Life on the Frontlines: One Woman’s Evolution from Warrior to Diplomat

MARY KIRK

Why is it that many successful, intelligent women who surmount the numerous institutionalized barriers to study and work in science and technology ultimately leave? The first clue lies in the “war metaphor” in this paper’s title. Although the overt discrimination that women in science and technology historically experienced has diminished, for some women today it still feels like a war zone. This paper chronicles one woman’s battles in and out of science and technology in relation to three fundamental themes: (1) the male-oriented science culture; (2) the historical legacy of barriers to education and employment; and (3) epistemological and pedagogical limits. It is a story about a woman who went AWOL from science and technology to find a “both/and” peace in-between, and about how Women’s Studies facilitated her evolution from warrior to diplomat.

Keywords: women in science / women in technology / institutional barriers / culture of science / male-oriented epistemologies of science

From my childhood days roaming the marshlands of Cape Cod with my beagle Barney in search of horseshoe crabs, to seventh grade biology class where I first learned the scientific complexities of the human body, to my high school years as a Red Cross volunteer in local hospitals, to my first year as a pre-med biology major at Virginia Tech, to my later attempts to be “Jacqueline Cousteau” at the University of California, San Diego, to my seven years as a technical writer in the software development industry, I remained fascinated with the natural world and intrigued by technology. I felt at home in my childhood experiences with the mysteries of nature and science. However, my adult experiences with science education and the software development profession felt less like a home and more like a war zone. It was life on the frontlines. Finally, after many years of advancing and retreating, I happily went AWOL from science and technology. It was a peaceful departure. I simply laid down my gun and walked off toward the light in the clearing beyond the trees. My evolution from war to peace was the result of my ongoing quest to understand, which led me to graduate work in Women’s Studies. My work in Women’s Studies explained the patriarchal historical legacies of scientific thought, and this understanding helped me to heal my battle scars. Once I understood why the world of science and technology had always felt like a series of battles that I never won, I was able to lay down my weapons. For me, the path of peace led away from a career in science and technology.

©2005 NWSA Journal, Vol. 17 No. 1 (Spring)
I hope that sharing what I've learned might help inform the newest generation of readers of the NWSA Journal in two ways: [1] to know that they are not the problem, and that the social paradigms are the problem; and [2] to give them the knowledge to stay in the war long enough to negotiate a peace for us all. Because if someone like me [who was relatively privileged in terms of race and class] could not find a way to thrive in the world of science and technology, how many other women will never even have the chance to try? I had many of the advantages that the data shows will help girls/women persist in science and technology (Seymour and Hewitt 1997). For example, I had one parent who was a professional and who always encouraged my interest in these areas—my father was an aerospace engineer. I had above average intelligence as shown in early testing and in the courses that I successfully completed years ahead of most other students. I graduated from high school ranked 70 out of 824 students. I came from a family where college education was a “given.” I had an assertive personality and was never afraid to speak in class. So, what happened?

I stepped on a land mine—the oppressively patriarchal world of science and technology. Allan Johnson defines “patriarchy” as a society that is “male-dominated, male-identified, and male-centered” (Johnson 1997, 5). Unfortunately, I did not have the words to understand patriarchal oppression while I was experiencing it. I just knew that I was attempting to inhabit a world where I never felt like I belonged: where no matter how clearly and unemotionally I stated an argument, I was accused of being emotional; where no matter how often I accomplished great things, my work was invisible; and no matter how hard I tried, it never seemed good enough—even for me. I had internalized the lessons of patriarchy well. I was a woman, which meant that by definition, I would always be “less than.” I had learned that I was inadequate by looking for answers in a knowledge tradition in which women are represented poorly, if they are represented at all.

