Has the Women-in-Mathematics Problem Been Solved?

Editor's Note: Beginning with our 1991 "special issue" on women in mathematics, the *Notices* has featured coverage of diversity and underrepresentation in mathematics. This tradition continues in the present issue with articles by Allyn Jackson, Carolyn Gordon and Barbara Keyfitz, and Herbert Medina.

—Andy Magid

The data in the tables below were reported by departments responding to Annual AMS-ASA-IMS-MAA Surveys of New Doctorates, from academic year 1995–1996 through 2002–2003. For Annual AMS-ASA-IMS-MAA Survey Reports, departments are divided into groups according to the highest degree offered in the mathematical sciences. Doctoral-granting departments of mathematics are further subdivided according to their ranking of "scholarly quality of program faculty" as reported in the 1995 publication *Research-Doctorate Programs in the United States: Continuity and Change* (National Academy Press, 1995). Groups are referred to in the following tables:

Group I is composed of 48 departments with scores in the 3.00–5.00 range. Group I Public and Group I Private are Group I departments at public institutions and private institutions respectively.

Group II is composed of 56 departments with scores in the 2.00–2.99 range.

Group III contains the remaining U.S. departments reporting a doctoral program, including a number of departments not included in the 1995 ranking of program faculty.

Group Va is applied mathematics/applied science; Group Vb, which was no longer surveyed as of 1998–1999, was operations research and management science.

Listings of the actual departments which comprise these groups are available on the AMS website at `http://www.ams.org/outreach/`.

Thirteen years ago, in June 1991, *Science* magazine published an article with statistics on the number of women in the "top ten" mathematics departments in the United States. Out of 303 tenured professors in these departments, the article reported, just 4 were women. The article caused a good deal of discussion in the mathematical community. The details were picked apart: Who says *these* are the top ten departments? Why weren't tenure-track women counted? But the larger question came across loud and clear: Why were so few women rising to the top levels of mathematics? The headline on the article, which was about a highly publicized tenure case at Berkeley, suggested an explanation: "Does the Harrison Case Reveal Sexism in Math?"

The *Science* article hails from a different era, when in-your-face pronouncements about the lack of women in mathematics were more common than today. In those ten departments—Berkeley, Caltech, Chicago, Columbia, Harvard, Michigan, MIT, Princeton, Stanford, and Yale—there are still around 300 tenured professors, and 16 are women. The number of women has quadrupled, and yet the picture is largely the same; what has changed is the lack of public expressions of discontent. Has the issue of women in mathematics, once so urgent in the mathematical community, disappeared from the radar screen?

Top Producers of Women Doctorates

Before examining that question, a look at a different set of data may provide some additional perspective. The September 1991 *Notices* was a "special

TABLE 1. Leading U.S. Doctorate-Granting Departments of Mathematics by Number of Women Doctorates Reported, from Academic Year 1995–1996 through 2002–2003

	Total Women Doctorates Reported	Total Doctorates Reported	% Women
Maryland, University of (College Park)	49	179	27.37
California, University of (Los Angeles)	40	160	25.00
Illinois, University of (Urbana-Champaign)	40	161	24.84
California, University of (Berkeley)	39	244	15.98
Massachusetts Institute of Technology	37	174	21.26
Wisconsin, University of (Madison)	34	165	20.61
New York, State University of (Stony Brook)*	32	101	31.68
Michigan, University of (Ann Arbor)	30	155	19.35
Rutgers University, New Brunswick	26	100	26.00
Nebraska, University of (Lincoln)	26	63	41.27
California, University of (San Diego)	24	88	27.27
Texas, University of (Austin)	24	94	25.53
Illinois, University of (Chicago)	22	95	23.16
Purdue University	22	109	20.18
Boston University	22	55	40.00
Michigan State University	20	82	24.39
Minnesota, University of (Twin Cities)	20	108	18.52
Rice University*	20	44	45.45
Virginia, University of	18	49	36.73
Stanford University	18	70	25.71
Brown University*	18	73	24.66
Graduate Center, City University of New York	17	69	24.64
Syracuse University	17	32	53.13
New York, State University of (Stony Brook)	16	71	22.54
Pennsylvania State University (University Park)	16	75	21.33

* Applied Mathematics Departments

issue" on women in mathematics, with nine articles devoted to this topic. One of them, "Top Producers of Women Mathematics Ph.D.'s", provided data from the Annual Survey showing which mathematics departments had produced the most women doctorates in the preceding ten years. This data has been updated for the present article; see the accompanying tables. It is useful to note that in the eight-year period covered by the tables (academic years 1995–1996 through 2002–2003), 26% of all mathematics doctorates went to women. For the ten years preceding 1991, the analogous figure was 17%.

