The Role of Women in Science

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STEM fields have many women to thank for their significant contributions to constant innovation in chemistry, biology, astronomy, and more despite facing many gender-based challenges in pursuing such careers. These challenges include gender-based discrimination and prejudices in the workplace, which have made it extremely difficult for women to break through. However, many women have overcome these obstacles to achieve great success for not only their field of scientific advancement, but also the women to follow in their paths. Some of these women include Katherine Johnson, Marie Curie, and Elizabeth Garrett, though there are dozens more who have advocated for womens’ abilities to pursue careers in STEM. Even now, however, there is still a large disparity between men and women in these fields, with women making up only 34% of the entire workforce (“The Stem Gap,” 2024). Women make up 80% of the healthcare industry, but most of these jobs include lower-level jobs, including nurses and home healthcare workers, with few obtaining the more prestigious and higher-paying jobs, such as doctors and hospital executives (“The Stem Gap,” 2024). These types of more prestigious jobs require a strong academic and career support system, which is unfortunately more difficult for women to obtain in scientific career areas where they have been historically marginalized. Women also receive significantly less money for the same job in a STEM field: they receive around 15,000 dollars less on average, while Latina and Black women earn 33,00 dollars less on average when compared to a man’s salary in the exact same field of science (2024).

Katherine Johnson was an exemplary scientist who broke both gender and racial barriers during the 1900s as a Black female mathematician for the company that eventually became NASA. She was the first woman and one of the first three Black people to receive admission into

graduate school at West Virginia University in 1939, compared to the 835 Black students admitted to the same graduate school program in 2022 (NASA, 2024). This was an incredible breakthrough that allowed hundreds more Black men and women the opportunity she pioneered over 80 years ago. Despite leaving school to start a family shortly after entrance, Katherine ended up quickly returning to her specialty and began working at the National Advisory Committee for Aeronautics (NACA), which later became NASA. She worked as a mathematician who ensured that complex aeronautical operations ran smoothly. She was trusted to run these calculations by hand, even working on John Glenn's mission, the Friendship 7, that was overwhelmingly successful and aided the United States in its Space Race against the USSR (2024). This mission marked the first time an American was able to orbit Earth, and it was crucial in leveling the playing field in the Space Race, as the Soviets had launched Yuri Gagarin into Earth's orbit shortly earlier (Garber, S., et al, n.d). It was crucial for the United States to maintain ground in such a race, and Katherine Johnson played an extremely important role in its success.

Marie Curie is another prime example of a revolutionary woman in STEM, who was not only the first woman to win the Nobel Prize, but also the only person to ever win multiple in two different scientific fields. She discovered two elements now found on the periodic table, radium and polonium, during the early 1900s (Shanbhag, N. M., et al, 2024). However, as a woman, it was difficult for her to find educational opportunities, as women were not allowed to enroll in higher education in Poland, her home country, at the time. She initially joined the "Flying University," which was an illegal, underground form of education that lasted until 1920, when it became the legitimate Free Polish University (Puiu, T., 2023). Determined to obtain a formal education, however, she moved all the way to Paris, where she studied at the Sorbonne in Paris

to receive her Doctorate of Science in 1903, becoming the first female professor. Her discovery of radium and its use in radiation therapy to kill cancer cells paved the way for modern cancer treatments (2024). She also pioneered X-ray treatments, even bringing them to the battlefield during World War I, where she created portable X-ray setups that were able to help identify injuries and bullet locations for over one million Allied soldiers, saving many lives (Encyclopedia Britannica, n.d). Her work revolutionized multiple aspects of the medical field for the future, including the introduction of radiation therapy and the invention of X-rays for viewing images of the inside of the body.

Elizabeth Garrett Anderson, a crucial player for women in England to be allowed to pursue careers in medicine, was the first female doctor in England. She was so passionate about becoming a doctor that she studied French by herself in order to pursue a medical degree in Paris but was not allowed entry into the British Medical Register because women were not yet allowed to become certified as doctors (BBC, n.d). She instead started her own hospital for women, employing the first American female doctor: Dr. Elizabeth Blackwell. Her activism for women in STEM also contributed to the Medical Act of 1876, which allowed women to become certified as medical professionals for the first time (Shaban, L., 2020). This act required British Medical authorities to license anyone with proper qualifications, regardless of gender. Although before this, some women would practice as unlicensed physicians, women could now officially become physicians. Unfortunately, many medical schools did not accept women, so it still was difficult for them to become licensed physicians, but it was a step in the right direction for women in STEM careers.

These three women, along with so many others, have redefined women's experiences in STEM fields, opening up the courage and hearts of many women by providing them with the

opportunity to advocate for themselves and their desired careers. Still to this day, there are many biases prevalent in STEM fields, including the beliefs that women are less competent than men or that they aren't able to commit to an intense job while managing a family or household duties. Regardless, women have made many advancements not only in their respective fields of study, but also in growing the number of women who work in STEM careers.

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