I spent way too much time trying to be a warrior who better fit the uniform rather than seeking a new country where my intellect and my character would be assets. I was stuck in the patriarchal battle of “either/or”—a battle I could never “win” since many of the dualisms that stem from “either/or” assumptions are false. Though life had always seemed more complex to me than simple dualisms could explain, it was not until I encountered Women’s Studies that I could describe the problem. Women’s studies scholars were the first to name my experiences. The “both/and” paradigm expressed by writers such as Patricia Hill Collins and bell hooks gave me a model for beginning to understand the importance of context and of life’s complexities. Evelyn Fox Keller’s story of her struggle to “fit” as a woman in science and her early awareness that “the most important barrier to success for women in science” was the “intrinsic masculinity
of scientific thought” helped me know that my experience was not unique (Keller 1992, 21–5). Women’s Studies gave me the theory, history, data, and [perhaps most important] stories to see that most of the battles I had fought had little to do with me—they were manifestations of systemic ills. At last, as men have experienced in the patriarchal knowledge tradition for thousands of years, I was standing on the shoulders of the great women who had gone before me. From that vantage point, I was finally able to see. The brave women, such as Ruth Hubbard and Bonnie Spanier, who shared their stories of moving away from “doing science to studying it” helped me to give voice to my story (Hubbard 2001; Spanier 2001). What follows here is the story of what I learned in my personal war for freedom from the tyranny of patriarchal thought.

In contrast to their foremothers, women today have far better access to education and to the professions, but women still face a series of barriers that impede our participation in science and technology as students, as scientists, as teachers, and as users and creators of technology. Many scholars have postulated a variety of reasons for women’s under-representation in science and technology (Bleier 1991; Hanson 1996; Keller 1992; Rosser 1995) that can be organized into three fundamental themes: (1) a male-oriented science and technology culture; (2) the legacy of historical barriers to education and employment; and (3) epistemological and pedagogical limits.

**Male-Oriented Science Culture Makes Ill-Fitting Uniform**

The history of women’s under-representation in science and technology begins with the ideas upon which science was founded in Europe and the Americas in the past few hundred years. The Baconian dualism that was popular in the seventeenth century “elaborated the metaphors of science in sexual and gendered terms, with science as male and nature as female, a mystery to be unveiled and penetrated.” Woman was embodied in “the natural, the disordered, the emotional, the irrational,” and man “as a thinker epitomized objectivity, rationality, culture, and control” (Bleier 1991, 6). This dualism has profoundly influenced perceptions of the world of science and technology, and it has also influenced who participates in that world today (Bleier 1991; Merchant 1980; Schiebinger 1999; Wajcman 1995).

One contemporary example of how powerfully science is associated with maleness is the persistence of the stereotypical image of a “scientist” as male. In 40 years of “draw a scientist” data gathered during the 1950s through the 1990s, students have consistently drawn “a scientist as a middle-aged or older man wearing glasses and a white coat and working alone in a lab” (Sadker and Sadker 1994, 123). This image starts to
influence girls’ attitudes about science and technology at very early ages. Multiple scholars have documented the predictable self-esteem slide that occurs in many girls as they enter adolescence and begin to feel increasing social pressure to be “feminine” (Brumberg 1997; Pipher 1994; Sadker and Sadker 1994). Since girls shy away from the image of “scientist” as “unfeminine” in those pivotal adolescent years, this leads them to take fewer advanced math and science courses in junior high and high school, and makes them more likely to decide that they do not belong in college (Margolis and Fisher 2002; Sadker and Sadker 1994; Spender 1995). If they overcome these obstacles to arrive at college, the pervasive “weed-out” culture in many science and technology programs adds to the kill-or-be-killed war zone climate of the classroom. In fact, in their landmark study Talking About Leaving: Why Undergraduates Leave the Sciences, Seymour and Hewitt make a direct connection between this practice and the male culture of science when they parallel weed-out systems with “the hazing practices of military academies and fraternities” (122). Most women (and, indeed, some men) are unprepared to survive in this inhospitable climate of “maleness.”