The tables provide various ways to view the question of which departments produce the most women doctorates and require some care in interpreting. In Table 1 some departments are high on the list because they produce so many doctorates overall, even though the percentages of women doctorates in those departments are lower than the percentages for all departments. In Table 2 some departments that rank highly in terms of percentage of women doctorates award mostly degrees in mathematics education, which are not separated in the Annual Survey statistics.

Comparing these tables to the ones that appeared in 1991 shows that women are receiving doctorates in higher proportions in all kinds of departments. For example, for every department that appeared both in the 1991 version of Table 1 and in the updated version, the percentage of women is up, in some cases dramatically. In the 1991 version of Table 2, there were no Group I departments; now, two Group I departments appear there, Boston University and Duke University (see the box for explanation of the Groups). Table 3 shows the percentage of women doctorates in departments of similar sizes; the percentages are generally much higher than in 1991. In Table 4, which shows the percentages of women doctorates in departments in Groups I, II, III, and Va, all the percentages are up from the 1991 figures.

A small number of departments that are producing a high proportion of women doctorates were contacted by the *Notices* and asked about the reasons for their success. One of these is the

TABLE 2. Leading U.S. Doctorate-Granting Departments of Mathematics by Percentage of Women Doctorates Reported for Academic Year 1995–1996 to 2002–2003 (Departments Granting an Average of at Least Two Doctorates per Year)

	% Women	Total Doctorates Reported	Total Women Reported
Northern Colorado, University of	56.52	23	13
Illinois State University	56.00	25	14
American University	55.56	27	15
Lehigh University	54.17	24	13
Syracuse University	53.13	32	17
Dartmouth College	52.38	21	11
Rhode Island, University of	52.17	23	12
Western Michigan University	48.28	29	14
Rice University*	45.45	44	20
Colorado, University of (Boulder)	43.75	32	14
Cincinnati, University of	43.75	16	7
Oklahoma, University of	43.33	30	13
Nebraska, University of (Lincoln)	41.27	63	26
New Mexico, University of	40.54	37	15
Boston University	40.00	55	22
Washington State University	40.00	30	12
Washington, University of*	40.00	30	12
Colorado State University	40.00	25	10
Wesleyan University	39.13	23	9
Rensselaer Polytechnic Institute	39.02	41	16
Emory University	38.24	34	13
Oregon, University of	37.50	40	15
Duke University	37.50	32	12
Bowling Green State University	37.50	32	12
Vanderbilt University	37.14	35	13

* Applied Mathematics Departments

Department of Computational and Applied Mathematics at Rice University, where 46 of the Ph.D.'s granted from 1995 to 2003 went to women. Department chair William Symes said several factors account for this large proportion. One of the main ones is the influence of Richard Tapia, who as chair of graduate admissions in the late 1980s made a point of admitting women into the program; Tapia has been a strong mentor for women and minority students in mathematics. Convinced that his approach was effective, the department has continued to admit a large proportion of women. "The champion role, which Richard played for us, seems to be critical," Symes commented. The continued emphasis on admitting a significant number of women students seems to produce a snowball effect, in that prospective graduate students visiting the doctoral program see that there are many women around, which in turn encourages women to enter the program. Women faculty members have provided role models: Mary Wheeler was in the department for many years before moving to the University of Texas in 1995, and Liliana Borcea has been on the faculty since 1997. The department has an intellectually inclusive atmosphere that facilitates interactions with researchers from all areas of science and engineering. This inclusiveness, together with the department's emphasis on mentoring, has a positive effect on the graduate students. Symes said he did not have precise figures, but he estimated that graduation rate of students admitted to the Ph.D. program is about 80%.

Over 50% of the doctorates given by the mathematics department at Dartmouth College in the past eight years went to women. The small doctoral program—just 21 degrees were given between 1995 and 2003—seems to be welcoming for all students, male and female. The department has no special programs aimed at women students, but "we have faculty members who try to encourage and support all our grad students, who are aware of the special concerns of women, and who consciously nurture the supportive nature of the grad program," commented Dartmouth faculty member Marcia Groszek. She is one of four women faculty members (three are tenured, one is tenure-track) out of a total of

TABLE 3. Percentage of Women among Doctoral Programs of Comparable Size

For this table, departments of mathematics were divided into categories of comparably sized doctoral programs, where size is defined by the number of reported doctorates awarded by the department, from academic year 1995–1996 through 2002–2003. The size categories are given in the leftmost column. For each size category, the table lists the three departments having the highest percentage of women doctorates in the given period. The rightmost column gives additional information about the departments in each size category.

