The Career Mentoring Workshop: A Second-Generation EDGE Program

Rachelle C. DeCoste

Abstract The EDGE program, originally founded to provide support for women entering doctoral programs in the mathematical sciences, has had a dramatic, positive impact on the mathematics community well beyond its program participants. Many of the women who have participated in the EDGE summer sessions have not only successfully earned doctorates in the mathematical sciences, but have subsequently assumed leadership roles in new outreach efforts aimed at diversifying the United States mathematics community. In this paper, we examine in more detail the impact of the author's—an EDGE alumna and current Associate Professor of Mathematics—efforts to diversify the mathematics community by way of founding the Career Mentoring Workshop (CaMeW) for women completing their math doctorates. Lessons learned, including challenges and successes, will be shared for others who may consider initiating similar outreach efforts. CaMeW is an example of a "second-generation EDGE program," that is a program founded by an EDGE alumna who is actively working to diversify the math community.

1 Introduction

In the summer of 1998, I participated in the first EDGE program. It was held at Bryn Mawr College and I was one of the eight women participants who were about to enter their first year of graduate school in mathematics. In the 20 years that have followed, I have completed a PhD, held a National Research Council Postdoctoral Fellowship, and earned tenure and promotion at a small selective liberal arts college—my dream job. I regularly publish research articles on the geometry of nilmanifolds arising from Lie groups; I teach undergraduate mathematics classes at all levels; and I mentor students, some of whom go on to graduate school in mathematics and other disciplines. However, I am not just a typically successful

R. C. DeCoste (✉)
Wheaton College, Norton, MA, USA
e-mail: decoste_rachelle@wheatoncollege.edu

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academic mathematician; I am an EDGE mathematician. The impact of the EDGE program is most heavily seen through the work I have done as a member of the mathematics community in the 15 years, since I completed my PhD. EDGE mathematicians are deeply committed to work diversifying mathematics.

I am the founder and director of the Career Mentoring Workshop (CaMeW), a program that has mentored 95 women finishing their PhDs over the course of seven workshops. This program helps women secure first postdoctoral positions—either inside or outside of academe—and aims to ensure that they feel supported moving forward.

2 CaMeW Rationale and Structure

CaMeW seeks to create a supportive community for women mathematicians in pursuit of fulfilling professional careers. This is important for the individuals, but also for the mathematics community. Women faculty enhance the persistence of women students, as supported in Dasgupta [2] and Herrmann [7].

The Career Mentoring Workshop began as a hallway conversation with another EDGE community member at the 2007 Joint Mathematics Meeting (JMM). At the time, I was a National Research Council Fellow with a joint appointment at the United States Military Academy at West Point and the United States Army Soldier Research Center. This EDGE alumna was completing her PhD, searching for her first postdoctoral position, and experiencing self-doubt about her ability and potential to secure a faculty position. She was surprised to hear that I had felt similarly when I had sought my first position. Our common experience was a classic example of imposter syndrome, a well-studied phenomenon first introduced by Clance and Imes [1] that tends to impact even the most highly successful professionals.

This JMM conversation started a chain reaction. I could no longer ignore the palpable consequences that doubt was having on women's potential to access careers they not only wanted, but were well qualified to fulfill. I decided to establish a space where women could have open, honest conversations about the job search process. Indeed, according to Hill [8], women in STEM (Science, Technology, Engineering and Mathematics) fields are more susceptible to feeling like they do not belong in academia, thus they are posited to benefit directly and strongly from mentoring by other women. According to Fridkis-Hareli [3], the majority of women in science who have been successful in their careers have been mentored, whether formally or informally.

