

## **The EDGE Program: Adding Value through Diversity**

### **A Brief History**

In 1998, the EDGE Program began as a joint project of Bryn Mawr and Spelman Colleges. The original aim of the program, motivated by the experiences of the founders and their students, was to improve retention of women students, with particular attention to women from underrepresented groups, in graduate mathematics programs. The idea for EDGE evolved from an earlier program, the Spelman-Bryn Mawr Summer Mathematics Program, an REU-type program for undergraduate women from the Atlanta and Philadelphia areas. When the funding for this four-year, NSF-funded project ended, the co-directors (Sylvia Bozeman and Rhonda Hughes) realized that they continued to be frustrated by the experiences of their own undergraduates when they would begin graduate school. This personal experience, together with an NSF initiative to improve graduate education, led to a proposal for the EDGE Program. "Enhancing Diversity in Graduate Education" did not readily receive funding, and it took over a year and the efforts of a supportive Program Officer to bring EDGE into existence. The original proposal requested funding for a six-week program, but budget constraints shaped the four-week program that was eventually supported. Supplementary funding was later obtained from the National Security Agency, and ultimately the Andrew W. Mellon Foundation took over from NSF and provided core support, with NSF assuming a supplementary role. In all cases, Program Officers who were committed to the basic philosophy and goals of EDGE were crucial in the effort to garner funding. The EDGE Program has been a fascinating and instructive journey for the co-directors and the many women and men who have devoted themselves to the EDGE effort over the years. To date, the program has helped to prepare over one hundred women for graduate school in mathematics. The summer session initially alternated between Bryn Mawr and Spelman Colleges, and in 2003, became portable, moving first to Pomona College, then back to Spelman in 2004, to North Carolina A&T State University in 2005, and to New College of Florida in 2006. Radunskaya has taught in the program every year since its inception, and in addition hosted the EDGE Summer Program in 2003. Many instructors have returned to the program repeatedly, some of the graduate mentors served for several years before earning their Ph.D.s and returning to teach in the program, and for the past several years, the mentors have been selected from former EDGE participants.

### **Philosophy and Goals**

The EDGE Program is founded on the belief that students who have been superstars in earlier mathematics courses, but may have had limited exposure to advanced mathematics, can still earn doctorates. Moreover, exposure to graduate-level mathematics and the culture of graduate school, along with a rich support network and positive feedback, will significantly enhance a student's ability to obtain a Ph.D. This philosophy is contrary to the popular view among most mathematicians that the well-prepared, fast-thinking graduate student with high GRE scores is the most likely to succeed in her or his graduate program. As we will demonstrate later, our philosophy has been borne out time and again in the experiences of EDGE students. The long-range

goals of the program are to increase the presence of women, with a special focus on women of color, in the upper ranks of mathematical scientists, and to create models for mathematics programs that allow people from all backgrounds and cultures to thrive, advance, and contribute to the profession. There are several short-term goals for the EDGE participants: an understanding of their strengths and weaknesses that enables them to make a successful transition from undergraduate to graduate programs in mathematics; an increased level of confidence that is sustained through temporary setbacks; the ability to redirect their ambitions when a program is deemed unsuitable; membership in an active support network of mathematicians; and a broadened perspective of mathematics and the culture of graduate school.

### **Components of the Program**

The structure of the EDGE Program is designed to achieve the program's goals, and support its basic philosophy. The cornerstone of the program is the four-week Summer Program, consisting of both academic and social components. The academic program consists of two four-week core courses in abstract and linear algebra, and in analysis; problem sessions conducted by three graduate student mentors; a mini-course and special guest lectures on timely areas of mathematical research; TEX sessions; and presentations by participants. The choice of algebra and analysis as the academic courses was based on the notion that these subjects would form the core of the first-year graduate school curriculum for most students. Many EDGE participants, however, are headed to programs in statistics, operations research, and applied mathematics. Their subsequent reactions to the usefulness of the courses is nevertheless positive; they (and we) believe that the content of the courses is secondary to the process of intense exposure to material and mastery through problem-solving by a combination of individual effort and teamwork. In 1998, there were eight student participants. Over the years, as funding has allowed, that number has grown to fourteen. The selection criteria include acceptance into a graduate program in the mathematical sciences (including statistics and operations research, but not computer science); an expressed desire to obtain a doctorate degree, and interest in being part of a network of women scholars; academic and leadership potential identified by faculty recommendation letters; and the need for exposure to graduate-level mathematics or the graduate school culture. EDGE participants have all been stars in their undergraduate institutions.

The social aspects of the program are designed to build a community of scholars in a collegial and supportive environment. A Diversity Seminar, held in the first week of the program, with a follow-up session in the third week, enhances communication across racial, cultural, gender, and learning-style lines. Panel discussions on issues relative to a successful graduate school experience give students a glimpse of what lies ahead. Thursday-night dinners of participants and mentors at an off-site location contribute to bonding and the forging of lasting friendships. In the middle weekend of the program, the previous year's participants return for a reunion and share with current students their first-year experiences. The reunion weekend is often a highlight of the program, and offers participants invaluable insight into the graduate school experience. The second major component of the EDGE Program is the Follow-Up Mentoring Program. The Co-Directors and Local Coordinator arrange for a faculty mentor at each student's

graduate institution. In addition, they maintain contact with students during the year, and provide a small research allowance for books and professional travel. As indicated above, each student is invited to return to EDGE the following summer for a reunion, and students are encouraged to attend the January Joint Meetings for a mini-reunion. A bulletin board on the program's website affords alumnae the opportunity to share triumphs and challenges throughout their graduate school years.

### **Student Outcomes and Program Results**

With the selection criteria stated above, 105 outstanding women were accepted into the EDGE Program from 1998 to 2006. As of 2005, data show that EDGE participants are from diverse racial (49% underrepresented minorities) and educational (44% liberal arts) backgrounds. Furthermore, they are taking a variety of paths through their graduate programs. The success of the summer sessions, along with the rate of student achievement, has sparked a growing interest in EDGE among students, faculty, and institutions. The list of colleges and universities represented as the undergraduate institutions of those in the applicant pool and among the subsequent participants has continued to expand. In the first eight years of the EDGE Program (1998-2005) there were 90 students who entered graduate programs. Approximately 92% of these have either earned a graduate degree or are persisting in their graduate programs. Of the total group, by 2006 28% had earned the master's degree and discontinued their education, most often to accept employment, and 58% were continuing in a graduate degree program. To date, six EDGE participants (6.7%) and three other EDGE graduate mentors have earned the doctorate in mathematics and several other participants expect to complete degree requirements by the end of 2007. These results are particularly gratifying in that the racial diversity of the program is reflected in these rates of success; for example, among the six doctoral recipients, three are white and three are African-American.

Since the EDGE Program was created primarily to reduce first year attrition in mathematics, we conclude that in its first eight years of operation, the EDGE Program demonstrated its effectiveness in preparing students for the first year of graduate study, both mathematically and culturally, with a success rate of 92%. In actuality, the program seeks to mentor students through their graduate years until the doctorate is earned.

Beyond those students who earn degrees, there is one other indicator of success: students who find their initial choice of a graduate school unsatisfactory often relocate to a second university rather than dropping out. The EDGE Program strongly emphasizes to students that the inappropriateness of a particular graduate program or institution is not a reason for discontinuing one's graduate education. To date we have observed, and sometimes assisted, several students in relocating after the first year, and several others who have relocated after obtaining the master's degree.