Size of Department Group	Top Three Departments by % of Women	% Women Doctorates	Average % Women Doctorates for Departments in This
Depts. Granting 100 Doctorates and Above	New York, State University of (Stony Brook)*	31.68	20.70% for 14 departments (414 women out of a total 2,000 doctorates)
	Maryland, University of (College Park)	27.37	
	Rutgers University, New Brunswick	26.00	
Depts. Granting 80–99 Doctorates	California, University of (San Diego)	27.27	20.83% for 6 departments (111 women out of a total 533 doctorates)
	Texas, University of (Austin)	25.53	
	Michigan State University	24.39	
Depts. Granting 60–79 Doctorates	Nebraska, University of (Lincoln)	41.27	22.39% for 16 departments (241 women out of a total 1,078 doctorates)
	Stanford University	25.71	
	Kentucky, University of	25.40	
Depts. Granting 40–59 Doctorates	Rice University*	45.45	23.26% for 37 departments (401 women out of a total 1,724 doctorates)
	Boston University	40.00	
	Rensselaer Polytechnic Institute	39.02	
Depts. Granting 20–39 Doctorates	Northern Colorado, University of	56.52	38.85% for 64 departments (541 women out of a total 1,875 doctorates)
	Illinois State University	56.00	
	American University	55.56	
Depts. Granting 9–19 Doctorates	New Hampshire, University of	53.33	24.46% for 42 departments (132 women out of a total 544 doctorates)
	Howard University	45.45	
	Southern Methodist University	45.45	

TABLE 4. Percentage of Doctorates Granted to Women by U.S. Departments of Mathematics (Groups I, II, III and Va), 1995–2003.

Group I (Public)	22.24%	(553 women/2,486 total doctorates)
Group I (Private)	19.14%	(272 women/1,421 total doctorates)
Group II	26.24%	(515 women/1,963 total doctorates)
Group III	29.55%	(341 women/1,154 total doctorates)
Group Va	23.22%	(163 women/702 total doctorates)

18; another is the current president of the Association for Women in Mathematics, Carolyn Gordon. Groszek said that the "critical mass" of women faculty and students in the department creates an "atmosphere in which being a woman in math is ordinary and normal." The department provides financial support to all students and gives them equal teaching responsibilities, policies that Groszek said help students to feel that they are all "on an equal footing." Her colleague Dorothy Wallace attributed much of the friendliness of the department to the students themselves. "The graduate students have developed a culture of cooperation, preparing each other and the younger ones for qualifying exams, making sure seminars happen, etc.," she said.

Boston University, with 40% women doctorates from 1995 to 2003, had the highest percentage among Group I institutions. Chair Steven Rosenberg emphasized that the department does not give women students preferential treatment and does not lower standards in order to increase the number of women. But he did point to a number of factors that may account for the department's success in producing women doctorates. Out of 31 tenured faculty, there are five women, including three full professors: Gail Carpenter, Nancy Kopell, and Emma Previato. Kopell, a MacArthur Fellow and codirector of the Center for BioDynamics, has been especially visible. Another factor is the department's size. "It is neither so small that students feel a fishbowl effect nor so large that students feel unnoticed," Rosenberg observed. Once students are accepted into the doctoral program, faculty work hard to persuade them to come. "I believe this personal effort convinces students of both sexes that we are interested in them for their specific strengths, not just to fill a [teaching fellow] slot," he said. The department probably casts a wider net for students than departments that are, as Rosenberg put it, at the "pinnacle" of Group I. "In our case, the wider net means considering many candidates from other countries, e.g. former Eastern Bloc countries, where my nonscientific impression is that women make up a greater percentage of math majors than in the U.S.," he explained. "This wider net has presumably helped increase both the quality of our graduate program and the number of women students, without any of the conflict an imposed social agenda would entail."