That fateful hallway conversation led to the first CaMeW held in the summer of 2007 at the United States Military Academy at West Point. The workshop was supported by a Mathematical Association of America (MAA)/Tensor Grant for Women and the Department of Mathematical Sciences at West Point. Ten women were invited to participate in the workshop from a pool of twenty-five applicants. Since then, funding has been secured for the workshop to run in 2007–2010,

2012, 2016, and 2018, with financial support from the MAA/Tensor Program, the Department of Mathematical Sciences at West Point, Wheaton College (MA), the NSA, the EDGE Foundation, the Department of Mathematics and Statistics at Mount Holyoke College, and the Summer Mathematics Program at Carleton. Each CaMeW session has hosted 12–15 graduate student participants. Even though transportation for faculty mentors was funded, faculty did not receive stipends for work preparing for or participating in CaMeW in the first five workshops. These faculty volunteers demonstrated a deep commitment to supporting other women mathematicians. June [10] describes tension between expecting professionals to mentor the next generation and to perform service to the community and the fact that much unpaid service is performed by women and other underrepresented minorities. Moving forward, CaMeW expects to compensate faculty for their participation in the program, though we recognize that the rate of compensation is well below what their professional expertise should dictate. Throughout the iterations of CaMeW, several of the faculty mentors have been members of the EDGE community.

The 3-day format of CaMeW has remained consistent throughout the years. While a longer workshop would allow for more reflection time and community building, a 3-day commitment is as much time as most participants can afford away from their doctoral theses. Additionally, in the early years of the program, asking faculty to volunteer more than 3 days of their time without compensation seemed like too large a request. The workshops have been held in the Mathematics Departments at West Point, Wheaton College, and most recently, at Mount Holyoke College. The suggestion to move the workshop to a national mathematics meeting to save money has been rejected because of the privacy afforded by these more intimate venues. To hold CaMeW at MathFest, for example, would not allow for the same level of comfort that leads to deep, honest conversations. When one's classmates, advisor, or potential employer might be just around the corner, it is harder to feel safe with the level of vulnerability necessary to achieve true connections between our participants and faculty.

The goals of the workshop are multiple. The immediate objectives are to educate women about possible career paths and to help them establish, or build upon, existing peer and mentor networks. Toward this end, several of the sessions consist of faculty presenting material on topics such as possible postdoctoral positions, the steps of the job search process, types and expectations of interviews, and negotiating strategies. Each participant is asked to prepare and submit job search materials (cover letter, curriculum vitae, research statement, and teaching statement) prior to the workshop. Two different faculty members read each participant's package and then meet with the individuals to provide personalized feedback during the workshop. This intentional mechanism allows the participants to have solid material for their job search prior to the mathematics academic job search season, which typically begins in early fall. In addition to preparing practical job materials, participants also prepare and present a short talk about their dissertation research in small group sessions where they receive individual written and verbal feedback. The supportive atmosphere allows the participants to gain valuable personal feedback without the negative consequences of a stressful environment. These practice

presentations help prepare the participants for talks at the JMM or for job interviews. Feedback on the talks focuses on both content and delivery, with the intent to help each participant improve her ability to give an effective talk. In addition to the formal interactions and sessions, time is set aside during CaMeW for each participant to reflect on her stated goals and their outcomes both at the beginning and at the end of the workshop.

As stated in the beginning of this essay, the overarching goal of CaMeW is to help women find first postdoctoral positions that help them establish life-long careers in mathematics. We believe that a first step in this process is to ask women participants to consider the kind of a career they want to pursue.

CaMeW is often the first place where participants are asked to reflect on the path they want for their future. Indeed, they usually know what their PhD advisors envision, but they are often surprised when they realize that they have never questioned whether their advisor's goals align with their own. In fact, over the years, we have helped several participants navigate difficult conversations and relationships with advisors. We encourage participants to think about their long-term career goals, by thinking individually about their desired day-to-day experiences, as well as the more encompassing characteristics of their desired future work life. We ask them to consider the balance between research and teaching, both short term and long term. We challenge them to prioritize certain aspects of their future life from a long list that includes job-related details—these include number of classes taught each semester, sabbatical support, travel support, types of courses taught, class size, size of the faculty, etc. We also validate the important consideration of the quality of life when thinking about their future, and we encourage them to examine schools' idiosyncrasies that are not directly work-related, such as geographic location, urban vs rural locations, availability of social support, etc. We strongly believe that thinking about priorities leads to a fulfilling work–life balance and is essential to establishing a successful career in mathematics. We use this exercise to help participants see that they are not a homogeneous group of 15 graduate students vying for the same set of jobs. We embolden each participant to seek a job that aligns with her individuality and with her own personal objectives. We openly and strongly affirm that each list is valid and that each choice is legitimate.

