

Women and science: why is this an issue more than ever?

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1. Introduction

During the last years, many women and men have been trying to understand the reason why still nowadays women face special gender-related barriers to entry and success in scientific careers and if their exclusion in this area has affected the way we currently do science.

Women are under-represented in science, technology, engineering and mathematics (STEM) majors and careers in most industrialized countries around the world because scientific institutions have not been immune to the prejudices of our societies. The **persistence of certain myths** fed several misconceptions that in the end led to inequality in the STEM-related fields.



Several organizations - created with the aim of **encouraging feminist analysis and research** in the field of the history of science - have been actively involved in several projects and campaigns in order to fight against this problematic situation.

HeForShe
UN Women Solidarity Movement
for Gender Equality

Figure 1. Logo from one of the newest campaigns from the United Nations Women.

Objectives

Why are there so few women scientists?
Which barriers, subtle exclusions and unwritten rules have conditioned female scientists through history?
Which are the best ways to promote and increase diversity in science?

2. Why are there so few women scientists?

Despite the fact that the rate of women entering scientific professions has improved significantly, there is a continuing disproportionate lack of women in most scientific and engineering disciplines.

The reality is that women face multiple forms of discrimination in several levels and all the persisting differences between women's and men's experiences in science make this question as relevant today as it has been in the past years.

2.1 The leaky pipeline metaphor

Science as a **pipeline** made of distinct segments corresponding to different educational stages:

