Women in Science

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Abstract

The progress of women in science has been much slower and uncertain than the achievement of equal rights between the sexes. Women are on their way to becoming the majority among students, but still in the minority in the scientific area, according to UNESCO only 30% of scientists are female, and this number is even lower in leadership positions in science; in Latin America only 18% of deans are women. The reasons are numerous, from cultural issues, family responsibilities, substantial degree of discrimination against women - more than enough to suppress the progress of women in many professions, and others. Diversity is important and necessary in the academic field, as it provides a substantially wider point of view, with more sensitivity and respect for different perspectives. Policies to encourage the participation of women in leadership positions are necessary, because when more women occupy strategic and decision-making positions, the greater will be the representation in the area. As well as increasing diversity in scientific recruitment committees and strategies to help with the professor's family commitments, such as payment for day care centers and maternity leave for the fellows, are also actions that help to avoid the evasion of these women from the scientific environment.

Gender equality is a millennial concern, as evidenced in the Sustainable Development Goals (SDG 5), which foresees the achievement of gender equality and the empowerment of all women and girls by 2030 (UNDP, 2015). Unfortunately gender inequality, present in all social classes and economic sectors also occurs in the scientific environment, where it is observed that the majority of scientific leadership positions are held by men, studies show an underrepresentation of women in several scientific fields, the UNESCO report of 2020 reported that the participation of women in science as researchers in the world ranges between 8 and 63%, with an average value of 30%, the report also reveals the conflict faced by women who are left between academic career ambitions (pursuit of doctoral studies) and family responsibilities (UNESCO, 2020).

Today, even with all current efforts by women to integrate into the scientific community, they remain insufficient, as female underrepresentation is still a defining characteristic of modern professional contexts (Abuwatfa et al. 2021). Despite studies showing that women in the US and the European Union (EU) tend to be better represented in the humanities, biological and social sciences and less well represented in engineering, mathematics and physics (Alexander et al., 2016), in the medical field, evidence indicates that women represent a minority (range 9.3 to 29.4%) in scientific article authorship positions, as well as a limited presence on clinical trial directing/executive committees published in leading medical journals (10%). (Martinez-Rosales et al. 2021).

The shortage is even more prominent of women in engineering, mathematics, and physics - STEM fields, even IQ tests showing no average difference between men and women (Blickenstaff 2005; Hyde 1996). Discrimination, including gender, race and class, sociocultural factors, institutional patterns of bias, as well as underrepresented cultural norms that underlie social principles; result in a minority of women in STEM (on average 25%) not advancing to senior positions, where only 5% hold leadership positions (Gupta 2020).

In the European Union, women nominated to higher positions in the academy represented about 24%, in Latin America, only 18% of public universities have a woman as dean. In Brazil, the ministry of science and technology, created in the 1980s, has never been occupied by a woman. This low representation of women in science, also reflects in publications, salaries, senior rankings, annual productivity and consequently allocation of resources (Huang. et al.). In the UK in 2019, it was reported that women in academia earned about 15%, on average less than men (Abuwatfa et al. 2021).

Studies point to numerous reasons for this gender inequality in science around the world, although the underrepresentation of women varies by region and within regions by nation, as well as by field of knowledge, age, culture, etc. (Avolio et al. 2020). The reasons given are numerous, ranging from cultural issues, family responsibilities (double shift between work and family), substantial degree of discrimination against women - more than enough to barrier women's advancement in many professions. When such factors add up, they can perpetuate a hostile environment for women, leading to their exclusion from the scientific community (Saunders, 2020).

The under-representation of women in science has been highlighted due to the situation of COVID-19. A recent survey has shown that due to pandemic countermeasures, a disproportionate decline in the time devoted to research by women has been noticed. Researchers concluded that women's productivity decreased due to the burden of childcare, daycare closures, and increased housework due to work at home (Deryugina et al. 2021).

From the perspective of the Organization for Economic Cooperation and Development - OECD, women's participation in science and research is not only a gender issue, but also an economic issue: "Leaving women behind means not only overlooking the important contributions women bring to the economy, but also wasting years of investment in girls' and young women's education" (OECD, 2014).

Studies on the philosophy of science from a feminist perspective have noted that the historical exclusion of women from academic spaces has caused sexist and androcentric preconceptions in science (Guadalupe et. al. 2022). In a culture where women's abilities are not respected, women cannot effectively learn, progress, lead, or participate in society in a satisfactory way (Barres 2006). We all know theories and discoveries of Darwin, Lamark, and Lavoisier, but few know about discoveries of women scientists. If Mary Anning were taken seriously in the 19th century, we would know well in advance that dinosaurs were extinct, if Nettie Stevens were listened to we would also know in advance that what defines the sex in embryos are the X and Y chromosomes and not the diet of the woman during pregnancy, as the scientists of that time believed. And who knows how many other discoveries have been lost over time, because they were not accepted and published simply because they were made by women.

Diversity is important and necessary for advancement in any sector, especially in the academic area, because diversity provides a substantially broader point of view, with more sensitivity and respect for different perspectives, which is invaluable for any organization. The academy is the place where knowledge is produced to positively intervene in society, without diversity among scientists, these goals are compromised. According to UNESCO director Francesc Pedró (IESALC): "...It is necessary to train young people in institutions where gender equality is promoted and celebrated, universities have to be the example to follow" (UNESCO, 2020). The progress of science increasingly depends on the global community, only 10% of the world population is male and Caucasian (Barres 2006).

There are several actions that can be taken to increase gender equality in the scientific world, starting at the base of education. Culture and family tradition often prevent, even in childhood, girls from being encouraged to follow a scientific career (Avoilo et al 2020), in this sense, basic education schools have the power to overcome this paradigm, showing the different possibilities of professions in all areas, including bringing examples of successful women scientists. Government initiatives to stimulate girls still in high school to follow a scientific career are also welcome. In Brazil, the National Research Council - CNPq has launched calls for universities to develop actions with high schools to implement projects that encourage women to pursue a career in science in the STEM field (CNPq 2018).

Actions to increase the diversity of leadership in academic and scientific institutions are important to reduce the hostile work environment that young scientists often encounter. Women should also be encouraged to occupy positions of scientific leadership through policies to support female participation, as the competence exists, while more women occupy strategic and decision-making positions, the greater the representation in the area, increasing the debate and the fight for equal opportunities (Howe-Walsh and Turnbull, 2014).

Ben Barres points out that diversity should also occur in the scientists' recruitment committees, as well as policies that involve hiring strategies to recruit the best scientists, based on meritocracy, as well as on quality and not only on the quantity of published articles. Strategies to help with the family commitments of the professors, such as payment for day care centers, maternity leave for fellows, are also actions that help to avoid the evasion of these women from the scientific environment. Just as there should be less silence in facing discrimination, although the academic leadership has a particular responsibility to speak out, but everyone shares this responsibility, the responsible authorities should be informed about acts of discrimination in any work environment (Barres, 2006).

The presence of women in science brings bilateral benefits, both for their education - because the career of scientist is noble and fundamental for progress, through science we can improve and transform the world, all the innovations that make our lives easier and longer today came from great scientific discoveries. As well as for science itself, which can only gain from female participation, because studies have shown that women have more advanced verbal and motor coordination skills than men, as well as care for details, keen

perception, sensitivity, and whimsy (Sarseke, 2018), fundamental qualities to achieve good results in research.

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