CRA-W Grad Cohort 2014

Pretest/Posttest Evaluation Report | May 2014

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CRA's Center for Evaluating the Research Pipeline

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Recommended citation:
Cundiff, J. L., Stout, J. G., & Wright, H. (2014, May). *CRA-W Grad Cohort 2014: Pretest/Posttest Evaluation Report.* Computing Research Association: Washington, DC. Available from: http://cra.org/cerp/evaluation-reports

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acknowledgments

CERP would like to acknowledge and thank the Grad Cohort participants who generously volunteered their time to CERP's survey research. Their thoughtful responses and comments help us better understand the impact of Grad Cohort on women's professional development in computing. CERP also thanks the CRA-W board for their involvement in the development of survey concepts.

Grad Cohort 2014 was funded by numerous sponsors, including: corporate sponsors Microsoft Research, Google, Yahoo, IBM, Two Sigma, Walmart; non-profit associations CRA and ACM; university computer science departments across the U.S.; and David Little.

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CERP is currently funded by the National Science Foundation through the CRA-W/CDC Alliance grant (award #1246649 to CRA). Any opinions, findings, conclusions, and recommendations are the authors' and do not necessarily reflect the views of the National Science Foundation.

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About CERP

The Computing Research Association's (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

Grad Cohort is a two-day workshop that seeks to improve the success and retention of women in computing research by advising graduate students in computing on research skills and on career planning and development. Grad Cohort seeks to meet these goals using presentations, panels, and individual mentoring, and by creating professional social networks. Grad Cohort participants completed surveys prior to and immediately following the workshop. Findings suggest that Grad Cohort had a positive influence on participants' self-efficacy, interpretation of setbacks, strength of professional network, networking skills, and knowledge about skills necessary for professional growth. In addition, participants rated the sessions as useful. Participants also expressed satisfaction with the CONNECT system, a social networking tool used at Grad Cohort. Participants rated the system as easy to use and useful for networking with others. In addition to expressing enthusiasm and overall satisfaction with Grad Cohort, participants also provided helpful suggestions for improving the program.

"I really liked the social, networking, and discussion dynamics of an all woman space. It made me appreciate ways I'm different in the more male dominated groups. I left feeling a lot more positive about my experience as a PhD student so far and less isolated and worried about the ways I think I struggle in school."

- Grad Cohort Participant

Key Findings

After attending Grad Cohort, compared to before, participants reported:

- Greater self-efficacy in computing
- Stronger tendency to interpret setbacks as challenges
- A stronger professional network
- Greater networking skills
- Increased knowledge about skills for professional growth

Suggestions for improving Grad Cohort:

- Include sessions to address needs of international students
- Provide specific strategies for dealing with gender bias
- Provide additional individual advising sessions

"The opportunity to share and be bolstered by others' advice and experiences is a privilege that I am extremely grateful for and I hope to stay friends with the women I met."

- Grad Cohort Participant


GradCohort
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W
April 11 – 12, 2014
Regency,
California
We would like to thank the following organizations for their generous contributions:
Microsoft Research
@WalmartLabs
IBM
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computer society
SIGPLAN
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ACM SIG Special Project Fund
TWO SIGMA
David Liddle
University Departments
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Introduction

Women are underrepresented at all levels of the computing research pipeline: women make up only 18% of bachelor degrees, 22% of graduate degrees, and 18% of tenure-track faculty in computer science (National Science Foundation, 2013; Zweben & Bizot, 2014). Underrepresentation can lead to feelings of isolation, lack of fit, and attrition from a field (Dasgupta, 2011; Murphy, Steele, & Gross, 2007; Sekaquaptewa, 2014; Walton & Cohen, 2007). Developing networks of social support with others who share similar experiences, such as experiences relating to one's gender, can help individuals persist in the face of adversity (Robnett, 2013; Richman, vanDellen, & Wood, 2011; Szelenyi, Denson, & Inkelas, 2013). But because many women graduate students find themselves in the minority within their computing departments, it can be difficult to connect with other women in the field.

To help fill this void, the Committee on the Status of Women in Computing Research (CRA-W) established Grad Cohort as a two-day workshop for women who are in their first three years of graduate study in computing. Grad Cohort provides women graduate students the opportunity early in their career to connect with a supportive community and create professional networks with other students and senior researchers in the field who are also women. Through presentations, panels, and individual mentoring, senior women advise students on research skills, publishing, career planning, internships, collaborations, and other professional development topics to promote students' successful progression into computing research careers.