While Boston University, Rice, and Dartmouth have no programs specifically aimed at women, the University of Nebraska, with 41% women Ph.D.s, has become known for its special programs to encourage women in mathematics. One of the department's most visible events is its annual Nebraska Conference for Undergraduate Women in Mathematics. Each conference brings together over one hundred students to discuss mathematics and to meet women who have established careers in the field. The department also has a week-long summer "math camp" called ALL GIRLS/ALL MATH for female students in grades 10 through 12. The attention to female students continues at the graduate level; in 1998 the department received the Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring based on its success in mentoring female graduate students during the 1990s. It is the only mathematical sciences department in the nation ever to have received this award. When it comes to encouraging graduate students, the department puts its money where its mouth is: each year it spends around $6,000 for awards to recognize outstanding graduate students and around $15,000 to support students attending professional meetings.

Evolution, Not Revolution

As the data show, there are encouraging signs that the obstacles women encountered in the past in establishing careers in mathematics are lessening. "Things are undeniably better than they were twenty-five years ago," commented Groszek. "The most egregious and visible problems (and hence the egregious and visible evidence that something should be done) have been eliminated.…The solutions to the problems that remain are not simple or straightforward (and thus, not easy to agitate for)." It is therefore unsurprising that the women-in-mathematics issue has become more quiescent. Radical calls to overthrow the "old boys' network" seem to have given way to a more systematic, professional approach.

This approach could be seen in a "leadership workshop" sponsored by the Association for Women in Mathematics (AWM). Held in March 2004 at the University of Maryland at College Park, where the AWM offices are located, the workshop brought together about forty women mathematicians from academic institutions all over the country. It was dedicated to the memory of Ruth Michler, a mathematician at the University of North Texas in Denton who died in an accident in 2000 at the age of thirty-three. Some of her colleagues and friends came to the workshop, and her father, Gerhard Michler, a mathematician at the Universität Essen, flew over from Germany to attend. The aim of the workshop was to help women mathematicians who are at the early stages of their careers to prepare for leadership positions, such as serving as department chair.

Most of the workshop activities focused on providing sound, practical advice that would be useful to anyone, male or female, taking on a leadership role. Speakers from different kinds of institutions discussed their experiences in administrative positions, and in small group sessions participants grappled with real-life examples of

problems that arise in mathematics departments. There was also a panel discussion on leadership in professional societies and research. Some of the issues that arose were particular to women, such as the "tenure clock" and how having children affects women's careers. Things happened at the workshop that one could not imagine happening in a group of men. For example, at one point the participants were asked to stand if they had ever been mistaken for a department secretary; about half stood. For many of the women it was gratifying, inspiring, and just plain fun to be surrounded by so many female mathematicians.

The basic assumption of the workshop seemed to be that the problems women might encounter in establishing careers in mathematics could be addressed by imparting to them the right advice and the right skills—in other words, evolution, not revolution. And yet some of the senior mathematicians at the workshop expressed a good deal of impatience and exasperation at what they see as the slow pace of change. Joan Feigenbaum was a mathematics major at Harvard University twenty-five years ago and then went into computer science. She was at Bell Labs for many years before moving recently to the computer science faculty at Yale University. As a student she heard people at Harvard talking about the lack of women on the mathematics faculty. Today "there are still no tenured women on the Harvard mathematics faculty, and yet I don't hear anyone talking about it," she remarked. "I find this shocking," she continued. "I find it amazing that this was not dealt with, that no one has boiled over about this." Why have such issues faded over the years? Feigenbaum ticked off a number of reasons: the women's movement losing steam, the backlash against affirmative action, and the erosion of Vietnam War-era social consciousness. Nowadays, she remarked, people are more placid and willing to go with the status quo.

Another senior participant in the workshop was Lenore Blum of Carnegie Mellon University, who is a founder of AWM and has been a longtime advocate for women in mathematics. For the past three years Blum has served on the program committee for national meetings of the AMS, most recently as chair. She said that in her experience very few suggestions for women speakers arise unless the committee is prodded. For example, in the planning stages for the upcoming national meeting to be held in Atlanta in January 2005, the initial suggestions for potential candidates for AMS invited addresses were all men. When Blum drew this to the committee's attention, it immediately responded with suggestions of women speakers. She pointed out that the instructions to the program committee quote a resolution passed at an AMS Business Meeting in 1972, which states in part: "The American Mathematical Society will work actively for equal opportunities for women in the following areas: …the Society will include more women on Society programs and panels, including invited speakers." Blum expressed frustration that she and others have been raising these same issues repeatedly for the past thirty years and the message seems not to have sunk in. "It's really outrageous, and I am thinking of resigning from the AMS," she said. "It's way past time that the leadership of the AMS deem top priority the full inclusion of women in the enterprise—and that includes significant presence in the prestigious and highly visible roles as invited speakers at national meetings."

