

WHY DO WE NEED PROGRAMS THAT WORK?

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As a former astronaut, I was fortunate to have had one of the best jobs in the *universe* that one can have with a good math and science education. Even in the best job in the universe, there are degrees of “best,” whether real or perceived. The caste system or “food chain” in the astronaut office was determined less along gender lines than on pilot/non-pilot status. The mission commander is always a pilot. The second-in-command is also a pilot. Some pilots perceive that they are the *real astronauts* and mission specialists (the rest of us) are merely passengers. I perceive them as bus drivers and us as the *real space workers*. In my mind, the pilots’ perception is simply wrong and if they can live with that, so can I. If there were a significant difference in the pay scale between the bus drivers and the real space workers, then the relative values of the jobs would no longer be just a matter of perception—it would be real.

Why do we need programs that work to get women and minorities interested in and qualified for careers in science and engineering? To answer that question we should not look at the few of us who slipped through—there will always be a few who just don’t get the message and, against the odds, become successful in nontraditional fields. We should find the ones who are missing.

White males comprise only 40% of the American population [1]. While not exactly an endangered species, they are a seriously *over*-represented minority in scientific and engineering fields, holding 65% of the jobs [2]. From a national perspective, we simply cannot afford to waste the technical talents of the other 60% of the population. According to projections from the U.S. Bureau of Labor Statistics [3], by 2008 this country will need 23% more physical scientists, 35% more biological scientists, and twice as many computer scientists and engineers as were employed in 1998. The number of science and engineering jobs will grow at four times the rate of all occupations [4]. Not everyone is cut out to be a scientist or engineer, but we must remove the road blocks (overt discrimination) and the speed bumps (less obvious discouragements) to the success of all of those who are inclined toward science and engineering professions.

From an individual perspective, science and engineering jobs pay better than the traditional “women’s work.” Back in my youth (in the *olden days*), a young woman was sent to college for two reasons. First, to find an educated husband with a good earning potential who could support her and, second, to acquire job skills “to fall back on” in the unhappy event that her husband died or left her under less honorable circumstances. Today we know that most of our daughters will work outside their homes at some time during their lives, either as partners with their husbands in supporting their families, or as single heads of households.

Several years ago, I went to a conference sponsored by the American Association of University Women (AAUW) on gender equity, or rather gender inequity, in education. After the conference as I was driving home, I began thinking about the economic inequity between traditionally male-dominated professions and what has been considered “women’s work.” I realized that I was about to pay the girl who cared for my three children for eight hours almost the same amount I paid the boy who mowed my lawn—about an hour’s work. I knew that I could not single-handedly change the economic reward structure of our society, but I could see that my daughters had a choice.

The next day, with all the best intentions, I was determined to teach my oldest daughter, who was about ten years old, how to use a WeedEater. She reluctantly listened while I explained how to operate it, and how safe it was (she couldn’t cut off her foot) although she should wear protective glasses. The lesson was going quite well until I started the WeedEater and, frightened by the noise, she ran away and crashed into a brick pillar. We spent the rest of that Sunday afternoon in the emergency room having the gash in her forehead stitched. She has recovered with only a small scar, the kind that adds character to one’s face, and she does occasionally mow the lawn. I learned a lesson that day (she needed a helmet!) and she learned that there are benefits and drawbacks to one’s choice of career or part-time job. Although babysitting does not pay well, at least it does not usually involve bloodshed.

We must increase the number of young women and minorities in the science and engineering work force for several reasons. We want to create opportunities for all young people for interesting and rewarding careers. We want to increase the number of workers in technical fields to sustain our economic competitiveness. But, there is another important reason: we need a diversity of experiences and ideas in solving problems that affect us all. In his testimony before the Commission on the Advancement of Women and Minorities in Science,

Engineering, and Technology Development, Bill Wulf, President of the National Academy of Engineering, very eloquently made the point that the engineering profession, to the extent that it lacks diversity, is diminished and impoverished. Engineering is by its nature a creative process, which seeks to find the most elegant solutions to problems that also satisfy all the constraints. “In any creative profession, what comes out is a function of the life experiences of those who do it....Without diversity we limit the set of life experiences that are applied and as a result, we pay an opportunity cost—a cost in products not built, in designs not considered, in constraints not understood, and in processes not invented.” [5] In addition to filling the thousands of new high-tech jobs with talented, well-educated young people, we need to ensure that this work force reflects the values, the needs, and the experiences of our nation as a whole.

