CRA-W Grad Cohort

Comparative Evaluation Report of
2011-2012 Participants | February 2014

Prepared by
CRA's Center for Evaluating the Research Pipeline

Jane G. Stout, Ph.D.
Jessica L. Cundiff, Ph.D.

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Table of Contents

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About CERP

The CRA Center for Evaluating the Research Pipeline (CERP) evaluates the effectiveness of intervention programs designed to increase retention of students from underrepresented groups in computing, namely men from underrepresented racial/ethnic groups and women of all racial/ethnic backgrounds. More generally, CERP strives to inform the computing community about patterns of entry, experience, progress, and success among individuals involved in academic programs and research careers related to computing.

CERP was created by the Committee on the Status of Women in Computing Research (CRA-W)/Coalition to Diversity Computing (CDC) Alliance and is funded by the National Science Foundation (NSF). Visit CERP online at http://cra.org/cerp/ or contact cerp@cra.org to learn more.

Executive Summary

The CRA-W is committed to taking positive action to increase the number of women participating in Computer Science and Engineering research and education at all levels. One CRA-W program that works towards this goal is Grad Cohort, a multi-day

Participants from 2012 Grad Cohort.

mentoring workshop for women graduate students in computing research. Grad Cohort uses formal and informal discussion sessions to elucidate strategies for success in graduate school, and to promote professional networks among women in computing. The current report offers a summary of professional outcomes among a sample of women who have and have not participated in Grad Cohort.

"[At Grad Cohort] I've met some interesting, generous, and talented people and now I feel more confident that I can successfully engage with some of the challenges that are unique to the female graduate student experience. It's also revealed the wonder of networking and what an integral part it is to the graduate student experience."

- Grad Cohort Participant

KEY FINDINGS

Compared to women who have no other experience with a career mentoring workshop, Grad Cohort participants:

• Feel more knowledgeable about concrete steps towards professional development

• Have a stronger network of professional collaborators

• Are more likely to attend professional conferences and to engage in networking with individuals at those conferences

Results suggest that Grad Cohort is meeting its goal of promoting professional development and networking skills among women in computing.

Introduction

"Leaders of the future will have to be visionary and be able to bring people in - real communicators. These are things that women bring to leadership and executive positions, and it's going to be incredibly valuable and incredibly in demand." – *Anita Borg*

Women are underrepresented at all levels of the computing research career pipeline. This trend is problematic because (a) women are missing out on financially lucrative and potentially personally rewarding career paths and (b) society does not reap the benefits of a diverse and innovative computing research workforce that can serve a broad range of interests.

Grad Cohort

Because so few women engage in computing research careers to begin with (e.g., only 18% of bachelor's degrees in computing are awarded to women; NSF, 2012), it is critical to encourage those few women to stay the course and reach their full potential. One initiative that harnesses this goal is the Grad Cohort workshop, which is organized and run by the Computing Research Association's Committee on the Status of Women in Computing Research (CRA-W).

Grad Cohort is a two-day workshop for women graduate students who are in their first three years of graduate study (MS or PhD program) in the fields of computer science and engineering in North America. At Grad Cohort, a number of senior women computing researchers and professionals share pertinent information about how to thrive in graduate school, as well as more personal information and insights from their own experiences. The workshop emphasizes the rewards of a research career through a mix of formal presentations and informal discussions and social events. One overarching goal of the workshop is to allow students to build mentoring relationships and develop peer networks that will form the basis for ongoing activities during their graduate careers.

This Report

The Center for Evaluating the Research Pipeline (CERP) is an evaluation center designed to assess the effectiveness of intervention programs aimed at increasing persistence among individuals in computing research career tracks. CERP uses data from a national sample of students enrolled in computing programs across the U.S. in order to assess outcomes of program participants vs. non-participants. In this report, we focus on outcomes related to career preparation among graduate students in computer science and computer engineering programs who participated vs. did not participate in Grad Cohort.

Method

Procedure

During the fall of 2011 and 2012, 1479 graduate students from a broad range of computing departments at colleges and universities across the U.S. completed CERP's continuing student survey. The survey assessed knowledge about effective professional development; professional experiences, such as one's publication record and conference attendance; and strength of one's professional network.

Analytic Strategy and Sample

Within our aggregated dataset, we extracted women who had participated in Grad Cohort at least one year prior to receiving our survey (n = 22). We also extracted two comparison groups of interest: women who had a similar graduate mentoring workshop (GMW) experience as women in Grad Cohort, and women who had no experience with a GMW. Specifically, we selected women within our larger sample who indicated that they had previously participated in a formal day-long or multi-day GMW (n = 30) and women who had never participated in a GMW (n =48).