After we ask participants to think about their ideal jobs and we give feedback on their application materials, we hold an interactive workshop session on interviews, during which we engage in mock interviews. The participants often find this awkward at first, but we ask them to pretend that they are interviewing for their self-defined "perfect job." This experience gives the applicants an opportunity to explain to someone else why they want this particular job and how they are qualified for that position.

We ask questions that they might be asked on an initial interview, again offering the opportunity for them to practice responses in a situation where there is no risk. Participants also brainstorm lists of questions they think might arise and questions they should ask during the interview process. We find that many participants do not know that they are expected to ask questions during an interview. The interactive

workshop session opens the door for us to remind them that interviews are dialogues where they should gather information to understand whether the position fits their personal and professional objectives, as discussed above. Through these sessions, our participants become better communicators and confident speakers who can advocate for themselves.

3 CaMeW Follow-Up

After the participants leave CaMeW the core faculty routinely review second drafts of application material, discuss interviews, and provide advice on negotiations as the participants move through the job search during the following year. We also arrange an informal gathering at the JMM each year. In this meeting, we invite participants from all years of CaMeW; this allows them to share their job search experiences, while interacting with others who have been through the process, providing additional role models and success stories. As they continue in their career trajectories, we offer discussions about changing jobs, balancing work and family life, and becoming more established in their professional settings. Today, the community of women who continue to support each other as CaMeW alumnae is impressive. They continue to mentor and advise each other, in person or online through social media.

4 CaMeW Staffing

The workshop is faculty-intensive. For instance, over the course of 3 days in 2018, 15 participants interacted with 16 faculty and other professional mathematicians. For each iteration of CaMeW, six core faculty are present for the entirety of the workshop: the core faculty are there for every session, every meal, and even for breaks. For the middle day of the workshop, the core faculty are joined by additional faculty from nearby schools who participate in the feedback sessions and later host a panel discussion for the participants. A benefit to holding CaMeW at schools located in the Northeast has been the close proximity of many other colleges and universities. It is necessary to include additional faculty to provide hands-on feedback for the participants, but also to increase the number of perspectives shared during the workshop, which is necessary to support our goal of allowing participants to interact with a range of successful women in mathematics. We strive to represent racial and ethnic diversity for the faculty and we also aim to invite faculty mentors from a diverse range of schools, from traditional liberal arts colleges, to comprehensive universities and R1 institutions. We seek to include faculty who are at various points in their careers. For instance, we rely on more junior faculty to discuss current trends in the job search in mathematics, as we

know these trends change over time. We ask mid-career faculty who have achieved tenure and who may have changed jobs to offer their perspective on the often-elusive life–work balance. We also make sure to provide the perspectives of more senior faculty who have mentored junior colleagues for years and who can share lessons learned from their seasoned careers. The presence of senior faculty also benefits the junior faculty as it allows for strong connections and mentoring relationships to form among these faculty members. It should be noted that in the initial years of CaMeW, there were men included among the faculty members. However, in later years, the faculty have been all women, based on the belief that there are many male mentors in the mathematics community. With only 20% of the women among full-time faculty at R1 institutions, according to AMS data (2018), participants may be lacking in both female role models and mentors.

Faculty who participate for 1 day are fully engaged through their individual meetings to review application materials, through the feedback they give during the math presentations, and through their panel session. They are also committed to the success of the workshop through all the informal interactions that occur during breaks and meals. Topics during the panel usually range from practical questions about what makes a job application stand out, to personal experiences tied to the challenges and rewards of life as a woman in mathematics. We end our one full day together with a keynote talk by a woman mathematician who discusses her own journey through mathematics. The most successful talks have been the ones where speakers have shown their own personalities, honestly shared stories of successes and challenges, and have humanized the life of a successful woman in mathematics. Keynote speakers have included Ruth Haas, cofounder of the Smith College Center for Women in Mathematics; Rhonda Hughes, Bryn Mawr College, cofounder of the EDGE program; Suzanne Weekes, Worcester Polytechnic Institute, cofounder of Preparation for Industrial Careers in Mathematical Sciences; Liz McMahon, Lafayette College; Catherine Roberts, College of the Holy Cross and current AMS Executive Director; Kathi Crow, Salem State University.

