UNDER-REPRESENTATION OF WOMEN IN STEM

Many fields have found a way to improve gender gaps, so why hasn't STEM made the same efforts?

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By **Angela Root**

DESPITE ADVANCEMENTS IN EQUAL gender Rights, women continue to be underrepresented in many aspects across the globe. This includes the fields of science, technology, engineering and mathematics (STEM) based schooling and careers. As Ceci states in the *Psychological Science in the Public Interest*, "Simply put, the more the math, the fewer the women". This being said, there is clearly a serious issue of gender inequality in STEM academics that needs to be fixed. There is no reason that as people age, there is a decrease in a gender involved. While this gender gap continues to be a problem, the best step we can take to find a solution is to teach women throughout their development that they have the same capability and opportunity in STEM as men.

Image 1

When you think of a person involved with STEM, you may automatically think of the stereotype of an introverted, greasy haired boy wearing glasses. When girls and women are consistently seeing this stereotype around them, why would they want to be associated with that type of person? Cheryan says in her research of the gender balance in STEM fields, "The culture of STEM is often spoken about as a uniformly hostile place for women – as a 'chilly climate'". Unless you like to be in a hostile environment (which you probably do not), I doubt you will want to willingly join such an environment. This may deter some young women who had an interest in working with math or computers from pursuing a degree or career in that later in life. If we can make efforts to back away from this stereotype, we may see a small raise in the interest of women to genuinely want to be a part of STEM.

Going along with this, when women enter college either pursuing a STEM major/minor, or thinking about switching to those degrees, they will see a lack of women in most of their classes. I started my degree in civil engineering, and although the difference of men and women in my classes was noticeable, it was not quite as noticeable as when I made the switch to a degree in computer science my junior year. I was shocked at how few women were in my classes. In a class of more than 100 students, I could count the women around me on two hands. This was quite discouraging to me at first, and I kept thinking to myself do women not belong in this major? After a few weeks learning more in my classes, and finding the passion I had been hoping to come across, I started thinking, *why* aren't there more women in these classes?

Don't get me wrong, there have been efforts and plans put in place to decrease the gender gap in STEM fields, and not all of them have failed. Chemical engineering has almost completely eradicated the gender gap in the field, and there is a shrinking gap among many other engineering fields, as well as mathematics and physics. However, one of the few fields that has not been having a positive effect by the current efforts put in place is

computer science. In Reshma's article about the gender gap in computer science he stated that "despite unprecedented effort to expand computer science for children and young adults, women's share of the computing workforce continues to fall – from 37 percent in 1995 to 24 percent today". If this drop was only by a 1-2% it may not be as noticeable, but a drop of 13% over the last 20 years is insane while at the same time we are hearing about the advancements women have made. There is an effort in place to expand computing professionals beginning with children and young adults, which is what we need to see more of for this effort to thoroughly improve the size the of the gender gap. With this, there is clearly something involved with computer science that is continuing to push women away from pursuing a career in it.

While doing my research on the gender gap, I came across a paper by Yansen and Zuckerfeld that brought forward an excellent reason to why young boys and girls see STEM fields as male based. They said that "there is room to assume that during early childhood, the lack of media transmission of female role models associated with innovative behavior when using technologies might be a relevant factor" to why the gender gap in STEM is starting at a young age. When you think about the television shows you watched as a child, how many can you list with strong female leads involved with the sciences? I know I can't think of any. The first technological cartoon I could think of was '*Dexter's Laboratory'*, and one of the main aspects of the show I could remember was Dexter's sister messing up and getting in the way of all of his experiments. This can easily put the impression on young girls that if they want to do science experiments, they are just going to mess something up or get in the way of the much 'smarter' boys around them. I know what you're thinking, not all young children are reading into cartoons that deeply, and it may not affect their future decisions in the least. Which is certainly the case for some children, and those who do take the time to think critically about the show may be impacted when it comes to STEM related decisions later in life.

