# Women in STEM and Cyber Security Fields

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There is an acute shortage of personnel in the STEM field that may take several decades to recover. Despite being 50 percent of the workforce, females account for only about 25 percent of the personnel in the field. In cyber security only 10-15 percent of the workforce is female. Efforts have been made to encourage more women in the cyber community, but much remains to be done.

Much attention has been given as of late to the issues surrounding cyber security. Cyber criminals are constantly attempting to hack our financial institutions, nation states are probing

our defense systems and our personal computers require ongoing supervision. To meet these challenges, we need a well trained, educated and growing pool of individuals skilled in the intricacies of the digital world. Those individuals may be degreed from a college or a trade school, young or old, male or female. What we need to ensure is that there is a constant flow of people in the education pipeline and that everyone who has a desire to participate will have an equal opportunity to take part in the effort, and an opportunity to advance in their career.

While the shortage of cyber security personnel is acute, the continuing paucity of females in STEM programs and in cyber security in particular is a growing concern. Heilbrinner[4] notes that "…in the past decade, women earned more doctoral degrees in science than ever before, and they earned more doctoral degrees than men in some fields such as biology. However, the actual picture is more nuanced, for women are still underrepresented in other fields…."[4]. While women represent half of the workforce, only about 25 percent in the STEM field are female and this percentage has not changed in nearly 10 years. More troubling is that in some areas such as engineering, the percentage of females has actually declined. Changing fields is not uncommon, but after entering the STEM field, only about 60 percent of women remain in the field compared to 80 percent of men who remain. Some of the reasons women have for leaving their profession include job or climate dissatisfaction, pay inequity, pressure from family issues, gender discrimination, lack of social change, or lack of support from employers for advancement. These issues continue to be addressed in education and trade publications.

In cyber security, the picture is even bleaker. Recent research indicates that women only fill 10-15 percent of cyber security positions. A recent study sponsored by Raytheon showed surprisingly little interest from young adults in pursuing a career in **cyber security.** Among those

attracted to the **cyber security** field, the study found a gender gap. Young men gravitated more to **cyber security** careers than young **women.** "As a father of a young daughter, I was surprised and a little disheartened by the gender gap of those interested in a career in **cyber security,** Jordan Wiens, **cyber** engineering lead at Raytheon Intelligence, Information and Services, told eWEEK[8]".  A recent report showed that over a period of six years, those companies who had a more gender-diverse staff outperformed male only groups by 26 percent.[2]

The situation is not unique to the Unites States either. Caldwell notes that in the UK "Things are not yet looking up. The number of women who took cyber-security training with QA during 2012 also declined in real terms by almost a fifth, down 19.5% compared to the figures for 2011. During the same period, the number of men taking cyber security training more than doubled, increasing by 118% between 2011 and 2012"[2].

While there has been some improvement in certain areas, much needs to be done to reduce the male/female imbalance in the technologies. As noted above, there are numerous reasons why females do not join the STEM field and remain once on track. The U.S. government has initiated programs to increase females in the sciences and President Obama has even offered initiatives aimed at increasing female participation in the sciences. While these actions are noteworthy, success can come from other avenues as well. Beginning in early grades teachers and guidance counselors need to broaden their perspectives and encourage young men and especially women to consider the STEM field. Young people are easily influenced by role models so efforts should be made to promote technology by highlighting females that have been successful. Young notes from her study that"…research suggests that female role models may positively impact women in a variety of traditionally male-dominated fields, including STEM

disciplines". Furthermore, "…identifiable female role models in STEM fields can increase a woman's implicit identification with science, while simultaneously decreasing, and indeed inverting, implicit gendered stereotypes about science. Female role models in STEM can increase how well women students feel they fit in STEM fields, a known factor in increasing women's intentions to pursue a career in these fields.[10]"

Guidance and role models can lead young women into technology, but once in the field, efforts need to be made to increase the likelihood that they will stay. Equitable pay and opportunities for advancement pay a major roll, but research indicates that mentoring plays an even more important role in retention. Chioma[3] notes the important of mentoring and writes

"In a highly competitive labour market, the challenge of retaining satisfied and productive employees has become a top priority. Many organizations are implementing formal mentoring programmes and providing training to potential mentors on how to develop employees because of research evidence supporting the benefit of mentoring. Jordan (1997), reports that all successful female executives had a male mentor who performed significant functions in their careers." [3]

There is no magic bullet that will universally solve the issues of female shortages in STEM, technology and cyber security. Instead, a consorted effort is needed to seal with the issue. That includes government support, guidance, role models, equality in the workplace, and mentoring. If organizations wish to take advantage of the differing perspectives that women bring to the workforce, fill the gaps in technology, and add to their bottom line, then women need to be put on the STEM track early, recruited, and made to feel as good a part of an organizations hierarchy as anyone else.

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