Given all these reasons and goals, it is evident that one of the challenges for each CaMeW has been to find a well-balanced cohort of faculty who can represent a wide range of women mathematicians. Each individual must be comfortable with the vulnerability inherent in sharing her personal story, including the obstacles and the failures faced along the way. To stay true to the original intent of the workshop, we must provide a space for women to feel safe in sharing their struggles honestly. In our experiences, the most effective faculty mentors are those who do not pretend that their success is void of challenges, but the ones who share their full stories along with some effective strategies for overcoming the difficulties that can arise in the life of a woman mathematician. In addition to ensuring that each individual faculty member will contribute to the overall goals of the workshop, we strive to ensure the group is both diverse in its composition and cohesive in the overall message, which is to validate and support each individual's choices of professional path.

5 Outcomes of CaMeW

Over the seven iterations of CaMeW, we have mentored 95 women from 54 different graduate programs. Following the completion of their doctorates, participants of CaMeW have gone on to successful careers in academia and in industry. Their first postdoctoral positions include research postdocs, teaching postdocs, tenure-track positions, visiting positions, industry positions, and full-time parenting. At CaMeW, we discuss that many academic job paths are not linear and that many people change jobs during their careers, including several of our faculty mentors. We provide women with tools to persist in their chosen careers and we want them to recognize that if they are in academic positions that do not fulfill them—for either professional or personal reasons—they should know that the issue may not lie with them not belonging in academia. We also recognize that sometimes women DO choose to leave academia and move to industry; other times women choose to remain at home after having children. These are all valid career choices as long as they are ones that the women themselves feel empowered to make, rather than feeling they must leave mathematics because they do not belong.

Following CaMeW, participants are able to finish preparing materials that are tailored to specific jobs and discuss their preparation for these positions. During interviews, CaMeW participants are able to articulate their own interests and understand how they fit various positions. Overall, we believe that participants are more confident in their ability to navigate the job search and that this contributes to the successful attainment of their first postdoctoral position. Taking away the unknown and the feeling of isolation provides a level of comfort that allows them to focus on finding a job that is right for them instead of wondering if they belong anywhere in mathematics. With our encouragement, CaMeW participants pass on the knowledge and experiences they gain from their participation in CaMeW with their peers. We also encourage them to apply for participation in other professional development opportunities, such as the Association for Women in Mathematics Graduate Poster Session at the JMM and MAA's Project NExT.

6 CaMeW Challenges

We are aware of the possibility that participants may arrive at CaMeW with the notion that they are in "competition" with each other on the job market. We ask that they list their own personal objectives, which allows them to see that the overlap of desired jobs is small. We ask participants to set aside this potential competitive angle so that we may all support each other's individual goals. During each iteration, we have succeeded in creating a genuinely supportive environment in which participants establish lasting relationships.

Funding remains a challenge for the sustainability and continuation of CaMeW. The lack of funding has led to years when CaMeW could not run. The current

iterations of the program, including funding for faculty, cost on average just over $17,000. Though this small investment (just over $1000 per participant) effectively supports diversifying mathematics, regular funding remains elusive. The future of CaMeW is in doubt.

7 The Future of CaMeW

Why should programs like the EDGE program and CaMeW continue to exist? Do women no longer need targeted programs to support their career-long participation in the mathematics community? One needs look no further than the recent report about sexual harassment in STEM fields edited by Johnson et al. [9] to see that all is not equal in academia. Women remain underrepresented in the professoriate, as documented in the AMS surveys of graduate students and departmental profiles by Golbeck et al. [4], and are still internalizing these community-wide issues as personal ones. The AMS recently participated in the National Science Foundation-funded STEM Inclusion Study. While published results are not available, some indications of the results were written about by Helen G. Grundman, AMS Director of Education and Diversity, in the inclusion/exclusion blog of the AMS (November 29, 2018) [6]. As she indicates, women are significantly more likely than men to agree that they have to work harder to be perceived as a legitimate professional.

