teaching

statement, and one wanted more teleconference sessions devoted to interviewing skills. One gave suggestions for future sessions.

The teleconferences are good for the information provided. I do think they would be more interesting to me if they discussed topics not usually covered by mentors or advisors: providing mentorship to students, creating relationships with industry/government, or a basic day in the life of a professor from your viewpoint and not how students see it.

When asked for suggestions of how to improve the iREDEFINE workshop, eleven participants responded. Four respondents said they would like mock interviews, three wanted CV reviews, and three requested more information about interview guidelines including expectations for research and teaching focused universities.

Now that I have interviewed for a couple of postdoc positions, I think an emphasis on how to prepare for a job talk/presentation would be beneficial, e.g., discussing what publications to show and how to emphasize future collaborations.

Two participants recommended a longer poster session, more prepared industry representative, and having new assistant professors share their job interview experiences. One participant recognized the importance of the information shared at the workshop and their fortunate position in having access to it that not all graduate students do.

I have been lucky in my time as a graduate student to already have received similar information from mentors and webinars through my university. If I didn't have these connections, then this information would be very new to me and extremely important.

This demonstrates both the need for such programs and the variation in what is provided at different universities.

Lessons Learned

Although individual campuses do not have the ability to bring together hundreds of department heads, there are things that can be done at the individual or regional level to encourage more W-URM to pursue academic positions. Universities might consider collaborating with others in their regions via the Regional ECEDHA meetings to offer similar opportunities for networking with poster sessions or professional development if more resources are available. Considering some of the student responses on the evaluation, individual department heads could work to be sure that graduate students do not find all faculty “too busy” to offer assistance. Perhaps different engineering departments at institutions could collaborate and incentives could be offered or this work could be valued as service. More opportunities for students to learn about funding opportunities could be offered. Some universities have PhD mentoring committees, groups of faculty who ensure that PhD students take advantage of all opportunities to develop themselves into good candidates for academia including help with presentations, participation in proposal writing, help with CV and application material preparation, and mock interviews. Although many campuses offer some services such as mock interviews or CV review at their career services offices, some graduate students might either not be aware or feel that the services are more geared to undergraduates or industry. Engineering department heads and deans could insure that services are provided and easy to access for graduate students.

Individual departments could also address the students' comments about lack of preparation for teaching. Centers for Teaching and Learning on Campuses could be helpful partners. Also, programs such as the National Effective Teaching Institute (NETI) [25] and the NSF-funded Leverage program [26] could be advertised to students.

ECEDHA or regional ECEDHA groups might be able to facilitate groups of peer graduate students who might also be helpful but face challenges if no incentives or accountability is incorporated.

Plans for Second iREDEFINE workshop

In response to participant feedback, some changes have been incorporated into the second iREDEFINE workshop to be offered in March 2018 in conjunction with the 2018 ECEDHA conference. A panel of junior professors is planned. Also, more time is allocated to the student posters to allow for more interaction time with the chairs.

We would like to increase the participation of the students in the surveys. During the March 2018 conference, we plan to put more emphasis on the value of the survey as an important tool to evaluate the effectiveness of the program and modify it to maximize its value. Although the surveyed students will most probably not be the direct beneficiaries of the improvements, their feedback will benefit future students. Therefore, the survey can be viewed as an opportunity for the participants to contribute to the cause of improving the diversity of the ECE faculty.

Conclusion

It was heartening for the iREDEFINE committee that the students were so excited about the benefit of the networking offered by this program. Capitalizing on the unique opportunity to bring together department heads and graduate students at the ECEDHA conference was indeed beneficial. Not only did students value networking with ECE chairs but also ECE peers. The enthusiastic response of applicants exceeded expectations and demonstrates the need for this type of program. Although we initially intended to have a much smaller group of participants, about a dozen, we ended up with 46. This larger number did provide more opportunities for students to meet peers from more institutions. These W-URM graduate students in ECE attended a workshop held in conjunction with the 2017 ECEDHA conference. Surveys were given immediately after the workshop and six months later to evaluate the effectiveness and plan for improvements. Overall, students felt the workshop and subsequent mentoring teleconferences were valuable. Only a few students have applied for academic positions but this should increase with more time.

Recognizing the need for something to enhance the diversity of the ECE postdoc population and professoriate, this iREDEFINE project serves as an example of collaboration and action. By sharing this with the larger ECE community, we hope that others will be inspired to consider and act on other creative efforts to enhance the profession. The ideas and findings of this project could be applicable to other engineering disciplines that suffer from low W-URM participation.

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