

A Girl's Perspective on STEM

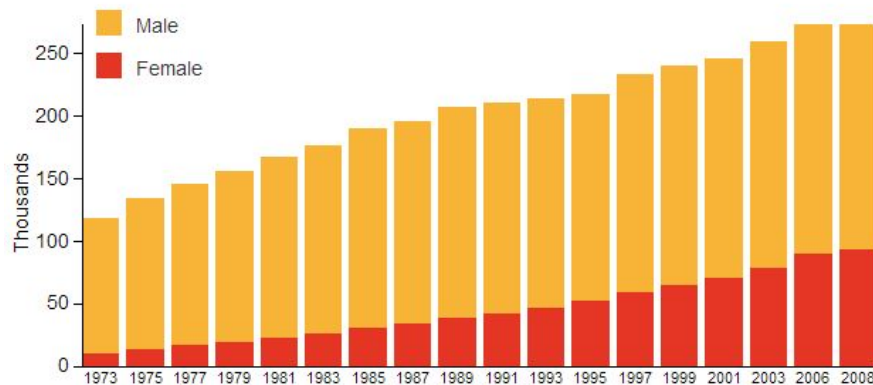
Ellie Thurston

Norman High School

A Girl's Perspective on STEM

Most people can agree that female underrepresentation in science was a problem in the past, but it is not always acknowledged that sexism in STEM fields still exists today. In 1970, women made up a total of seven percent of female scientists; this percentage increased to 23 percent in 1990 (Giudice). Some may misinterpret this information by assuming the issue of underrepresentation should no longer be of any concern. However, the percentage of female employment in science has stayed consistent after 1990 (Giudice). Females are currently underrepresented because male involvement in science has increased along with female involvement. The male:female ratio has stayed consistent, which can be seen by analyzing the number of men and women who obtain Ph.D.'s in fields that are considered to be in STEM (Shen).

GENDER BREAKDOWN BY FIELD OF STUDY FOR US SCIENTISTS AND ENGINEERS WITH PHDS EMPLOYED IN ACADEMIA



(as used in "Gender Breakdown by Field of Study for US Scientists and Engineers with PHDS
Employed in Academia." by Shen)

My team, Norman Advanced Robotics, has been very encouraging and fosters creativity and diversity. However, I have had experiences inside and outside the botball community that have made me realize sexism, especially in STEM, is still a very prominent issue. Before middle school, I was not aware of the social expectations that were put upon girls. I was raised in an environment that encouraged new ideas and exploration, and I loved conducting my own science experiments; I knew I wanted to pursue a career in science.

When I started middle school, I realized that boys and girls were treated very differently on my botball team. In sixth grade, the sponsor of botball had a rule that only boys were allowed to build on the robots, and the girls were only allowed to program. I was unaware of the gender bias, so I thought that the division was just a convenient way to quickly divide up the tasks. However, I soon discovered that the reason why girls were not allowed to build was because the administration believed that the girls would be pushed over, and that the boys would take over the project. Many of the girls involved in middle school Botball dropped out. Because of the belief that girls could not take leadership of the project, I did not participate until the next year (after a change in management). Out of around forty to fifty people, there were only five girls on my botball team during seventh and eighth grade.

Through Duke TIP, I participated in an engineering class at Wake Forest University. Out of seventeen people in my class, there were only five girls present. I was team leader in a class project to design a chair under very heavy constraints. I came up with an idea of how to organize the group's ideas, but a boy on my team told me, "No, I don't have to listen to a girl". I was

dumbfounded by his response, but I quickly learned that it was going to be a struggle to gain respect in the world of scientists. My instructor suggested that I pursue a career in engineering, since there are so few girls who remain in the field of STEM for any length of time. The next summer, I signed up for a class on artificial intelligence at Georgia Tech. Out of the seventeen people in that class, there was only one other girl. She was hesitant to take the class, because she was worried that all the boys in the class would make fun of her for being a girl programmer. To provide another inside-the-classroom perspective, Tad Thurston, physics and astronomy professor at the Oklahoma City Community College, agreed to a brief interview to compare both the social and academic behaviors in his classes. Out of the 100 students in Dr. Thurston's classes, only 32 of them were females. These females, on average, scored higher than the males. This is most likely due to the fact that only the serious and prepared females enrolled at this level. Some of the males "float in because they think they are supposed to do science" (Thurston). The males feel pressured to take a science course, even though they may not be motivated to succeed. Socially, the females are usually more introverted than the males. Dr. Thurston's reasoning is that "The scientifically-minded girls grew up curious about the world around them, and did not worry as much about social activities" (Thurston). Society assumes that males are mathematically and/or scientifically experienced. In contrast, females are assumed to be experienced in language and fine arts. Therefore, both genders feel a social pressure to take a course that they may not be interested in because they feel the need to be accepted into the social ladder. If a female student is dedicated enough to break away from the "normal" class selections, they risk being excluded from social activities simply by following their interests. However, this

person will usually be more dedicated to their class work and learning, to justify their break-away from mainstream pursuits.

