

The Challenge for American Leadership in Science and Technology

By Vicki Cobb

A continuous lament of emerging, third-world countries is that they are victims of a "brain drain." Their most promising students, sent abroad to study in American and European universities, never return home to apply their much needed scientific expertise or practice their professions.

The United States too, suffers from a "brain drain" of epic proportions, but of another sort: It is the waste that occurs when many of *our* "best and brightest"-- millions of highly qualified and scientifically apt girls and young women--do not choose science, mathematics and technology as career goals.

This "brain wastage" has important national policy implications. If the United States is to remain competitive in international markets, our nation must have the world's largest cadre of scientific leaders and an ample technologically competent work force. There are also vital national defense considerations, an area which is now almost totally based on scientific technology.

Studies have shown that there is no "math gene" for boys and that more than eighty percent of both boys and girls like math in elementary school. Unfortunately, both boys and girls lose enthusiasm for math and science as they get older, but by high school the percentage of girls' loss of interest drops 20 points as compared to 12 points for boys'. The disparity increases with age as evidenced by the drastic under representation of women in science, engineering and mathematics career tracks.

The findings of numerous studies of girls and boys in the classroom are summarized in the 1992 AAUW report, *How Schools Shortchange Girls*. It states, "Despite a narrowing of the 'gender gaps' in verbal and mathematical performance, girls are not doing as well as boys in our nation's schools. The physical science is one critical area in which girls continue to trail behind boys. More discouraging still, even girls who take the same mathematics and science courses as boys and perform equally well on tests are much less apt to pursue scientific or technological careers than are their male classmates."

The decision to pursue interests in math and science must be made during adolescence, precisely when girls suffer a striking loss of self-esteem. According to the seminal research of Dr. Carol Gilligan, author of *In a Different Voice: Psychological Theory and Women's Development*, articulate, assured preadolescent girls are often transformed into apologetic, hesitant teen-agers. Teen-age boys typically come into "individuation," or the establishment of an autonomous self, while teen-age girls get quiet, subordinating their own wishes to those of the group. Gilligan has extended her work into finding ways of "strengthening healthy resistance and courage in girls;" necessary behavior for a making a personal commitment to science and math, subjects traditionally staked out as male territory. Interestingly, the AAUW reports that there is a "crucial--and circular--relationship among self-esteem levels, interest in math and science, and career aspirations: Girls...who like mathematics and science have higher levels of self-esteem. And girls... with higher levels of self-esteem like math and science...."

The image of a scientist is also not very alluring to young girls who are intent upon trying to respond to society's demands that they be sexually attractive. Typically a male scientist is portrayed as an "egg-head" or a nerdy guy in a lab coat or even as "mad," and a female scientist as wearing flat-heel shoes, thick glasses, obviously without the option having a man in her life. Girls see no role models of attractive, even glamorous, women who combine a love of science and math with a full rich life. Noted physicist and astronomer, Dr. Fiorella Terenzi, wryly maintains, "It *is* possible to do astrophysics and buy a dress." Sadly, the general public is unaware of the many aspects of personal lifestyles among professional female scientists and mathematicians.

We need to do a number of things to get more girls interested in developing and pursuing their interest in science and math. Public relations campaigns should be mounted to persuade girls and young women that such careers are interesting, fulfilling and "cool." More leading female scientists should be promoted as role-models. Science-shy elementary school teachers should get extra training to overcome their own reluctance to nurture scientifically gifted children.

Why do scientists love science? There is nothing more intellectually satisfying than making a scientific discovery, no matter how small, even for a beginner. It allows the uninitiated to "get" what science is about. Once that happens, there is increased appreciation for the accumulated body of scientific knowledge, acquired through tiny incremental steps contributed by thousands of people over centuries. Each incremental step is not so complicated on its own and can be understood. The power of this cumulative massive human endeavor has ultimately led to the magic of today's technological world. It's time for women to contribute their fair share.