I cannot offer any special insight or guidance on programs that work for women and minorities—I am one who slipped through—but I do have a few thoughts that I would like to share.

Please don't tell young women, as many of us were told, that “you can have it all.” You can't have it all: a successful career, a wildly romantic marriage, several above average, well-adjusted children, a clean house, gourmet meals, an active social life and your sanity. All of us, whether we are in high tech jobs or not, know that we make choices and compromises every day. After my first child was born and I became for the first time a “working mother,” I was intrigued by magazines that promised to tell me “How To Have A Happy Child And A Great Career,” or other such come-ons. I poured over those articles hoping to find out what I was doing wrong. Eventually I learned that the conclusion of all the articles was that raising a child while building a career is difficult. Well, I already knew that and I did not have time to waste reading articles that told me what I already knew. Let's be more honest with our daughters. Tell them that some choices, such as having a child and a career, are very difficult but also enormously rewarding.

Tell young women that it is not always a nice place out there for those who cross the invisible gender or race lines. Tell them to expect it and to deal with it. Women faculty at MIT felt that they were being discriminated against in a number of ways [6]. Rather than taking their case to court, these scientists sought and received approval to study the situation and to prove their case to the administration. Some inequities were easy to prove. Even though in three of the School of Sciences' six departments, women undergraduates outnumbered men, the percentage of female faculty has remained at 10% for two decades. No woman had ever served as department

chair. Women faculty were granted, on the average, only half of the office space that was allocated to male colleagues. The women proved their point with those data and other harder to quantify inequities, and a modest change is now underway at MIT. The School of Science agreed to increase the number of tenured female faculty by 40% the next year. At this rate, it will take forty years before the 40% of the School's faculty is female.

And finally, ask young women as we must ask ourselves: As women are drawn from the traditional women's jobs for more lucrative high tech careers, who is going to replace them? Just as the projected demand for science and engineering workers will draw women into those fields, a shortage of entrants into traditional women's professions will force us to reassess the value of those professions to our society, and to reward them with the pay and the respect they deserve. We must also not forget the contributions of "non-working" mothers, who are undoubtedly some of the hardest working women I know. Women who helped me take care of my children while I was building a career, "non-working" mothers did more than their share of the carpooling, were coaches and team mothers, ran the PTO, the swim team, the Girls Scouts and Sunday school. Because of them, I did not have to make a choice between having a career and a family. They deserve our respect and gratitude.

I applaud all you have done and are now inspired to do to encourage young women and minorities to continue their studies in math and science, and to excel in those fields. Your continued effort will eventually change the face and the quality of our nation's science and engineering workforce. Thank you for the opportunity to be a part of this conference.

References

- [1] *Annual Population Estimates by Sex, Race And Hispanic Origin, Selected Years from 1990 to 2000*, U.S. Census Bureau, Internet: <http://www.census.gov/population/www/estimates/nation3.html>
- [2] *NSF Science and Engineering Indicators*, National Science Foundation, 2000, Appendix Table 3-10, Internet: <http://www.nsf.gov/sbe/srs/seind00/>
- [3] Internet: <http://stats.bls.gov/>
- [4] *NSF Science and Engineering Indicators*, National Science Foundation, 2000, Chapter 3, Internet: <http://www.nsf.gov/sbe/srs/seind00/>
- [5] W.A. Wulf, testimony to the Commission on the Advancement of Women and Minorities in Science, Engineering, and Technology Development, *Committee on the Diversity of the Engineering Workforce* (July 20, 1999).
- [6] B.I. Koerner, "The Boys Club Persists," *U.S. News & World Report* 126, (13) (1999) 156.