

In the sciences, a gender-inclusive approach will benefit us all

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Every 11th of February, we mark the International Day of Women and Girls in Science, a day set aside by the United Nations in recognition of the need to promote active female access and participation in the field of science. As we celebrate the day, we need to reflect on how far we have come, but more importantly, how we can get even further.

According to a 2017 report from the United Nations Education Scientific and Cultural Organisation (UNESCO), Ghanaian girls are discouraged from participating in Science and other related fields such as Technology, Engineering and Mathematics by a number of factors. First, longstanding biases occasioned by gender-specific norms, socio-cultural beliefs and stereotyping have prevented women and girls from accessing and participating in science related fields as they climb the academic ladder. Second, limited public awareness about the importance of these programmes and gender insensitive teaching approaches also discourage girls from entering STEM programmes. It is important to note that, historically, women were routinely shut out of many mainstream activities, including the right to formal education. This created a self-perpetuating myth about the supposed abilities of women, which in turn led to further discrimination and exclusion.

The effects of this gender disparity go beyond inequality. They impact our country's ability to succeed in the evolving world. The Fourth Industrial Revolution is shifting our world, and in order to be a part of the innovations being developed, we need both female and male Ghanaians pursuing science related careers. Through collective efforts and diverse perspectives, both genders can drive innovation, inclusive growth and sustainable development. If we continue to shut out the greater proportion of our populations from contributing to such a significant endeavour, we deprive ourselves of talents and potentially world-changing innovations. The exploits of women such as Marie Curie, the only person to win two Nobel Prizes in two separate sciences, and the African-American women (Katherine Johnson, Mary Jackson, and Dorothy Vaughan) who designed NASA's mission to launch people into space for the first time at a time when the field was even more male-dominated should tell us what women can do when they are given the opportunity. In Ghana, we can speak of the achievements of the renowned Biochemist, the late Professor Ewurama Addy, the first host of the National Science and Maths Quiz and also the first Ghanaian woman to attain the rank of full professor in the Natural Sciences. The next generation of women and girls must experience none of the barriers that have held their forbearers back.

There is a lot we must do to bring women and girls to enable women and girls reach their full potential in the sciences. For instance, in a 2017 study, UNESCO¹ found that in the Jasikan District, for example, only 29 out of 855 girls in senior high school were pursuing elective science programmes (i.e., *physics, chemistry, biology*). The situation is not different

¹ United Nations Educational, Scientific and Cultural Organization (UNESCO) (2017). *STEM clinics to boost girls' participation in STEM education in Ghana*. Available at <https://www.un.org/africarenewal/news/stem-clinics-boost-girls%E2%80%99-participation-stem-education-ghana>

at the tertiary level. A study conducted by the University of Education, Winneba on the access provided by the university for female undergraduate students to study mathematics education from 2009 to 2018 indicated that the annual average qualified female applications was only 9% of the total applicants. Out of these, the mathematics department where I previously taught provided access for nearly all.

According to the UNESCO (2017)² world report on girls' and women's education in STEM, female students represent only 35% of all students enrolled in STEM-related fields of study at the tertiary education level globally. But, unfortunately, none of our public tertiary institutions has attained this target or global-level achievement. A 2018 report by the National Council for Tertiary Education (NCTE), for instance, showed that out of 69,214 students who enrolled in science related programmes (i.e Engineering, Medicine, Applied Science, Information technology, among others) in the 2017/2018 academic year, 70% were males and 30% were females. A disaggregated data shows, however, that the privately owned Ashesi University, does have approximately 50/50 gender ratio across its departments, including Engineering.

Even though women contribute a greater share of the population globally, they occupy only about 26 percent of STEM jobs, as reported in 2019 by *Women in STEM*. In Ghana, evidence from the Ministry of Environment, Science, Technology and Innovation in 2018 showed that, out of a total of 5,573 researchers in public research institutions, only 1452 representing 26.1% were females. Again, of 233 scientists in nuclear science who were counted in 2018, only 23.2% were women. Further, the Global Education Monitoring Team in 2018 also noted that women in Ghana account for less than a quarter of all Science, Technology, Engineering, and Mathematics degrees.