In a presentation at the AWM workshop, Blum described the efforts at Carnegie Mellon to increase the number of women students in the School of Computer Science (SCS). One of the things that made a difference in the Ph.D. program was a reorientation of the admission criteria: rather than zeroing in on applicants with a lot of prior programming experience, she said, SCS now looks for "people who might be visionaries in computer science." As a result, more women were admitted, and the men who were admitted were better-rounded individuals. Blum has also initiated a community-building program called Women@SCS. When she was a deputy director of the Mathematical Sciences Research Institute in Berkeley, Blum noticed that Mondays were a good day for announcements of new theorems. The reason: Mathematicians would get together socially on the weekend and end up doing mathematics. It can be difficult for women to take part in these kinds of activities that combine the social and the professional. Programs like Women@SCS provide an infrastructure through which women can build the professional, educational, and networking relationships they might otherwise miss out on. "We are providing things that guys take for granted," Blum remarked.

"I think things have improved a lot" for women in mathematics, said Ruth Charney of Brandeis University, who was one of the organizers of the AWM workshop. Thanks to the work of organizations such as the AWM, she noted, the problems are "gradually solving themselves." But she believes there is still a need for programs, like the workshop or Women@SCS, that help talented young women remain and succeed in the field. Charney pointed to the long-running AWM program of travel grants for women as another example of a program that is still very much needed. Some women interviewed for this article said that participation in the annual Institute for Advanced Study/Princeton University program for women undergraduate and graduate students made a big difference in their careers. This program, originally associated with the Park City Mathematics Institute, was begun in 1994 by Karen Uhlenbeck of the University of Texas at

Austin. Another well-established program is EDGE (Enhancing Diversity in Graduate Education), run by Sylvia Bozeman of Spelman College and Rhonda Hughes of Bryn Mawr College. Now six years old, the program aims to prepare women to excel in graduate school in mathematics.

"No, but..."

If things have improved so much, what kinds of problems *do* women in mathematics face today? The following scenario provides one example:

> Your department has been building up faculty in a new area. Kevin and Jim, two assistant professors in that area, are serving on a search committee for a third person in the area. You scan the applications as they flood in and notice a few unusual letters. For example, one writer says: "I really admire Martha. She is always smiling. She looks after her son, bakes for our department colloquia, and still finds time to do research!" In another letter, the writer explains that Sally has taken a relatively long time to complete her Ph.D. because she has gone through a messy divorce and custody battle. Kevin and Jim quickly decide that Martha and Sally are "not really in the right field."

Gail Ratcliff, chair of the mathematics department at East Carolina University, presented this scenario for discussion during a small group session that she ran at the AWM workshop. The scenario is real, though the details have been slightly altered. Imagine a letter about a man that contained a comment such as "John is always smiling"; when one of the participants said this aloud, it sounded so absurd the room broke out in laughter. There appeared to be general agreement in the group that it is fairly common for such inappropriate personal remarks to be made in letters about women mathematicians. There was also acknowledgment that in all likelihood the letter writers were genuinely trying to be positive and helpful. The group discussed whether it really was the personal remarks in the letters rather than the applicants' research records that triggered the negative response on the part of Kevin and Jim. It was suggested that the department chair should discuss the letters with them to be sure they ignored the remarks.

The difficulties that women encounter in mathematics are akin to the scenario above; in ways that are small and subtle but can be quite damaging, women are treated differently from their male colleagues. When asked if she had encountered obstacles in mathematics because she is a woman, one of the participants at the AWM workshop gave a response that may be typical of many young women mathematicians: "No, but…" She went on to recount the following story. She and a man in her department had each been awarded a research grant. A few days before a faculty meeting, she had been in communication with the department chair about her grant. At the meeting the chair announced the man's grant as if it were big news; nothing was said about the woman's grant. When she later complained to the chair, he apologized and was quite embarrassed. It seemed to have been a genuine oversight, but she was left with the nagging suspicion that it is unlikely the man's grant would have been overlooked.

The same kind of "No, but…" reply came from another young woman mathematician attending a recent workshop at the Mathematical Sciences Research Institute in Berkeley. She is an assistant professor in a department at a public university with a strong emphasis on research. She sees tenure as the juncture where difficulties can arise for women mathematicians. As an example she pointed to a recent tenure case in her department concerning a male professor. He had a strong research record in an area not much appreciated in the department, which recommended against tenure. She observed the ease with which objections could be raised about him by, for example, reading his letters of recommendation from a certain viewpoint; from a different viewpoint, the letters could be seen as very laudatory. "People gain power by being negatively critical of the work of others even when it is not in their area," she remarked. "Or they make a taste judgment and pretend it's factual.…People are not always honest about when they are being objective and when they are not."