Eligible applicants to Grad Cohort must be in their first three years of graduate study in a Terminal Master's or PhD computing program. Participants are chosen from a diverse array of research areas, institutions, and race-ethnicities. In 2014, 503 applicants applied to the workshop and 304 were accepted (60% acceptance rate). All participants received full funding for travel expenses, meals, and registration, made possible by the generous sponsorship of corporations, associations, university departments, NSF, and individual sponsors.

CRA-W enlisted CRA's Center for Evaluating the Research Pipeline (CERP) to evaluate the immediate impact of Grad Cohort on participants' views, beliefs, and networks, and to assess participants' feedback and suggestions for improving the workshop. This report presents findings from that evaluation.

"I most enjoyed just getting to see and chat with so many women with similar interests and challenges. It was really refreshing to be in a professional atmosphere without having to worry about standing out or keeping up appearances."

- Grad Cohort Participant

Evaluation Method

Procedure

Grad Cohort participants were recruited at two time points (one week prior and immediately following the workshop) to complete a brief online survey gauging self-assessments of knowledge, skills, and professional networking related to achieving success in research career tracks. The survey that was administered immediately following the workshop also contained questions capturing participants' feedback and evaluation of the workshop. Survey items can be found in the Appendix B.

Survey Respondents

Of the 304 individuals who were contacted, 162 (53%) completed the survey at both time points. Academic and demographic characteristics of the sample are displayed in Appendix A, including race-ethnicity, citizenship status, degree program type, and year in degree program.

"Presenting at the poster session was really nice because you could meet people who were specifically interested in your research and build a bond with them-- also makes me feel good knowing that I'm bouncing my research off really bright people and getting their feedback. I initially wasn't thinking that I'd present anything but I'm really, really glad I did."

- Grad Cohort Participant

Evaluation Results

Two sets of results are presented below. The first set of results concerns the **immediate impact of Grad Cohort** on participants' views, beliefs, and professional networks, comparing participants' responses at Pretest (prior to the workshop) to their responses at Posttest (immediately following the workshop). The second set of results concerns **participants' evaluation of Grad Cohort**, reporting on responses at Posttest only.

Immediate Impact of Grad Cohort

This section uses a pretest-posttest research design wherein participants' responses at Pretest (prior to the workshop) are compared against their responses at Posttest (immediately following the workshop). This pretest-posttest design allows for the evaluation of the immediate impact of Grad Cohort on women's professional development in computing.

Self-efficacy. To assess self-efficacy in computing research, respondents reported their confidence in their ability to accomplish activities required for success in computing research careers (three items; see Appendix B). As shown in the top row of Table 1, respondents reported greater self-efficacy after attending Grad Cohort compared to before.

Growth mindset. With a growth mindset, people interpret negative feedback and setbacks as opportunities for growth rather than as diagnostic of lack of fit or ability. Growth mindset was assessed across four items (e.g., "I think of negative feedback from my advisor as a learning experience"; see Appendix B). As shown in the second row of Table 1, respondents reported having a stronger growth mindset after Grad Cohort than before.

Strength of professional network. Strength of professional network was assessed across four items (e.g., "I have a strong network of peers to interact with at conferences"; see Appendix B). As shown in the third row of Table 1, respondents indicated having a stronger professional network after Grad Cohort than before.

Networking skills. Respondents reported confidence in their networking skills across three items (e.g., "I feel confident in my networking skills"; see Appendix B). As shown in the fourth row of Table 1, respondents indicated more confidence in their networking skills after Grad Cohort than before.

"I felt like I was inducted into the league of Computing Research professionals."

- Grad Cohort Participant

Interest in pursuing PhD. Grad Cohort participants consisted of those who were pursuing PhDs as well as those who were pursuing terminal Master's degrees. Of those who were pursuing terminal Master's degrees (n = 32), we asked how interested they were in pursuing a PhD. As shown in the bottom row of Table 1, respondents expressed more interest in pursuing a PhD after Grad Cohort than before, though this effect was not statistically significant.

Table 1. *Impact of Grad Cohort on self-efficacy, mindset, strength of network, networking, and interest in PhD.*

	Pretest	Posttest
Self-efficacy	2.86	3.18**
Growth mindset	3.55	3.75**
Strength of network	2.77	3.02**
Networking skills	2.84	3.36**
Interest in PhD (n = 32)	2.75	3.00

Note. Responses were given on a five-point scale with higher numbers indicating a higher level of the construct. See Appendix B for specific items and scale labels. ** $p < .01$.