Characteristics of our sample, including demographic and academic information, can be found in the Appendix. All of the women in our sample were in their third academic year or greater. The racial-ethnic composition and academic year distribution of survey respondents were similar across comparison groups. However, Grad Cohort participants were more likely than women with no GMW experience to be U.S. citizens, $p < .05$ (see Appendix). Table 1 provides a list of respondents' universities.

> *"I found [Grad Cohort] extremely helpful and returned very motivated with a lot of energy and ideas on how to improve my performance as a grad student. I have a much better idea of my academic goals."*
> - Grad Cohort Participant

Table 1. *Universities that contributed to the sample of women graduate students.*

CUNY Hunter College	University of Massachusetts, Amherst
DePaul University	University of Michigan, Ann Arbor
George Washington University	University of Michigan, Flint
Georgia Institute of Technology	University of Missouri, Columbia
Kean University	University of Nebraska at Lincoln
Millersville University of Pennsylvania	University of Nevada, Reno
Mills College	University of North Carolina at Chapel Hill
Norfolk State University	University of North Carolina, Charlotte
North Carolina A&T	University of Puget Sound
Old Dominion University	University of Rochester
Pasadena City College	University of South Carolina, Beaufort
Rutgers University	University of South Florida, Main Campus
Saint Joseph's University	University of Texas at Arlington
San Jose State University	University of West Georgia
Sonoma State University	Vanderbilt University
Texas State University, San Marcos	Villanova University
The College of New Jersey	Washington and Lee University
The University of Texas at Dallas	Washington University in St Louis
University of Akron	Western Oregon University
University of California, Los Angeles	Wheaton College (IL)
University of Illinois at Chicago	Yale University
University of Kansas	

Results

Knowledge about Professional Development

Compared to women who had no GMW experience, Grad Cohort participants indicated that they felt more knowledgeable in a variety of areas that are critical for professional growth (see Table 2).

Table 2. *Knowledge about professional development.*

How would you rate your current knowledge of the following areas? (1) None (2) Almost none (3) Some (4) Quite a bit	Grad Cohort	Other GMW	No GMW
Developing research collaborations	3.07	2.79	2.48**
Strategies for developing a professional network	3.21	2.93	2.71*
Obtaining funding for research	2.62	2.57	2.14*
Starting up a research program	2.62	2.08	2.10*
Strategies for selecting volunteer opportunities	3.00	2.86	2.32**

* p ≤ .10 and ** p ≤ .05. Comparison against Grad Cohort participants.
Note. Values indicate mean scores within each group.

Student presenting during a poster session at Grad Cohort.

"[Grad Cohort] motivated me to be more proactive and organized about seeking out opportunities for advancement."

-Grad Cohort Participant

Professional Experiences

Refereed Publications and Conference Presentations. As shown in Table 3, the likelihood of having at least one first-authored and/or co-authored publication or conference presentation did not significantly differ among the three comparison groups.

Table 3. *Referreed Publications and Conference Presentations.*

Have you had the following professional publishing experiences?	Grad Cohort	Other GMW	No GMW
At least one first-authored publication or presentation	70%	87%	79%
At least one co-authored publication or presentation	90%	73%	76%

* p ≤ .10 and ** p ≤ .05. Comparison against Grad Cohort participants.
Note. Values represent percentage within each group.

> *"It's really great to see role models who have accomplished what I want to do. It's also really great to know that [those role models] have failed at times and still are successful."*
>
> -Grad Cohort Participant

Julia H., computer science professor at Columbia University, presenting at Grad Cohort.

Collaborative Relationships. Grad Cohort participants tend to have stronger collaborative relationships with people from outside of their institution on their first author publications compared to women with no GMW experience, highlighting the strength of participants' professional networks (see top of Table 4). On co-authored publications, however, the types and strength of collaborative relationships do not differ among the three comparison groups (see bottom of Table 4).

Table 4. *Collaborative Relationships.*

For your professional publishing experiences, who were your collaborators?	Grad Cohort	Other GMW	No GMW
First author on a journal publication or refereed conference paper			
Other students or postdocs outside my institution	13%	0%	10%
Faculty from outside my institution	27%	24%	7%*
Someone from industry or government research lab	20%	6%	3%*
Coauthor on a journal publication or refereed conference paper			
Other students or postdocs outside my institution	0%	5%	10%
Faculty from outside my institution	18%	11%	7%
Someone from industry or government research lab	9%	5%	3%

* p ≤ .10 and ** p ≤ .05. Comparison against Grad Cohort participants.
Note. Respondents could select more than one option. Values represent percentage within each group.

> *"I feel much more focused and also gained valuable knowledge and tips from senior researchers and fellow students from esteemed universities. It was very inspiring to meet women working at top companies like Google, Microsoft and professors and fellow students."*
> - Grad Cohort Participant

Conference Attendance and Networking

Attendance. As shown in Table 5, Grad Cohort participants are more likely to attend primary technical conferences than women with no GMW experiences. Grad Cohort participants are also more likely to attend the Grace Hopper Celebration of Women in Computing than women with and without GMW experiences; this conference is known for its mission to empower women in computing.