Her larger point is that, far from being based on objective and impersonal evaluations of individual candidates, tenure cases involve subtle judgments about the candidate's research area, future potential in research, ability to relate to students, collegiality, professionalism, and a whole host of other factors that are difficult to measure objectively. In the complex process of weighing such factors, bias against women could creep in. Some women also say that when it comes to granting tenure or filling a position, women mathematicians are scrutinized more or in different ways than are men. As Chuu-lian Terng, a woman mathematician at the University of California at Irvine, put it, "Unconsciously, some people have more questions when it's a woman."

"Whiners" Not Welcome

Concerning the problems women face in mathematics, "It's not a dead issue," said Rebecca Goldin of George Mason University. "But it's an unpopular issue." The perception is that if one complains—"whines" is the word often used—about problems women face, "then you are doing it to get something

you don't deserve rather than in order to address actual problems." Young women mathematicians feel pressure not to be seen as "whiners". Part of this pressure may result from the common assumption that women have advantages in mathematics that men do not have. This assumption sometimes comes into play when women are accepted into elite universities as graduate students or are hired by top departments.

Emma Carberry is a Moore Instructor at the Massachusetts Institute of Technology. Five years ago, when she was in the Ph.D. program at Princeton University, she and her fellow student Julianna Tymoczko started a group for women students called Noetherian Ring. The name comes from a similar group that has been in place for years at the University of California at Berkeley and has been replicated in other institutions. The Noetherian Ring provides a way for women to build a community of collegial relationships and avoid isolation. One activity of the Princeton Noetherian Ring has been to invite women mathematicians to give talks open to the entire department; these lectures proved to be quite popular. Carberry said that one key to the success of the Noetherian Ring was the support of Princeton faculty member Ingrid Daubechies.

Such "women only" activities can contribute to the perception that women have special advantages, thereby leading to dissatisfaction among men. For example, Goldin noted that, although the IAS/Princeton women's program is open to male and female participants, only women receive financial support to attend. Some men expressed resentment over "not getting a foot in the door" the way women do, she said. She added that these men did not agree that the low number of women in mathematics points to a need for special efforts to encourage women in the field. Complaints of discrimination have led to changes in some programs. For example, the National Science Foundation (NSF) used to have programs that were aimed at encouraging women in science and that allowed only women principal investigators. The NSF reoriented those programs to allow male principal investigators after after being sued by someone who claimed discrimination because he was ineligible to apply to the foundation's Minority Graduate Fellowships program.

One young woman mathematician, who asked not to be named, said that when she was in graduate school, she sometimes found that she would be the only woman in a group of students. "There was not open sexism, but a difference in the expectation of what I was there for," she noted. "Sometimes I would walk in and the mathematics talk would cease." In addition, she observed that some of the men could handle another man taking the upper hand in a mathematical conversation, but they chafed if a woman did so. Among some of the men, she said, "the need not to be taught something by me was very strong." These kinds of problems lessen when there are other women around. "In my experience, if you get 20 percent women in a lecture hall or a classroom, it becomes a nonissue," Goldin remarked.

Do women do mathematics differently from men? Of course they work on the same kinds of mathematical problems, but their working style may be quite different. Carberry observed that women usually do not engage in the aggressive, highly competitive sparring that sometimes prevails in mathematical conversations among men. This observation is reinforced by Jane Hawkins of the University of North Carolina at Chapel Hill, who said she has seen differences in how women and men approach doing mathematics, especially in how they deal with competition and criticism. Women, she said, usually "don't want to get down in the mud," meaning that they shy away from competitive or aggressive confrontations over mathematics. Having a critical mass of women in mathematics may mean that a wider range of working styles are accepted, which could benefit the whole field.

Women are entering mathematics in greater numbers, and they are progressing to higher levels of achievement. Their representation in the top departments is still low, but given that there are a lot of talented young women in the pipeline, that is sure to change. In the meantime, women's groups, special programs, and organizations like the AWM still fill a need. "It is crucial that women's organizations stay strong for a long while yet, because it's not a dead issue," said Carberry. But in the end, what really makes a difference "is that quiet reminder that there are a lot of women doing really interesting mathematics."

—Allyn Jackson