Knowledge about skills for professional growth. Respondents rated their agreement with three items assessing knowledge about skills for professional growth: (1) "I know how to figure out which publication venues are the top-ranked in my field, (2) "At technical conferences, learning about current research is more important than networking, and (3) "I know how to make my working relationship with my advisor more productive". After Grad Cohort, respondents agreed less with the idea that learning about current research at technical conferences is more important than networking, and they felt they knew more about how to make their relationship with their advisor more productive, compared to before Grad Cohort. In addition, those who attended a session on publishing (n = 74) reported greater knowledge of how to figure out which publication venues were top-ranked after attending the session than prior to attending the session. Means are displayed in Table 2.

Table 2. *Impact of Grad Cohort on knowledge about skills for professional growth.*

(1) Strongly disagree (2) Disagree (3) Neither agree nor disagree (4) Agree (5) Strongly agree	Pretest	Posttest
I know how to figure out which publication venues are the top-ranked in my field.	3.73	3.92*
At technical conferences, learning about current research is more important than networking.	2.78	2.60**
I know how to make my working relationship with my advisor more productive.	3.12	3.81**

* $p < .05$ and ** $p < .01$.

Participants' Evaluation of Grad Cohort

This section focuses on responses provided immediately following Grad Cohort regarding participants' feedback and evaluations of the workshop sessions. Participants also provided feedback regarding the CONNECT system, an online tool for facilitating networking at conferences. The responses presented below are from 162 participants who completed the survey at both time points, as well as 5 participants who only completed the survey at Posttest.

Usefulness of sessions. Participants indicated the usefulness of each session on a scale ranging from "Not at all useful" to "Extremely useful". Table 3 displays the frequency of ratings for each session, which indicates that the majority of respondents rated each session as "quite useful" or "extremely useful".

Open-ended comments. Respondents provided comments to three open-ended questions regarding their favorite aspects of Grad Cohort, suggestions for improvements, and suggestions for additional topics.

Favorite aspects. Respondents' favorite aspects of Grad Cohort included:

- Opportunities for networking
- Hearing speakers share their personal stories and experiences
- Participating in the poster session
- Individual advising
- Individual sessions that provided tools and advice for succeeding

Suggestions for improving Grad Cohort. Respondents were enthusiastic and overall positive about their Grad Cohort experience, but they also offered suggestions for improving the Grad Cohort workshop. Suggestions included the following:

- Allot more time to individual advising and/or provide small group advising sessions
- Incorporate international perspectives, experiences, and opportunities, as well as international speakers
- Organize the poster session by research area
- Provide research topic roundtables for students to discuss research
- Implement more activities to facilitate interactions between speakers and students

"I had a very good time interacting with different professors and other graduate students. I made a lot of friends in the process and got some invaluable advise. I was looking to build a community of peers and I think this goal was achieved."

- Grad Cohort Participant

Table 3. *Usefulness of sessions.*

How useful were each of the sessions?	N	Not at all	Slightly	Somewhat	Quite a bit	Extremely
Networking	73	0%	6%	10%	38%	47%
Presentation and other verbal communication skills	53	0%	4%	15%	45%	36%
Finding and training your advisor	40	0%	8%	20%	38%	35%
Balancing graduate school and personal life	51	0%	4%	12%	39%	45%
Finding a research topic	63	0%	3%	6%	46%	44%
Master's vs. PhD	33	0%	3%	30%	30%	36%
Preparing your thesis proposal and becoming a PhD candidate	74	0%	8%	16%	41%	35%
Publishing your research	77	3%	8%	16%	43%	31%
PhD non-academic career paths and job search	86	0%	6%	13%	35%	47%
Future of computer science	155	2%	8%	21%	41%	28%
Financially supporting your graduate education	25	4%	8%	40%	36%	12%
M.S. career opportunities and job search	53	0%	8%	6%	30%	57%
Building self-confidence	57	0%	5%	16%	39%	40%
Summer internships	46	0%	7%	13%	35%	46%
PhD academic career paths and job search	96	0%	4%	15%	39%	43%
Building your professional persona	70	0%	3%	14%	44%	39%
Resume writing clinic	83	0%	7%	8%	34%	51%
Strategies for human-human interaction	151	1%	5%	15%	46%	33%
Individual advising	67	3%	8%	15%	27%	48%

Suggestions for additional topics. Respondents offered suggestions for additional topics to be covered in the sessions at Grad Cohort. Suggestions included the following:

- Specific strategies for dealing with negative situations and conflicts, in particular, gender bias and discrimination
- How to navigate department politics
- How to deal with failure and/or rejection
- How to find collaborators
- Techniques, tools, and strategies for time management
- Writing grant proposals
- Experience of being a professor (and managing service, research, and teaching)
- Sessions specific to international students

Although some of these topics had been covered in the Grad Cohort workshop (e.g., time management, gender bias), respondents expressed a desire to learn more about specific strategies and tools they could use in their everyday lives.