Here is my story of how I unsuccessfully tried to squeeze into the ill-fitting uniform of the male-centered science culture. Like many young girls, I fell in love in junior high school—not with a boy but with biology. It happened in seventh grade science class when we were studying human anatomy. I was fascinated. I was hooked. I immediately became a Red Cross volunteer so that I could work in hospitals and explore medicine as a profession. I continued that interest through my high school years in Thailand (at the U.S. Army’s Fifth Field Hospital) and Vietnam. During our periodic trips from Thailand to see my father in Vietnam, my mother and I traveled by helicopter to fire bases near Saigon with Red Cross “donut dollies” and volunteered to help wounded soldiers at the U.S. Army hospital in Saigon. My determination to become a physician was heightened by this experience because it seemed to be the perfect profession through which to manifest my desire to be of service to others and my abiding fascination with the biological sciences.

But just as women’s studies scholars predict, I began struggling with self-esteem, worrying about “being too smart” and scaring off the boys. Ultimately, these factors contributed to my decisions about what to study during my last two years in high school—decisions that meant I would lose my first battle as a woman in science. By the end of my sophomore year in high school, I had finished all of my math and science requirements and there were no higher biology classes to pursue. Knowing that I hoped to attend medical school, no adviser, teacher, or parent told me that if I did not continue to take higher math and science in high school, I would not be as well prepared to succeed in college. I found that out the hard way. Instead of taking the calculus, organic chemistry, and physics
classes offered at my high school, I took psychology, philosophy, and law. I was so “successful” that I finished high school six months early, but the two-year gap in my science studies left me ill-prepared for college-level success in the sciences.

During my first quarter at Virginia Tech (in 1973), I took calculus, chemistry [and lab], biology [and lab], and writing. At this school of 10,000 [with a 3:1 ratio of males to females], the math and science classes were large lecture halls with 200 to 300 students, of which I was one of only a handful of women. I did not know that the two-year gap between my studies in high school and college had disadvantaged me. I did not know that my gendered fear of being “too smart” and scaring the boys away was costing me. I was struggling, and I thought that I was just not smart enough. I was sure that I did not fit the uniform when I heard my pre-med classmates competing with each other over how much money they would make rather than how many people they would help. My values-based perspective was not appreciated, nor was it understood. In fact, it was a joke.

After years of focusing on this profession as my life path, I was suddenly sure that I did not belong. I was defeated. I spent another year drifting between different majors, but left college at the beginning of my junior year because I could not keep wasting my parents’ money on an education that seemed meaningless to me. I decided to earn money for a while.

**Barriers to Education and Employment for Boot Camp Dropout**

I was a boot camp dropout. But I might have passed my survival training if I'd known more about the history of women's education and employment. I confronted many of the same barriers as the women who had gone before me hundreds of years earlier. Margaret Rossiter’s landmark two volumes on the history of women in science, *Women Scientists in America: Struggles and Strategies to 1940* and *Women Scientists in America: Before Affirmative Action 1940–1972* chronicled the “series of limited stereotypes, double binds, resistant barriers” and other “no-win situations” that the women before me faced (Rossiter 1982, xvii). Women in the United States had extremely limited access to higher education until the late 1800s when a few women’s colleges improved access for those who were privileged by race and socioeconomic class: notably, Smith College [1871], Wellesley College [1875], and Bryn Mawr College [1885] (Rossiter 1982, 10). More women began to gain access to higher education and doctoral degrees in the 1900s, but their numbers did not steadily increase throughout the century. In fact, although women experienced some gains during World War II, after the war they were deterred from attending college through enrollment quotas that heavily favored veterans (only a few of
whom were women], and full access to all doctoral degrees in the United States was not available to all women until the 1970s.

Since very few women had access to higher education in the sciences, this was also reflected in limited access to the professions [industry, government, and higher education]. For the few notable women who did scale these barriers, their stories were not often told and rarely made it into the history books. Women studies scholars today have named the significance of mentors and role models to women who are forging new frontiers in areas of education and the professions previously closed to them. There is no question that knowing this history would have made a difference to me as a young woman attempting to be a scientist. One event in my story stands out in particular.