Women are affected throughout their lifetime when it comes to the math and sciences degrees and careers, and while cartoon and television shows start the impact on them, there are more obstacles later in life that will continue to affect their choices. Ceci did research on the changes of women in academic science, and came across the fact that "by middle school, boys are more than twice as likely as girls to expect to work in science or engineering". These expectations are going to have an impact on young girls as well, because middle school professors may be supporting the young men showing an interest in math and science more than they may support the young women showing the same interest. The expectations we are placing on children throughout their academic career will also effect the number of women we are seeing in STEM later in life. While the number of women entering STEM is increasing, it is not as quickly as other fields, such as physics and math. The lack of women in STEM careers also means that women have a lacking of a support system in the classroom and workplace. If we work to decrease the gender gap enough for women to "not view themselves as isolated" while at work or in class as Heilbronner says, more women will feel the courage to pursue their interests in these types of jobs. No, not all women need another woman around them to feel comfortable and supported, but for some it is helpful to have someone to talk to in your career that is going through the same gender challenges as you are day to day. We need an expansion on the types of support systems available to women in the STEM fields to help them see they aren't the only ones struggling with decisions related to it.

While many articles and research papers of the gender gap in STEM fields have had commonalities, not many explicitly laid out the challenges women face and the leading causes as well as Linda Sax did in her research paper. Sax states that there are five key explanations for the gender gap in these fields, and they are "individual background characteristics; structural barriers in K-12 education; psychological factors; family influences

Image 2

and expectations; and perceptions of STEM fields". The perceptions of the STEM fields are the stereotypes I mentioned above, that need to be changed in order for progress to be made with this issue. Structural barriers and psychological factors are just how noticeable it is in the classroom that there are more men than women attending. Working on the physically visible deterrents will make a difference on the amount of women you see around you in class and in the office. Individual background characteristics and family influences are also important on expanding young women involvement, but that is something those need to worry about on a personal level, as there is not much we, as women in STEM can change about every individuals home lives.

I have seen a few different ways that colleges and universities are working to decrease the gender gap of the people earning diplomas in STEM fields, and if we can help to spread these methods I believe we will see a success in destroying the gender gap that has been holding so many women back from pursuing a math and science degree for so many years. The University of North Carolina uses a scholar program called CWIT for those in STEM to encourage women studying such fields. They use five elements to help students throughout their college experience as Rheingans describes to be "community-building, mentoring, academic support, leadership training, and the living-learning community". All of the elements of their program are helping to build the strong foundation many people need to feel secure in what they are pursuing.

Rheingans mentions that they have seen a growth in the number of women graduating with a degree in a STEM field, as well as a decrease in the women's dropout rate in these fields. This is incredible that they were able to find a program that works for women, and there is no reason that other universities should be holding back on making the same efforts and decreasing the gender gap. A working foundation for a scholar program has been created and is effective at one University and we should work on spreading this further throughout the country. The biggest step we can make in shrinking the unnecessary gender gap of STEM fields is on a collegiate level. This is when women are making the decision of what they want to major in, and if they can

get that support system and encouragement from their school and their peers, they may be more inclined to stick with it and enjoy a career in STEM in their future. Rheingans also says that "gender is but a subtext to the main relationships built on a common passion for technology" which couldn't be more true. It should not matter the gender of someone for what they are capable of accomplishing. If you have a passion for something, you should go for it, and not let the stereotypes and challenges you may face along the way stop you.

Women have the capability and equal opportunity to succeed in science, technology, engineering, and mathematics fields, and with the help of those of you who have seen the challenges young women face first hand, we can shrink the existing gender gap to nothing. We need to be the role models to help nudge women towards their passions for STEM if they are having doubts. We need to spark that interest while they are still at a young age by creating more cartoons and television shows with a strong female lead in technology. We need to aid them in their struggle through college courses related to STEM by creating the support system they need to succeed and move forward. We need to forget about the well-known male stereotype that exists of working in these fields. Lastly, we need to establish laid out and organized programs to encourage young women that they are not alone, and we, as both men and women in STEM, acknowledge that there is a gender gap that needs to be corrected. If other fields are able to decrease the gender gap, there is no reason that STEM fields should still be facing the struggle of making the field equally filled with both men and women.

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