Chapter 4
Increasing the Numbers of Women in Science

Gwen White
Gateway Community and Technical College, USA

ABSTRACT

The fields of engineering and technology have traditionally been male dominated. The numbers of females in engineering and technology are traditionally less than their male counterparts. Within the past thirty years, women have had more opportunities to enter these fields. Previously stereotypes, misinformation and ignorance have shut women out of these important career choices. The short and long term goals are to eradicate stereotypes and make sure there is enough pertinent information available for women and girls about engineering and technology. There are a number of programs available that encourage females to enter the fields of engineering and technology; they just need to move up on the priority lists of corporations, guidance counselors and parents.

INTRODUCTION

Women are not entering the field of technology or engineering. They tend to see science and engineering as a male dominated field with no room for women. Women make up less than one quarter of the nation's scientist and engineers.

Women are held back due to stereotypes, lack of education, parental involvement and academic advising. These problems have continually contributed to the low numbers of females in engineering and technology.

This chapter will look at the overall placement of women and recommend ways to increase women's participation in technology and engineering. "The main hurdles in getting women to study engineering occur long before they reach college, and those that make it that far often have had a role model engineer like a brother or close family acquaintance to introduce them to engineering" (Wolcott, 2001).

BACKGROUND

Statistics in various countries shows that women for the most part are lagging behind males in engineering and technology. Countries include the United States, Canada, India, Japan and European nations. In the United States, women earned approximately 60% associate's degrees, 58% of all bachelor's degrees, and 59% of all master's degrees (Knapp & Kelly-Reid, 2006, p. 3). Overall high tech firms are lagging behind when it comes to women on the payroll in a STEM related field. Women only make up 25.6% of U.S. computer and math occupations. Only 8% of women with four year degrees are engineering managers (Anita Borg Institute, 2007).

There is expected growth in engineering and technology in the next four years. Management, scientific, and technical consulting services jobs according to the Employment Projections by Industry: 2006 to 2016 is expected to grow from 920,000 to 1,638,000. The same growth in Computer systems design and related services is expecting to increase from 1,278,000 to 1,767,000 by 2016 (U.S. Bureau of Labor Statistics, 2007).

The U.S. Department of Education's outlook for Engineering, Technology and Science Occupational Projections from 2002 – 2012 show that 1,500,000 positions in these fields are likely to be added in the near future. Only 26% of degree holders are women with a degree in Computer Science. "Women received about 38% of the computer science bachelor's degrees awarded in the United States in 1985, the peak year, but in 2003, the figure was only about 28%, according to the National Science Foundation "(Dean, 2007, p. 1).

Even though there is an expected increase in the number of technological positions, conversely the proportion of women available to work in these fields have decreased in the past 20 years in comparison to other fields like mathematics and science (U.S. Department of Education, 2005). However, only 26% of women hold professional positions in the IT industry in 2006. This number of females involved in technology is likely to decrease as the year 2012 approaches.

The National Center for Women in Technology (NCWIT, 2009) published statistics related to females in computer science. In 2008, 57% of women graduated in the Unites States with a four year degree. Of that 57% only 18% were computer science majors. This is a significant decrease from 1985 where 37% of female graduates were computer science majors. Statistics (Anita Borg Institute, 2007) in other countries show low number of computer science/engineering majors: India (8%), France (19%) and the United Kingdom (18.2%). In contrast, Eastern Europe (57%), China (59%), South Korea (46%) and Japan (66%) in 2000 have a higher representation of four year graduates. According to the Bureau of Labor Statistics, "demand for computer scientists in the United States will only increase in coming years," Dr. Cuny said. "If you look at the demographics of the country, if we are not going to get our new professionals from women and minorities and persons with disabilities, we are not going to have enough (Dean, 2007, p. 5)."

Climbing The Technical Ladder Study (2007) surveyed 1,795 men and women currently in the field of engineering or technology at various high tech companies in the Silicon Valley. The sample was chosen because it was representative of a globalized population. 34.2% of the sample was women. Women in senior management positions numbered less than 5%. There has been a decline in the number of women in technology and engineering fields as of 2005 (from 41% to 32% by 2005) (Simard, 2008). Based on the statistics, there are many of the same issues in other countries. The only bright spot is Eastern Europe where women have a greater portion of technical degrees than women in other countries.

Eastern Europe women in 1992 had 57% of all university degrees with at least 50% of these degrees in the engineering fields, 70% in natural sciences and 73% in mathematics and computer science (Anita Borg Institute, 2007).

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