It was the end of spring quarter 1978, and I was just finishing my first year back in college at the University of California, San Diego, as a marine biology major. In fact, I had been accepted to Boston University the year before, but tuition costs convinced me to wait a year and move to California where I could establish residence and pay in-state tuition. So, after a two-year absence from college, I had just returned with an exciting new vision of my future that included graduate school at Scripps Institute of Oceanography and a lifetime spent at sea on large mammal research. I thought that my talent for the biological sciences would earn me a spot in graduate school, even though my average performance in chemistry had eliminated medical school. During my time away from college, I had continued to read books about whales, dolphins, and sea lions, and I had joined The Oceanic Society and The Jacques Cousteau Society, both of which published journals that I read voraciously. Unfortunately, I had not continued to study calculus or organic chemistry, which meant that my first year back was marred by grades in these subjects that would not make me acceptable to a top-tier graduate school. While I earned A's in invertebrate zoology and marine biology, my average showing in calculus and organic chemistry caused me to doubt my potential as a research scientist, but the death knell of that professional path had yet to toll. It was to be a ship's bell.

One sunny [but blustery] San Diego spring morning, I embarked on a whale-watching cruise with my marine biology class [in which I was one of only a couple women]. I made the tactical error of going to the bathroom just as our small fishing vessel transited from the relative calm of North San Diego Bay to the open waters of the Pacific Ocean. When we dipped into the first of many ten- to fifteen-foot swells, the walls of the tiny bathroom moved back and forth, and I was violently seasick. I remember trying to "be brave" and go above deck where I could see the horizon. That did not help. As I rushed back toward the bathroom, my marine biology professor stopped me and explained that "sailors puked over the stern"
so as not to mess up the head for others. I was horrified at the thought of throwing up in public, but I had no choice. I spent the next eight hours breathing the exhaust from the boat and hurling what little was left in my stomach into the Pacific, while my professor stood by smoking cigarettes, thwacking me on the back, and chuckling as he asked, "How 'ya doin' Kirk?" I was so physically miserable and emotionally embarrassed that I could not even muster excitement when we sighted a gray whale and calf on their way to Baja.

I returned from that trip with my dreams dashed. I told others it was because of the seasickness, but I secretly knew that it was because I was not smart enough, and I did not belong. I did not fit in as a woman among all of these men—having to become "one of the boys" in order to survive, having to squeeze my identity into the predefined shape of a male marine biologist, and having to show my "manliness" by sharing bodily functions in public. I had flunked out of boot camp, and I did not belong in this army. Over twenty years later, during my doctoral studies, when I read about Mary Jane Rathbun who along with other women scientists helped establish Woods Hole Oceanographic Institution in the 1880s, I sat and sobbed (Rossiter 1982, 58). I did not have to wonder—in that moment I was certain—that just knowing about these women would have made a difference to me. I would have known that I was not alone. I would have known that other women had gone before. I would have had these brave women to support my embattled ego in believing that maybe I, too, could be that brave. After all, they found ways to surmount obstacles far greater than mine. But, I did not know their stories, and it made a regrettable difference. Gerda Lerner said it best:

The hegemony of patriarchal thought in Western civilization is not due to its superiority in content, form and achievement over all other thought; it is built upon the systematic silencing of other voices. Women of all classes, men of different races or religious beliefs from those of the dominant, those defined as deviants by them—all these had to be discouraged, ridiculed, silenced. (1993, 282)

I allowed myself to be discouraged, ridiculed, and silenced. With no path, no confidence, no voice, I spent another two years wandering around college largely directionless. Ultimately, I settled on writing as a major. It seems obvious now that I was seeking to give voice to my silence. At the end of my third full year at the University of California at San Diego, I still had one year left to earn a bachelor's degree in writing. In my idealism and naiveité, I thought that if I was really going to be a writer it was far more important that I actually write than that I spend more time learning about writing. After three more years in college, I left the University of California at San Diego without a bachelor's degree.
Epistemological and Pedagogical Limits Lead to Peace Negotiations