Table 5. *Conference Attendance.*

Did you attend any of the following conferences the last time they were held?	Grad Cohort	Other GMW	No GMW
A primary technical conference	82%	83%	49%**
A local or regional conference	41%	35%	29%
Grace Hopper Celebration of Women in Computing	40%	17%**	11%**

* p ≤ .10 and ** p ≤ .05. Comparison against Grad Cohort participants.
Note. Respondents could select more than one option. Values represent percentage within each group.

Students networking with industry professionals at Grad Cohort.

Networking. As shown in Table 6, Grad Cohort participants seem to take advantage of having met other people at past conferences, as they were more likely to network with these people while attending conferences than were women without GMW experience, and, to a non-significant degree, women with other GMW experience. Moreover, Grad Cohort participants reported that they networked more with senior members of the computing community and with individuals from industry and government (though not significantly so) relative to women without GMW experiences.

Table 6. *Sustained networking at technical conferences.*

The most recent time you attended a primary technical conference in your field, who did you talk with outside of formal sessions?	Grad Cohort	Other GMW	No GMW
People who I had met at this conference in previous years	62%	46%	30%**
People I had met at a different conference or workshop	71%	64%	33%**
Someone senior in the field from outside my own institution	62%	54%	42%
Someone from industry or government	67%	54%	55%

* p ≤ .10 and ** p ≤ .05. Comparison against Grad Cohort participants.
Note. Respondents could select more than one option. Values represent percentage within each group..

Grad Cohort participants also reported keeping in touch with individuals they had met at technical conferences, and discussing professional topics with those individuals compared to women with and without GMW experiences (see Table 7).

Table 7. *Types of interactions with professional network.*

To what extent do you keep in contact with people from outside of your own institution who you saw at a primary technical conference in your field? (1) Not at all (2) Almost none (3) Some (4) Quite a bit	Grad Cohort	Other GMW	No GMW
I have discussed my career options or received career advice	2.75	2.30	1.91**
I have gotten information about internship, fellowship, or research opportunities	2.75	2.19*	1.94**
I have offered advice or information about opportunities	2.87	2.00**	1.69**
I have interacted online through email or social media	3.05	2.67	2.20**
I have asked technical questions	2.40	2.33	1.94*

* p ≤ .10 and ** p ≤ .05. Comparison against Grad Cohort participants.
Note. Values indicate mean scores within each group.

Summary and Conclusion

The findings from the current report suggest that participation in the CRA-W's Grad Cohort program is associated with a number of factors relevant to career preparation[1]. Compared to women with no GMW experience, women who had participated in Grad Cohort reported feeling more knowledgeable about a variety of professional development topics, such as how to start a research program, obtain funding and develop research collaborations.

Our findings also highlight Grad Cohort's focus on professional networking. For one, participants were more likely to have collaborators from outside of their institution on first author publications compared to women without GMW experience. Further, participants were more likely to have a network from past conferences to interact with when attending new conferences. Finally, Grad Cohort participants reported a greater tendency to rely on their network from conferences for professional and interpersonal support.

Together, this report suggests that Grad Cohort is meeting its goals to promote strong professional networks and career building skills among its participants. Its participants fare just as well, if not better, than women who participate in other types of GMWs. This program and others like it may help retain the scarce number of women who have entered computing research career tracks, and help increase the likelihood that those women will go on to become leaders in the computing research field.

Students presenting during a poster session.

> *"It was amazing to meet and be able to hear such strong intelligent successful women (faculty, researchers, students) who would share all the important tips and ideas that have helped them succeed in their career."*
>
> - Grad Cohort Participant

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[1] As with any correlational data, results reported here should be interpreted with caution, as causality is unclear. Students self-select to participate in Grad Cohort, so differences between groups of women in this report may be due to self-selection bias rather than program experience per se.