Data from the World Bank on gender parity index for Ghana shows that access to education continues to favour boys and men, although it improved from 0.62 in 2011 to 0.77 in 2018 at secondary level. The introduction of Free SHS has brought further improvements and the ratio for 2019/2020 to 0.95, which could potentially impact the proportion of female access and participation in science education at the secondary and tertiary levels.

The education of females in science, technology, engineering, and mathematics is imperative from three perspectives based on empirical studies on gender and STEM. The first perspective is that of human rights — the need for all to be educated and be given equal opportunities. The second perspective is scientific — women boost scientific outcomes in terms of diversity, creativity, bias reduction, and promotion of robust knowledge and solutions. The third perspective is developmental — that is, the ability of men and women to acquire knowledge in and benefit from STEM opportunities. In fact, STEM fields have been shown by research to be prerequisites to societal and individual advancement.

We cannot risk a future in which women remain underrepresented in professional and academic endeavours, least of all the sciences. We have to take urgent and proactive steps to ensure that more women take up the challenge of studying and working in science-

² United Nations Educational, Scientific and Cultural Organization (2017). *Cracking the code: Girls' and women's education in science, technology, engineering and mathematics (STEM)*. Paris, France: UNESCO.

related fields. We need now to embark on deliberate, specific and targeted interventions to make science and related areas of study attractive and accessible to women and girls.

First, we need to tackle the inequity in STEM education in relation to gender stereotypes, deprivation, rurality, and disability in STEM education and careers, particularly in districts that are under-served by STEM learning and other science engagement activities.

We also need to highlight the roles of women in science and related fields. Around the country, we have many sterling women who are playing exceptional roles in the sciences, including in the ongoing global battle against Covid-19. We need to show young women and girls that they are just as able as their male counterparts. We must commend the producers of the National Maths and Science Quiz who have brought to the fore strong performances by young girls from schools all over the country. The show has also, in consistently choosing female hosts, shown the ability of women to lead and excel in the field. This is important because research has shown that on-screen roles by women directly affect the career choices made by young people.

We have to expose our daughters to STEM and related career options as early as possible. We can do this through our natural interactions as parents, guardians and teachers. But we must also create special programmes to address this. We can go back to the Girls in Science programmes. We can create new programmes with similar missions. We can set up STEM centres with a focus on women and girls. The important thing is to allow girls a chance to learn about science, interact with mentors and where possible, acquire basic skills in the field. This is what we did in Kwesimintsim when we organized a "Women in ICT" programme to equip young women with basic ICT skills. Women and girls have every potential they need to succeed in science, they simply need our support to start the journey.

We will also need to support girls in STEM with learning opportunities. This will mean collaborating with businesses to institute internship and placement opportunities targeted towards girls and women. It will mean designing a mentorship programme that links these young women with female leaders in the sciences. Through this, they can receive support, encouragement and invaluable career advice. All of us know the importance of having someone in your field you can talk to when you have doubts, or place a phone call on your behalf when you need a door opened.

We also need to identify and support STEM agencies in the country to expand their scope to work more closely with tertiary institutions to expand female access. We have to work with schools and communities in districts that are under-served by STEM learning to provide senior high school females with orientation to STEM education and careers. The agencies may include GES-STEM unit, NaCCA and NGOs such as Practical Education Network, which is training science teachers to use local materials for hands-on activities in their classrooms, with an observable increase in female JHS students' interest in science arising out of this practical work.

The urgency of this task is not in doubt. Ghana cannot be left out of the science-based revolution that is sweeping the world. We cannot do this with one hand tied behind our

backs, as it were. But that is exactly what we will be doing if we do not get more women involved in the sciences. That is why this day is especially important. The opportunity it affords us to reflect, revise and retool must not be missed. A generation from now, our girls could be at the forefront of global innovation. It is possible if we begin now. Let us not let them down; let us give them a chance to be great. Let us work to give this day, the International Day of Women and Girls in Science, its fullest meaning.

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