Today, women who manage to hurdle the barriers to a science education still face a new obstacle once they arrive—epistemological and pedagogical models that privilege boys/men. Numerous scholars have discussed epistemological reasons why women may be “less comfortable” with the way science is taught due to the educational model that privileges methods of study and styles of communication more common among men [Estrin 1996; Greenbaum 1990; Keller 1992; Riger 1992; Turkle and Papert 1990]. In the United States and many European cultures, “the first term in the following pairs generally correlate with maleness, and the second with femaleness: abstract/concrete, objectivity/subjectivity, logical/intuitive, mind/body, domination/submission” [Estrin 1996, 44]. Since science is defined in terms of all of the “male” aspects of the dualism, women who have been “appropriately” gender-socialized would not be expected to have epistemologies, or “ways of knowing,” that easily fit the existing scientific paradigm. This seems to be true according to scholars who have demonstrated that women are more likely to be concrete learners while men are more likely to be abstract learners [Belenky et al. 1986; Goldberger et al. 1996; Rosser 1995; Turkle and Papert 1990]. Turkle and Papert’s research examining learning styles in relation to computing shows that more women than men use a concrete approach, emphasizing interrelations and negotiations [Turkle and Papert 1990, 136].

In Re-Engineering: Female Friendly Science, Sue Rosser outlines the kinds of pedagogical changes that have proven more supportive for more learners. Rosser asks: “What would be the parameters of a feminist or women-centered science?” [15]. Rosser names the following constructive pedagogical changes, encompassing a range of issues from curriculum redesign to classroom practices: collaborative learning models; guiding rather than challenging; putting theory into practice; placing science in a social context; using combinations of qualitative and quantitative methods; including females in experimental design; and being open to critiques of results from different perspectives [Rosser 1997, 9]. These changes not only support women learners; culturally marginalized male students often find these approaches to be more hospitable as well.

The primary challenge with implementing these changes is that they require a fundamental redefinition of the culture of science and technology—not an easy notion to sell in the face of the historical legacy of attitudes about science. In fact, Rosser’s work shows that university faculty are very resistant to change beyond the “add women and stir” approach that is currently popular [Rosser 1997]. In Teaching the Majority: Breaking the Gender Barrier in Science, Mathematics, and Engineering, Rosser
described her version of the phase theory developed by women’s studies and education scholars, phases for including women in science: (1) absence of women not noted; (2) recognition that most scientists are male, and that science may reflect a male perspective; (3) identification of barriers that prevent women from entering science; (4) search for women scientists and their unique contributions; (5) science done by feminists and women; and (6) science redefined and reconstructed to include us all (4–17). Many science and technology educators have not even reached phase 1 or 2.

While I was teaching as a full-time lecturer in a computer science program, Sandra Harding visited our campus for a public lecture and a smaller invited seminar on gender issues across our academic programs. Since I taught the only two interdisciplinary, multicultural courses in our program—Women in Computing and Ethics in Computing—I was asked to present information at the seminar. Rather than just share my perspective based on my classes, I queried the colleagues in my department as well. Unfortunately, I was not surprised to receive the following comments (each from a different faculty member): “My classes are purely technical, and therefore completely gender-neutral (or gender irrelevant)” — an expression of the belief that “objective” science has nothing to do with society; “I have looked . . . to see if there appeared to be gender issues in class that needed attention and haven’t spotted any” — an expression that feminist science has to do only with treating individual women equitably; “I tend to sidestep issues of gender in my classes. Because my students are mostly male, I am concerned with ‘keeping my power’” — sadly, this was from a woman colleague.