In the same Inclusion Study, women members of the AMS report significantly higher frequencies of being harassed, verbally or in writing on the job in the last year than men. As a community, we need to do more to support the persistence of women in mathematics at all levels. According to NSF data [11], women earned 41.7% of the undergraduate degrees in mathematics and statistics in the United States in 2014. Further, according to the Fall 2016 Departmental Profile Report in the 2016 Annual Survey of the Mathematical Sciences in the US reported in the September 2018 Notices by Golbeck et al. [5], women account for 31% of all full-time faculty in the mathematical sciences. This mirrors the percentage of women earning PhDs in the United States, which was 30% in 2016 (31% in 2015) according to the AMS Survey of new PhDs, again reported by Golbeck et al. [5]. However, when one delves deeper into the employment data, one sees that women hold only 14% of full-time tenured and 26% of full-time tenure-eligible positions in doctoral mathematics departments. Though women are persisting in some areas of academia, they are still largely underrepresented at graduate degree granting institutions.

8 CaMeW Conclusions and the Larger EDGE Community

In my career, I have intentionally surrounded myself with women who are deeply committed to supporting each other and the larger mathematics community. All mathematicians should assist with inclusivity efforts in the mathematics community.

CaMeW is one program that has been successful in creating an inclusive community of women who support each other as individuals. In Chapter 5, I identify many other programs created or supported by members of the EDGE community. EDGE community members are creating, directing, and leading initiatives aimed at diversifying mathematics beyond—but because of—EDGE: they are second-generation EDGE activities.

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References

1. Clance, P. R., & Imes, S. A. (1978) The imposter phenomenon in high achieving women: Dynamics and therapeutic intervention. *Psychotherapy: Theory, Research & Practice, 15*(3): 241-247
2. Dasgupta, N, Stout, J.G. (2014) Girls and Women in Science, Technology, Engineering, and Mathematics: STEMing the Tide and Broadening Participation in STEM Careers. Policy Insights from the Behavioral and Brain Sciences 1(1): 21-29
3. Fridkis-Hareli, M. (2011) A mentoring program for women scientists meets a pressing need. Nature Biotechnology 29(3): 287-288
4. Golbeck, A.L., Barr, T.H, Rose, C.A. (2018) Report on the 2015-2016 New Doctoral Recipients. Notices of the AMS, March 2018: 771-785
5. Golbeck, A.L, Barr, T.A., Rose, C.A. (2018) Fall 2016 Departmental Profile Report. Notices of the AMS, September 2018: 949-959
6. Grundman, H.J. (2018) The STEM Inclusion Study: What we've learned so far. In: The AMS inclusion/exclusion blog. American Mathematical Society. https://blogs.ams.org/inclusionexclusion/2018/11/29/the-stem-inclusion-study-what-weve-learned-so-far/
7. Herrmann, S.D., Adelman, R.M., Bodford, J.E., Graudejus, O, Okun, M.A., Kwan, V.S.Y. (2016) The Effects of a Female Role Model on Academic Performance and Persistence of Women in STEM Courses. Basic and Applied Social Psychology, 38(5): 258-268
8. Hill, C., Corbett, C., St. Rose, A. (2010) Why So Few? Women in Science, Technology, Engineering and Mathematics. AAUW, Washington, DC.
9. Johnson, P.A., Widnall, S.E., Benya, F.F. (eds) (2018) *Sexual Harassment of Women: Climate, Culture, and Consequences in Academic Sciences, Engineering, and Medicine*. National Academies of Sciences, Engineering, and Medicine. Washington, DC.
10. June, A.W. (2015) The Invisible Labor of Minority Professors. The Chronicle of Higher Education, 62(11)
11. National Science Foundation, National Center for Science and Engineering Statistics. (2017) *Women, Minorities, and Persons with Disabilities in Science and Engineering*. Special Report NSF 17-310. Arlington, VA.