CONNECT system. A majority of respondents (n = 145, 86%) used the CONNECT system during Grad Cohort. Those who had used the CONNECT system indicated their satisfaction with the system, the usefulness of various tools, and assessed various aspects of the system.

Satisfaction. As shown in Table 4, the majority of participants indicated that they were either "satisfied" or "very satisfied" with the CONNECT system.

Table 4. *Satisfaction with the CONNECT system.*

	Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
Overall, how satisfied are you with your use of CONNECT for Grad Cohort 2014?	1%	3%	28%	52%	15%

"The Connect [system] allowed me to meet professionals and colleagues that I plan on collaborating with in the near future. It also allowed me to start conversations with people [when I otherwise] probably would have felt uncomfortable doing so."

- Grad Cohort Participant

Usefulness of tools. As shown in Table 5, the majority of participants found the CONNECT tools at least "somewhat useful".

Table 5. *Usefulness of tools.*

How useful to you was each feature in CONNECT with regards to networking?					
	Not at all	Slightly	Somewhat	Quite a bit	Extremely
Search tool	3%	14%	28%	39%	16%
Messaging tool	7%	12%	32%	36%	14%
Goals tool	22%	20%	31%	22%	4%
Community tool	12%	22%	29%	30%	8%

Assessment of the system. As seen in Table 6, the majority of participants indicated that they agreed that (a) the CONNECT system helped them understand the value of networking, (b) using the system increased their knowledge of how to network, and (c) they felt comfortable using the system to network with other attendees.

Table 6. *Assessments of the CONNECT system.*

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
Using the CONNECT system help me understand the value of networking.	2%	13%	29%	44%	3%
Using the CONNECT system increased my knowledge of how to network.	4%	19%	39%	36%	3%
I felt comfortable using CONNECT to network with other conference attendees.	2%	15%	27%	46%	11%

Summary and Conclusion

Results suggest that Grad Cohort has a positive impact on participants. In particular, participants reported increased self-efficacy, stronger professional networks, and increased networking skills after attending Grad Cohort than before attending. Participants also indicated a stronger tendency to interpret setbacks as challenges rather than as indicators of lack of fit or ability (i.e., stronger growth mindset) after Grad Cohort than before[1].

Overall, participants expressed satisfaction with the Grad Cohort workshop and were enthusiastic about the networking opportunities, individual advising, and career tools provided by the workshop. In addition, the vast majority of participants utilized the CONNECT system to network with others at the conference. Participants were satisfied with the system and rated it as useful and easy to use.

Participants also provided suggestions for improvements to Grad Cohort. In particular, participants emphasized a desire to learn specific strategies they could use in their everyday lives, particularly in regards to dealing with gender bias and discrimination. Participants also expressed a desire for more individual advising and more activities to interact with speakers. In addition, participants requested more attention be paid to the experience of international students by including session topics specifically geared toward international students as well as increasing the number of international speakers who could serve as role models.

> ***"[My favorite part was] the opportunity to meet people!! I love the fact that [Grad Cohort] was a relatively small group, with really smart women that are committed to helping each other succeed. I felt like I wasn't alone and there were lots of women to support and help me."***
>
> - Grad Cohort Participant

In summary, results suggest that Grad Cohort has a positive impact on participants. In particular, Grad Cohort helps participants network early in their career with other women students and senior women researchers in computing, which is one of the primary goals of the program.

[1] Although these results are promising and suggest positive impacts of Grad Cohort, it is important to note that results are based on self-reported data that may be susceptible to response bias and/or demand characteristics. For example, participants may have consciously inflated their responses at Posttest in order to show appreciation and gratitude for the Grad Cohort program. Furthermore, although results suggest positive changes immediately following Grad Cohort, it remains unclear whether these changes are sustainable over time.