Upon completion of my Ph.D. in Women’s Studies, which focused on issues in science and technology, I began to look for a tenure-track position in a university. Ours was a small, growing branch campus of a major research university. I had been one of two women faculty who founded the computer science program in 1996. Both of us were hired as lecturers on renewable one-year contracts. Since I had just finished my master’s degree in women’s literature, I felt privileged to have the teaching position (offered to me primarily based on my years as a technical writer in the software development industry). However, my sister colleague had a Ph.D. in computer science and had taught college for twelve years. During the four years that I remained in that job, numerous men were hired into tenure-track positions, while they denied my colleague a tenure-track position or even a promotion to senior lecturer (until she demanded it in her fourth year). When I completed my Ph.D. and announced that I was involved in a nationwide search for a tenure-track job, there was suddenly discussion about creating a tenure-track position for which I could apply. However, I would be only one applicant in a pool of national candidates, and could potentially wait a year to watch someone else be hired into the position that I had created.
While I considered remaining in this position (with a promotion to senior lecturer, which also meant a possible five-year contract), I submitted about a dozen applications to women’s studies programs across the United States. As the first few rejection letters began to trickle in, I was initially surprised to find myself relieved. However, it did not take long to identify the source of my relief. Basically, there are two options for women’s studies scholars: [1] teaching in women’s studies departments at large universities where tenure is granted by that department [many of which are just as hierarchical as traditional programs and are doing little to challenge the norms of the academy]; or [2] teaching in smaller universities where Women’s Studies may not even have department status and where tenure must be granted or denied by Women’s Studies and another “home” department. For me, there was one other option that I had been considering for over a year—to teach adults in an interdisciplinary program where students design individualized degrees. My whole life suddenly made sense in the context of that option. It was the process of completing individualized, interdisciplinary graduate study that had granted me authority over my own education, restored my lifelong love of learning, validated my innate desire to seek connections between things, and most important, that had given me back myself. I realized that I wanted to return that gift to other adult learners.

Like many other scholars who have struggled with the “either/or” of science versus Women’s Studies, I negotiated a different peace in the in-between (Ginorio, Marshall, and Breckenridge 2000; Mayberry, Subramaniam, and Weasel 2001; Rosser 2000; Subramaniam 2000). Banu Subramaniam told her story of cleaning up the myths of “scientific truth” in “Snow Brown and the Seven Detergents: A Metanarrative on Science and the Scientific Method.” My tale is more like a version of “Goldilocks and the Three Bears.” After a lifetime of searching, I have finally found the place that is “just right.” I am a tenure-track assistant professor in the Individualized, Interdisciplinary and Lifelong Learning Department at Metropolitan State University where one of my primary responsibilities is to guide adult learners in the development of individualized bachelor of arts degrees. At the heart of this work is facilitating student discussion of the question “What does it mean to be an educated person?”—a question that leads to many other interesting ones, such as: “Do we only learn in formal environments?”; “Who should decide what’s worth knowing?”; “How do we learn?”; and “How has our knowledge tradition been defined?” Gerda Lerner says that for thousands of years, men “argued with the giants that preceded them; women argued against the oppressive weight of millennia of patriarchal thought, which denied them authority, even humanity, and when they had to argue they argued with the ‘great men’ of the past, deprived of the empowerment, strength and knowledge women of the past could have offered them” (Lerner 1993, 166). This is not
just women's loss; this is society's loss. Until we build a society where all are full participants in the creation of our knowledge tradition, we will remain embattled, we will only find partial truths, and we may never discover that we could be asking the wrong questions.

Women's Studies helped me be at peace with myself, and this gave me the courage to lay down my weapons. I went AWOL from science and technology and found peace in an environment born out of the ashes of previous battles. I now teach "both/and" perspectives to students who might never set foot in a women's studies or ethnic studies course. Rather than depleting my energies surviving in the war zone of "scientific" thought, I am now renewed by the sacred act of facilitating others to question the limited boundaries they have been taught about their knowledge tradition, their society, their identity, and their sense of possibilities. I have been converted from warrior to diplomat, and am daily blessed with the privilege of expanding perspectives and inspiring a new legion of peace workers.

Mary Kirk is an Assistant Professor in the Individualized, Interdisciplinary and Lifelong Learning Department at Metropolitan State University where she also teaches in the Women's Studies Department. She has presented panels and papers on women in science and technology at multiple conferences such as the NWSA annual conference and the Grace Hopper Celebration of Women in Computing, as well as published in journals such as the Journal of Homosexuality and the Journal of Computing in Small Colleges. Most recently, she is presenting and writing about teaching practices that link feminist pedagogy with spirituality. Send correspondence to: Individualized, Interdisciplinary and Lifelong Learning Dept., Metropolitan State University, 700 East 7th Street, St. Paul, MN 55106; mary.kirk@metrostate.edu.

References