During my freshman year of high school, I was asked to engage in a news interview that changed the way I view myself as an engineer. Fox News asked if they could come to Norman Advanced Robotics to ask a few questions of the team representatives. The news reporter asked the three boys ahead of me questions like, “What major are you going into next year?”, or “What is your favorite part of participating in Botball?”. When he came to me, he asked me, “so *girls* can be in robotics?” I was shocked by his question, and was caught, unsure of what to say in response. His next question to me was, “*You’re* teaching these *guys* a little something about building robots?” Even though in the past I have been one of the only females involved in Botball, I had never felt as alienated as I had during that interview.



In the years following the interview, I became aware of the subtle references to female inferiority. On more than one occasion, members of the STEM community have told me, “I’m glad that you don’t act like a girl” and “thank goodness you’re like one of the guys”. When I gave a talk about building practices in Botball, one member of the group I was presenting to came up to me and said, “I don’t think I can be associated with you. You’re a feminist”. He believed that to be a feminist meant that you believed in female superiority. I explained to him that feminism was about equality, and asked why he thought I believed that women were superior. His response was, “I don’t know. You were just standing up there and talking”. This last year, I took part in a self-study course at Norman High on AP Physics Electricity and Magnetism. When the annual physics student and alumni picnic came around, a substitute teacher almost did not let me attend, saying, “Are you sure *you* are in physics?” It is assumed that girls do not participate in challenging STEM classes, and it is always met with surprise when I tell people that I am in Botball. “Even women who have been extremely successful in the academic system, namely tenured full professors at the prestigious Massachusetts Institute of Technology (MIT), turn out systematically to earn less and to receive less laboratory space and research money than do senior male faculty (Lawler, 1999)” (Ellemers 313-338). While it may not be intentional, these subtle references can be seen within the Botball community. At last year’s GCER, a slide show was cycling through the achievements of the Botball organization. While the teams were working on their bots, a large pink slide came on that said “20% girls!”. The girls at the conference paused what they were working on and passed awkward glances around the room. This raised the question of whether the girls were there to contribute, or whether they were there to provide proof for female interest.

Recently, STEM corporations have implemented programs to raise female interest in the field of engineering. While these programs can be helpful, a lack of interest is not the main reason why women do not choose to be involved in STEM. Fearful of verifying the feminine stereotype, women have become hesitant to apply for careers in STEM, despite their interest. In an experiment, two groups of people took the same test and each group contained both boys and girls. Half of the test subjects were told that gender is not a factor in the ability to take a challenging test. The other half of test subjects were not told anything before the test took place. The group that was encouraged showed the test scores of boys and girls to be very similar. In the other group, the girls scored significantly lower than the boys (Kamdin 24). This is evidence that while males and females have the same cognitive abilities, the constant fear of encountering and confirming stereotypes keeps girls out of STEM opportunities. Simply by encouraging the group of girls, the anxiety and fear, otherwise experienced, did not impact their performance. In middle school, I chose to take part in GLAMS (Girls Learning and Applying Math and Science). The program gave female students the opportunity to engage in interactive engineering activities and to learn about the many different types of engineering fields that are available. While I thought the program had interesting demonstrations, it did not prepare me for the working environment; no one had warned me about the injustices done to women in engineering. Engineering programs advertise their numbers, but few advocate for the girls involved. I want girls in STEM to understand that they are stronger than they are made out to be. I do not want to just tell girls that they can succeed; I want to show them that even when someone with biased expectations tries to get in the way, we can work together on creative solutions, starting with our robots here at GCER.

Works Cited

- Ellemers, Naomi, et al. "The Underrepresentation Of Women In Science: Differential Commitment Or The Queen Bee Syndrome?." *British Journal Of Social Psychology* 43.3 (2004): 315-338. *Academic Search Premier*. Web. 3 Apr. 2015.
- Giudice, Marguerite Del. "Why It's Crucial to Get More Women Into Science." *National Geographic*. National Geographic Society, 8 Nov. 2014. Web. 05 May 2015.
- Kamdin, Katayun. "Mind the Gap." *New England Journal of Medicine* 349.19 (2003): 1880. 18 Jan. 2014. Web. 6 Apr. 2015.
- Shen, Helen. "GENDER BREAKDOWN BY FIELD OF STUDY FOR US SCIENTISTS AND ENGINEERS WITH PHDS EMPLOYED IN ACADEMIA."
- Thurston, Tad. Personal interview. 4 April 2015.