



What Does a Scientist Look Like Anyway?



Dr. Ciara Sivels



Dr. Sivels' interest in pursuing a career in science was sparked in high school chemistry class when she realized the relevance to her personal interest and leveraged the unwavering support of a teacher.

Ciara Sivels is the first Black woman to hold a Ph.D. in Nuclear Engineering from the University of Michigan. She attributes her success to an intersection of efforts and supports - a positive academic identity, interest in the application of math & science, the dedication and vision of her Chemistry teacher Mr. Harold, and the motivation from her family to 'represent', even when she was the only example of Black Girl Magic in the room. According to a recent study by NSBE and SWE (2018), only 20% of all engineering bachelor's degree holders are women, and for women of color the statistics are even more dismal. Less than 4% of engineering bachelor's degrees are awarded to African American, Hispanic, and Native American women combined. We can change this!

Each year, 3M's State of Science index explores global attitudes about science. Here are just a few findings unearthed about STEM equity from this year:

87% believe we need to do more to encourage and retain girls in STEM education

70% believe there are negative consequences to society if the STEM community fails to attract more women to STEM careers

The work that Dr. Sivels currently does at the Johns Hopkins Applied Physics Laboratory, connects to the following Next Generation Science Standards and Danielson Teacher Framework competencies:

Framework	Corresponding Standards
<p>Next Generation Science Standards (NGSS) :</p> <p>Matter and Its Interactions (NGSS)</p>	<p>MS- PS-1. Develop models to describe the atomic composition of simple molecules and extended structures.</p> <p>MS-PS-4. Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed</p> <p>HS-PS1-2. Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.</p>
<p>Danielson Framework of Teaching & Learning</p>	<p>1b. Demonstrating Knowledge of Students 3c. Engaging Students in Learning 3e. Demonstrating Flexibility and Responsiveness</p>

Directions for Classroom Discussion: Prior to showing the profile video, offer students a few different ways to engage - by considering guiding questions as they listen, by simply watching or by taking out a journal or notebook to scribble down notes as they engage with the content. You may choose to play the video from start to finish or to pause the video at strategic points noted below to prompt specific discussion and reflection.

Pedagogical Approach	Classroom Activities & Directions
<p>Think, Pair & Share. <i>(pause video at 2:14)</i></p>	<p>What does it mean to ‘represent’ for your community? How might Ciara have felt being the only one that identified as Black in an academic space? Have you ever been in that situation? If so, how did you feel? If not, imagine how it would feel if you were.</p>
<p>Stop and Jot. <i>(pause video at 2:55)</i></p>	<p>What are you good at? What is it that you get a lot of joy out of doing? What might be your predictable future given your interest and skill?</p>
<p>Expert Jigsaw. <i>(post-video)</i></p>	<p>Elementary grades: Use a sorting activity or word search for students to begin to match the different disciplines of science (i.e. physics, astronomy, chemistry, botany, zoology, etc.). Students can also match disciplines of engineering with popular and local establishments by answering the question—What kind of engineer likely works here? What do they do? (i.e. aquarium, a popular bridge, chocolate factory, etc.)</p> <p>Middle/High School grades: Have students count off by numbered heads (if in person) or self-select into breakout spaces (if virtual) to research the work of 4 different types of engineers. In those breakout spaces students will become “experts” at one of 4 career paths—Chemical Engineering, Aerospace Engineering, Mechanical Engineering and Civil Engineering. Provide a template and leadership roles to support students in working together to understand:</p> <ol style="list-style-type: none"> What type of courses are required in college to graduate with that degree What industries is that type of engineer leading in What is the starting salary of that engineer in the local area BONUS: Find a profile of a female and/or minority engineer in that industry. <p>Create new mixed groups (1 from each expert group) to share out. Have them reflect on what is required of them now to be prepared to pursue a career in engineering.</p>
<p>Final reflection.</p>	<p>How did the mentorship of Mr. Harold help Ciara Sivels see a possible future beyond even her expectations for herself? Who is that person in your life? How might a career in Engineering help you to realize your biggest dreams? How did the doubts of her peers help to motivate the future Dr. Sivels?</p>