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Appendix A: Sample Characteristics

Figure 1. *Race-ethnicity of respondents.*

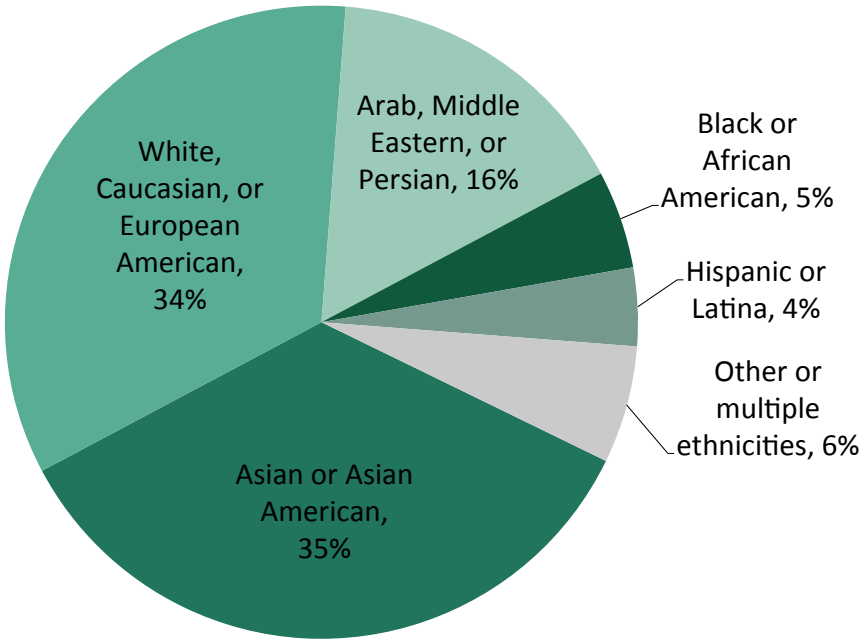


Figure 2. *Citizenship status.*

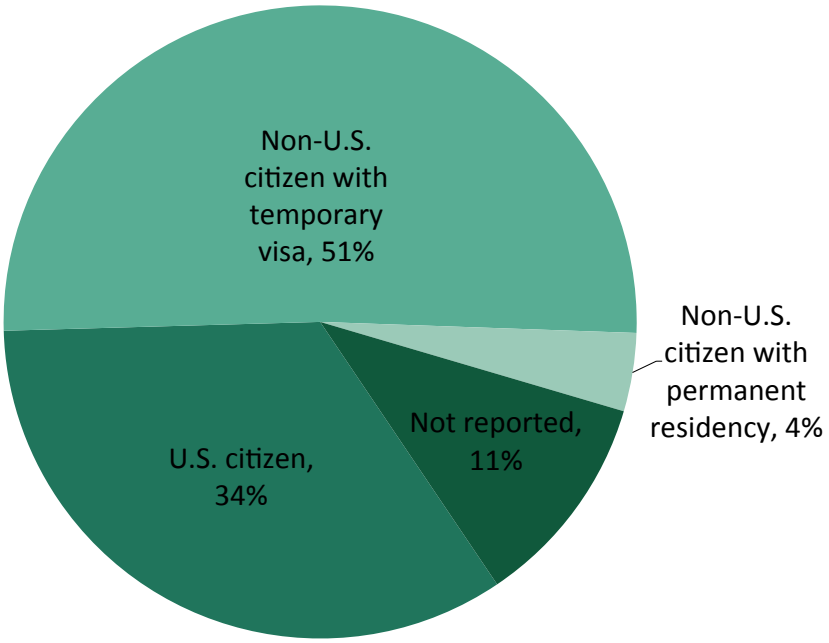


Figure 3. *Degree program type.*

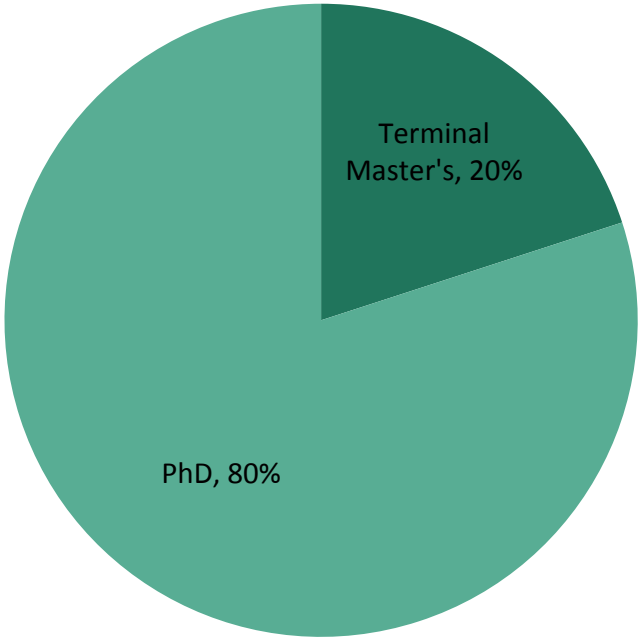
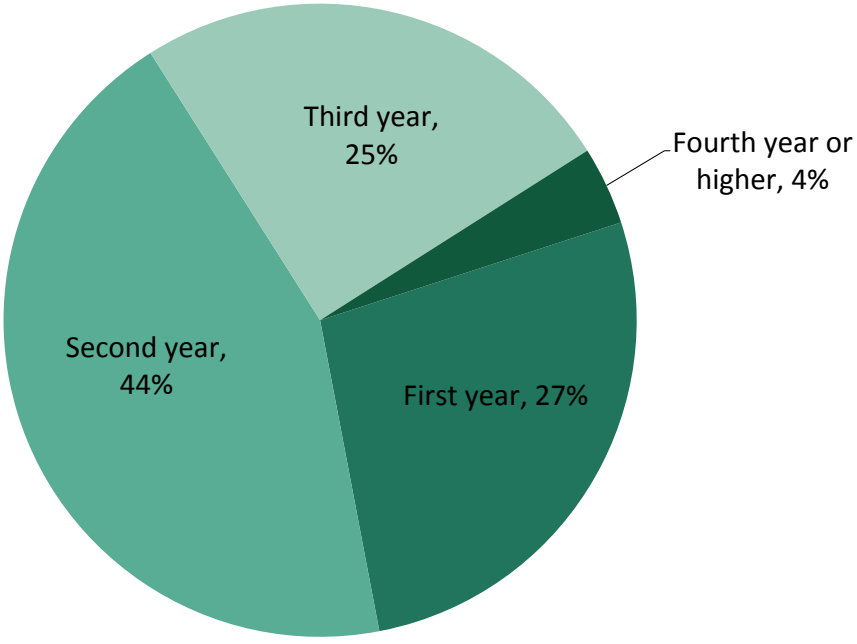


Figure 4. *Year in degree program.*



Appendix B: Aggregate Survey Items

Reliability was determined for multi-item constructs using Cronbach's alpha (α). Alpha levels ≥ .70 are considered acceptable. Items for each construct were averaged together to form composite scores. Individual items are listed below.

Self-efficacy

Participants' self-efficacy in computing research was assessed with three items. Items were averaged to form a composite score (α = .80 at Pretest and α = .79 at Posttest). Individual items are listed below.

How confident are you that, if you choose, you can…

(1) Not at all confident (2) Slightly confident (3) Somewhat confident (4) Quite confident (5) Extremely confident

- Publish papers as first author in the top publication venues of your field
- Discuss your research and other technical topics with senior members of the field
- Become a leader in the computing community

Growth Mindset

The extent to which participants endorsed a growth mindset was assessed with four items. Items were averaged to form a composite score (α = .54 at Pretest and α = .63 at Posttest). Individual items are listed below.

Rate the degree to which you disagree or agree with the following statements:

(1) Strongly disagree (2) Disagree (3) Neither disagree nor agree (4) Agree (5) Strongly agree

