

Women Recruitment/Retention in STEM Fields

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Abstract

Numbers in the United States are down in the STEM (science, technology, engineering, mathematics) fields compared to other countries. A look at the minority or women in STEM shows an even lower number. What can be done to improve these numbers? Once the minority or woman student is in the program, how can they be retained? This paper will give suggestions on where to recruit and pointers on how to reach out to women students. Hurdles to recruit and retain women students will also be examined and how to overcome them.

Introduction

The STEM (science, technology, engineering, mathematics) fields are important to our country. According to Rodney Akins, a senior vice-president at IBM Systems & Technology Group, “Only 5% of United States workers are employed in fields related to science and engineering, but they are responsible for more than 50% of our sustained economic expansion.” He also goes on to point out “according to NSF, the percentage of United States students studying math, science, and engineering has decreased from 21% in the 1980’s to approximately 16% today.”¹ So why recruit women? They make up 50.7% of the population from the U.S. Census numbers² and they only comprise 10.7% of the engineering occupation field and 24.8% of the mathematical/computer science field per the 2009 Bureau of Labor statistics.³ There is room for more women in the STEM fields and they can add great value and help our country and its economy. It has also been shown, according to Forbes that groups with women have a higher collective intelligence and that this can be contributed because, women possess a superior social sensitivity in reading non-verbal cues and other people’s emotions, and a fairness in turn taking.⁴ Where do we start to recruit and how do we retain once we have women in our universities. This paper will explore some ideas on how to reach out to women and hurdles that will need to be overcome.

Recruitment

Mindset - One of the hurdles to overcome in recruitment is mindset. Carol Dweck, a social and developmental psychologist at Stanford, developed an interesting program for 7th graders for 25 min/week for 8 weeks to challenge them that the mind is a muscle and needs to be worked. The program also taught mistakes are a way of learning; they are in charge; and that being smart is a choice. Typically grades fell during this time frame, but with her program, they were reversed. This research showed that struggle should not be seen as bad, but good. The evidence provided that a “growth mindset” (viewing intelligence as a changeable, malleable attribute that can be developed through effort) as opposed to a “fixed mindset” (viewing intelligence as an inborn, uncontrollable trait) is likely to lead to greater persistence in the face of adversity and ultimately success in any realm.⁵

Interestingly, in cultures that produce a large number of female math and science graduates, including South and East Asian cultures, the basis of success is generally attributed less to inherent ability and more to *effort*. This can be seen in the past year in the discussion of being a “Tiger Mother”⁶ and having students focus more on putting forth an effort. Many times in the U.S. culture, women students exude a need to having been born with the trait or skill, rather than it requires effort or that it can be thought of as a challenge.

Career Counseling - Because of mindset and effort, one major focus on recruitment can be on how we do career counseling. In an article by Lorraine Dyke, comparing Bangladesh and North America,”one key difference between the two countries is the streaming that goes on in the educational system in Bangladesh with field of study based on admission tests. Although this kind of streaming would be a major departure from our current system, greater emphasis on aptitude rather than interests in high-school career counseling could be beneficial.”⁷ Dyke also points out that in contrast to falling rates for women in STEM field in the US and Canada, Bangladesh has seen the opposite with rates going from 14% to over 20%.

Role Models - Avenues to recruit women students are can be done through established groups, such as Girl Scouts, 4-H, church groups, workshops, and community colleges. It helps to have women role models to guide and talk with the women and girls because it defuses the bias that women cannot be in the field. Some successful workshops have been the GROW (6th-8th grades)⁸ and EXCITE (9th-12th grades)⁹ workshops at Kansas State University where women engineering students help lead junior high and high school girls in workshops and activities that deal with STEM areas. Girl scouts have specific badges in these areas that can be earned and workshops and activities can be done to accomplish this. Cottey College in Nevada, MO, has a science workshop where girls come from all across the country to participate and see the STEM areas that are open to them.

We should point out incentives in the STEM fields to girls and how they can make a difference in the world. Many times women students want their work to count for something and if this can be shown, then they will take on the challenge.

Retention

Single-Sex Education is a possibility to help retention of female STEM students. Again from Dyke, “The Bangladeshi education system is also heavily based on single-sex education which may also support young women’s development of STEM skills. Mixed-sex classes are often associated with ‘dumbing down’ on the part of teenage girls who are more interested in being seen as feminine than competent by their male colleagues. Other research has shown that single-sex education is associated with higher achievement on the part of women.” “With the US culture, the girls typically do not want to outshine the boys and that it is not “okay to be smarter than the boys. This can also be seen in other ways, for example whereas in mixed groups boys tend to perform the experiments while girls write up the lab notes.”¹⁰ Jane McAuliffe says, “When we ask our STEM majors what it is about Bryn Mawr (Bryn Mawr College is in the top 10 among all colleges and universities in terms of the percentage of female graduates pursuing doctorates in the STEM fields) that encourages them to pursue these male-dominated fields we consistently hear two things – being exposed to role models among our faculty, alumnae, and their fellow students, and the positive effect of being in a classroom in which they aren’t the lone woman.”¹¹

Girls are more likely to express themselves and not hold back if they are in an all girls group. It has also been shown according to McAuliffe that “women are still at least twice as likely to major in a STEM field at a women’s college than at a co-ed.”¹² This isn’t to say that women can’t major in a co-ed setting, but in recruitment it helps to sometimes to have an all girls group.

Support - Along with mindset and effort, many women students need support with self-esteem and self-efficacy so they feel comfortable with the areas in STEM once they have chosen to study in these areas. It turns out that the biggest reason women drop out of STEM programs is not low grades, but low confidence according to The National Institute for Women in Trades, Technology and Science (IWITTS). At the University of Washington, the grade point average of women who dropped out of an engineering program was 3.2.¹³ Many times from Shelly Correll in the AAUW book, it shows that girls assess their mathematical ability lower than do boys with the equivalent past mathematical achievement. At the same time, girls hold themselves to a higher standard in subjects like math, where boys are considered to excel. Because of this, girls are less likely to believe that they will succeed in a STEM field.

Some ways to overcome the hurdle of self-esteem is to have teams in order to have a feeling of belonging and other women mentors, and women faculty. Jaschik, in *Inside Higher Education* reports, “New research provides evidence that female instructors may be key to encouraging talented female STEM students to stay in those disciplines.”¹⁴

Summary

STEM jobs help to contribute to the nation’s economic expansion. Since women have skills that are valued and they are underrepresented in these fields, it is important to recruit and retain them in these fields. Mindset and culture obstacles can be overcome with training and avenues such as workshops for girls only in Girl Scouts and university settings and career counseling based on aptitude and not on likes. Besides the workshops, having women instructors and mentors help to promote and inspire girls as role models. After recruiting, retention with encouragement and teamwork can be obtained.

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