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### How a Computer Science Teacher Inspires the Future of STEM

In the past two years, Sarah Putterman, a computer science teacher at Cheltenham High School in Wyncote, PA, has created four programs that promote women in STEM. She has designed two classes, one focusing on game design and the other on cybersecurity, and two clubs, Computer Science Honors Society and another focusing on cybersecurity. After teaching math for several years, Putterman noticed some of her students did not understand the purpose and greater applications of math, so she switched to teaching computer science, a field that has more indisputable applications in the workforce. Her initiatives have attracted over 120 students since their inception. The two clubs are not mutually exclusive, so students have the option to select which programs to participate in; this flexibility allows students to stay involved in STEM both in and out of the classroom. Through her efforts, she hopes to teach younger generations of women that their voices need to be heard.



## The Programs

Putterman's cybersecurity class explores cryptography, malicious software, and web security. Its curriculum, which is based on curricula provided by [cyber.org](#), is focused on teaching students to work with Wireshark, an open-source analyzer, and crack passwords.

The Game Design class explores digital game creation using Unity, a development platform. In this class, students first learn the basics of game design (i.e. creating characters, storyline, movement) and then create their own game.

In addition, the Computer Science Honors Society hosts events focused on exposing elementary school children to STEM and computing. Last year, they taught children to code using Micro:bits and Ozobots in the local community.

Her other club, Cybersecurity Club, participated in three competitions last year. As a result of their outstanding achievement, [they were able to qualify for Girls Go Cyberstart's national hackathon](#). This year, the club is participating in Carnegie Mellon's competition, [picoCTF](#), and Cyberstart America, and they plan to participate in more competitions later in the year.

When Putterman initially presented the idea for her clubs, she was met with approval and praise. Although the clubs took some time to get started, she was amazed by the number of opportunities that came her way once the programs kicked off. She easily found many grants and networking opportunities that allowed her to connect with schools and a limitless amount of resources, which took the form of speakers, college programs, and funding. Because of the pandemic, many classes and workshops are now available online—this is something Putterman has taken advantage of. She can now virtually engage with other teachers and learn to improve her programs; she has, for example, learned how to use VR to teach empathy in game design.

Putterman hopes to cultivate an environment in which girls feel comfortable exploring STEM, and she also hopes to teach them that they need to step up to ensure that their voices are heard. She shows her students examples of female leaders in STEM, such as Joy Buolamwini, who advocates for reduced racial bias in [facial recognition software](#). By highlighting a diverse range of leaders, she instills that STEM needs all kinds of role models from all demographics to accurately represent everyone's needs.

One of Putterman's students, Venus Agbadan, has been shaped by her actions as a teacher and a leader. Outside the classroom, Putterman has supported Agbadan with her own club promoting women in STEM. She has aided Agbadan by contributing ideas for activities and connecting her to grants. Inside the classroom, Agbadan learns how to be a confident woman in STEM through seeing Putterman, the only female STEM teacher, gain respect from her male students and co-workers. Agbadan describes her as "one of those teachers that wants to support your aspirations."

## The Inspiration

Putterman realized that connecting STEM topics with current issues would be "a really good way of stitching together concepts into something bigger." Putterman's recent teachings in cybersecurity connect to hot topics such as voting security in that cybersecurity helps to ensure reliable and untampered elections. And computer science relates to social justice in that it enables people to

organize protests and take collective action (like writing to government officials). These areas resonated with Putterman because they allow her students to impact the world around them but were not the only reasons she was inspired.

Putterman was also spurred by the need for women in STEM after realizing how women are underrepresented in many conversations around STEM. Although she has experienced moments where she felt out of place, she pushes through it, like many others before her, and continues to inspire future generations to do the same.

This past September, *Reinvented Magazine* launched the first-ever [teacher care package program](#), where they sent care packages, including a free planner, stationery set, and print copy of the magazine, among other things, to up to 200 teachers. These teachers, who had to be nominated, exemplify how to enact change in the workplace, society, and world.

Putterman is one of the many role models for teachers that inspire women in STEM. She advises, “We need to understand that computer science [and STEM] affects everyone, regardless of the field.”