References

National Science Foundation, National Center for Science and Engineering Statistics. (2012). *Special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, 2001–10. Retrieved June 10, 2013, from http://www.nsf.gov/statistics/wmpd/2013/tables.cfm*
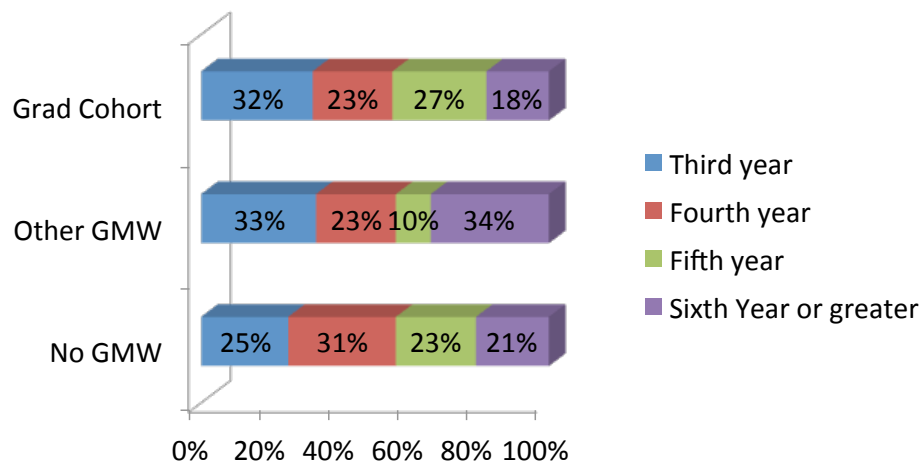
Appendix:
Sample Characteristics

Figure 1. *Academic class standing of respondents within each comparison group. Comparison groups did not differ.*
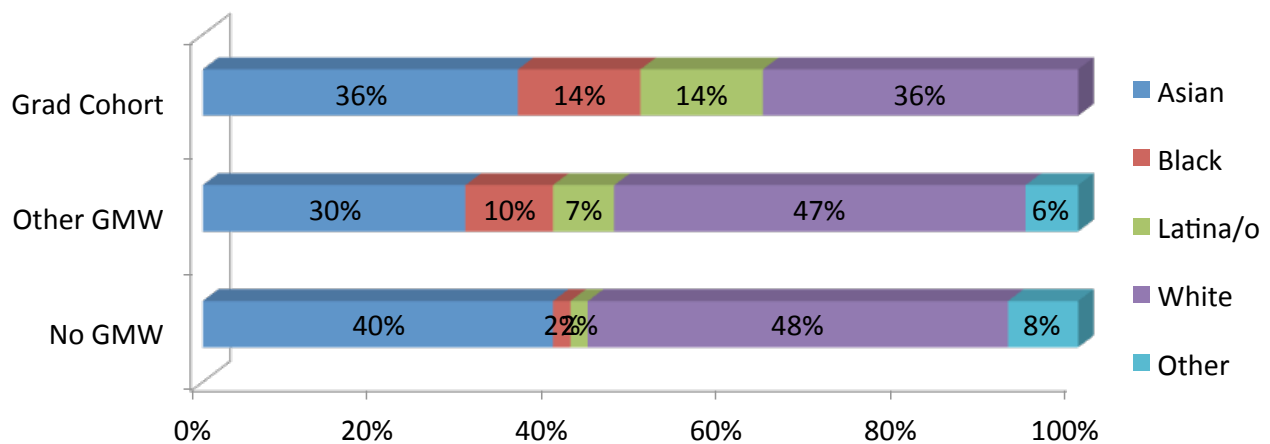

Figure 2. *Racial/ethnic distribution of respondents within each comparison group. Comparison groups did not differ.*
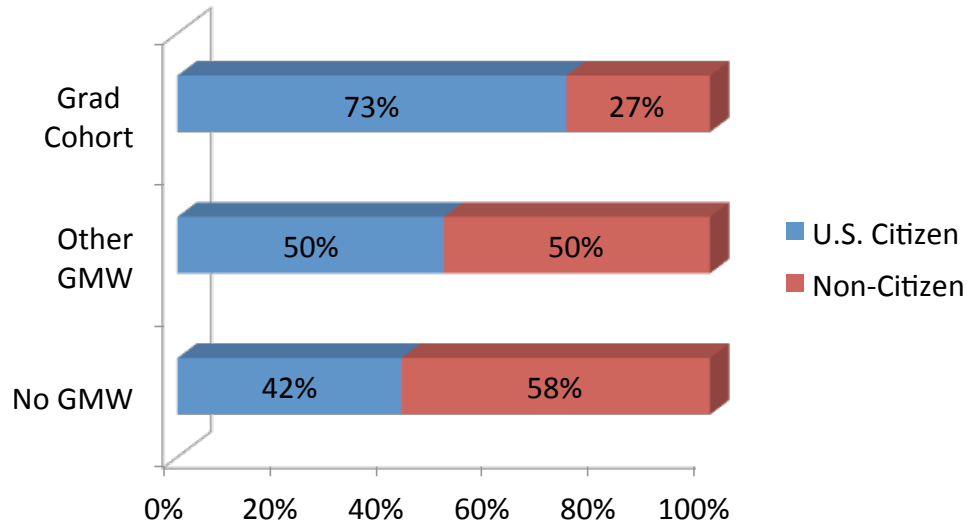
Figure 3. *U.S. citizenship status of respondents within each comparison group. Grad Cohort participants were more likely to be U.S. citizens than were women with no GMW experience, p < .05. There were no differences between Grad Cohort particpants and women with other GMW experience.*