- Obstacles in grad school make me want to give up (reverse-coded)
- I think of negative feedback from my advisor as a learning experience
- People who have been successful in my field have rarely encountered as much failure as I have (reverse-coded)
- Failure in graduate school indicates that you are really not meant to be there (reverse-coded)

Strength of Network

Participants' network strength was assessed with four items. Items were averaged to form a composite score (α = .87 at Pretest and α = .84 at Posttest). Individual items are listed below.

Think about your relationships with people in the computing community. To what extent is each of the following available to you at this point in your career?

(1) Not at all (2) A little (3) Somewhat (4) Quite a bit (5) Very much

- People with whom you can discuss professional development questions
- A strong network of peers to interact with at conferences
- People in your field who you identify with and can relate to
- People who would be excited to learn about your professional successes

Networking Skills

Participants reported on their networking skills with three items. Items were averaged to form a composite score (α = .85 at Pretest and α = .85 at Posttest). Individual items are listed below.

Rate the degree to which you disagree or agree with the following statements:

(1) Strongly disagree (2) Disagree (3) Neither disagree nor agree (4) Agree (5) Strongly agree

- It is hard for me to introduce myself to people at conferences (reverse-coded)
- I feel confident that I can network effectively
- I don't really know how to make connections at conferences (reverse-coded)