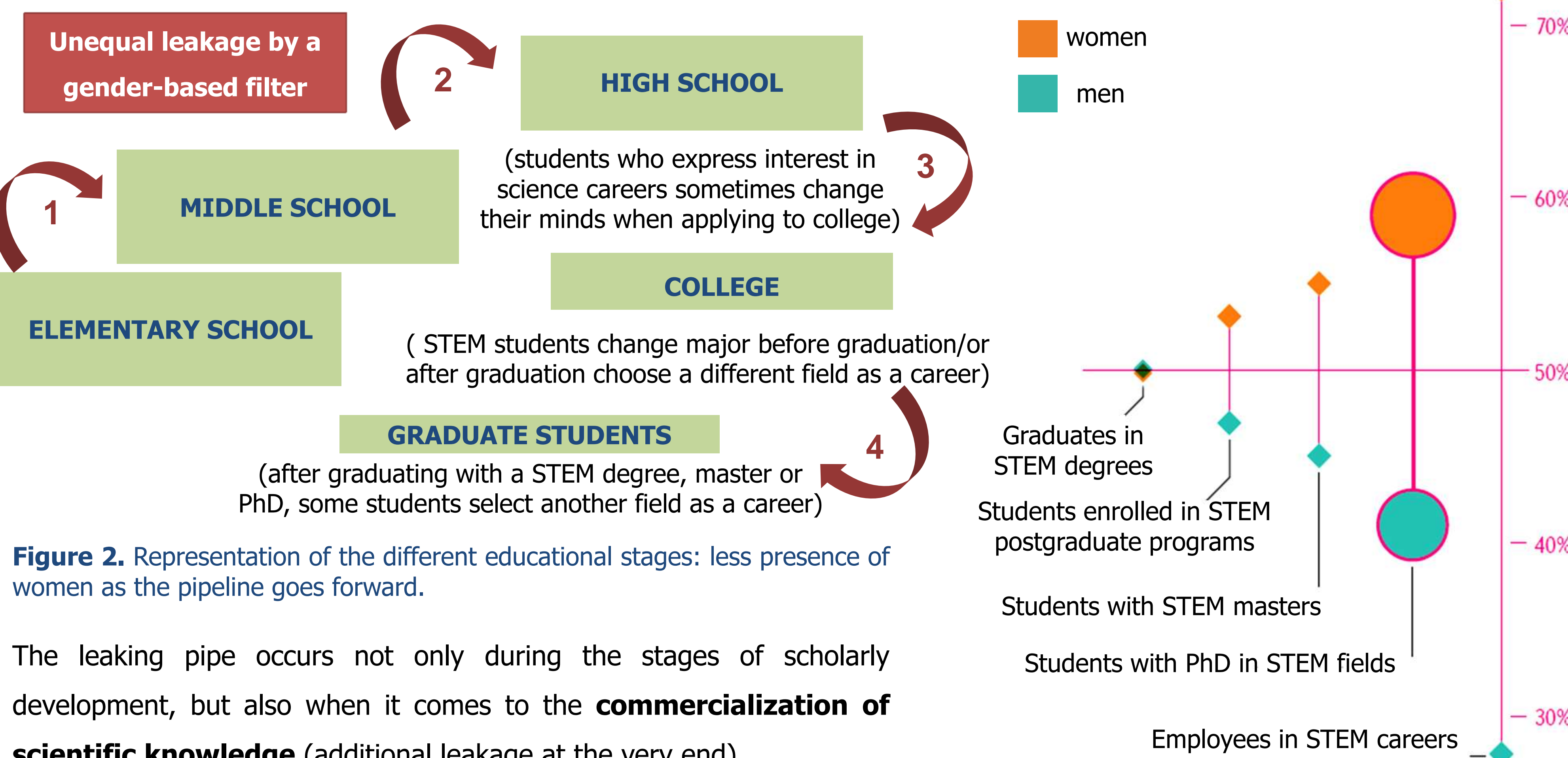


Figure 2. Representation of the different educational stages: less presence of women as the pipeline goes forward.

Figure 3. The leaky pipeline metaphor is represented in the graphic above. The proportion of women with PhD in comparison with men shows a huge disequilibrium, but when it comes to bachelor level, the graphic shows very close numbers of graduates. (1)

The leaking pipe occurs not only during the stages of scholarly development, but also when it comes to the **commercialization of scientific knowledge** (additional leakage at the very end).

The expectation that the problem of participation could be solve by simply encouraging girls to study science doesn't work and it is known as the **fallacy of supply side thesis**.

2.2 The priority of marriage

Dilemma of the contemporary female scientists: combine a demanding personal and professional life, without its effects on either

Women in high job positions are either those who are unmarried or those who are married but have no children



Figure 4. Representation of the imbalance between professional and personal life

• Marriage, parenthood and meaningful work are **all major experiences** in the adventure of life
• Their partners require to carry some of the **parental responsibilities** their wife has carried from them through the past history

the incorporation of women to top professions
↓
appearance of a new model of family

2.3 Early influences: family, school and others

→ different child influences between men and women in the values that underlie their future career choices.

→ to develop the analytic and mathematical abilities that science requires:

→ Independence
→ Self-reliance

Parents and teachers' encouragement is essential for:

- ☐ girls to appreciate their own potential
- ☐ understanding what a job in STEM field is about, its projection and relevance
- ☐ see the different opportunities that STEM careers offer

♪ Stimulate and reward girl's efforts to satisfy their curiosity about the world

♪ Encourage girls to refuse conformity

♪ Alert intelligence that ask why and rejects the easy answers

2.4 Effects of interruption of career

Difficulty to keep up after a long break due to parenthood

The quality of the intellectual output is strongly related to age

coincides with the time when women have to decide between having children or not

The peak of creative work is reached in the late 20s and 30s

Period of time when scientists are supposed to be publishing the most

Figure 5. Representation of how becoming a mother affects a scientist's career.

This whole situation seems to be a challenge for those women who want to pursue a scientific career during their whole lives and be mothers as well.

3. Barriers, subtle exclusions and unwritten rules conditioning female scientists

Despite the fact that the sensitivity to the social handicaps of race and class has increased during the last years, our society has remained unreservedly insensitive to those social handicaps imposed because of sex.

Rather than actual barriers to entry or a wall that prevents on recognition of achievement, difficulties exist at all phases of the STEM career lines.

Some of those barriers that make women less likely to engage in science careers and research are the following:

Lack of inclusion in networks	Organization
<ul style="list-style-type: none"> • Social capital • Science is an activity that demands community • Paradox: women pursue the myth that scientific individualism and isolation spurs scientific breakthrough 	<ul style="list-style-type: none"> • Constraints on women arise from the way that society tracks and awards women and men differently
Perpetuation of prejudices and fallacies	Economical and structural barriers
<ul style="list-style-type: none"> χ It is not necessary to think about what makes us different. χ Everybody experiences the scholar/work environment in the same way. χ Individually, it is not possible to change problems because they have been created by other people or they are too systematic 	<ul style="list-style-type: none"> • Economy affects conditions of entry/retention of women in science. • Barriers to entry in industry and academia fall most easily under conditions of expansion • Under conditions of recession, the competition increase and "informal discriminatory practices and attitudes" take hold with renewed strength.

Figure 6. This figure show 4 tables of the most important barriers that women face in STEM field.

Female scientists sometimes respond to the structures against them by adopting a research strategy that emphasizes the careful construction of extensive data bases in a special field rather than rapid shift from one hot topic to the next, longer but less frequent articles and a reluctance to test hypotheses for fear of being shot down.

4. The best ways to increase diversity in science

It is important to have in mind that there is no magical recipe or method to promote diversity that will ensure that one specific group of people will be represented in a more proportionate level. In order to create a more inclusive environment, some strategies work better than others.

There are two ways out of this dilemma:

- Try to 'reform' women to socialize them to become more assertive, more willing to enjoy the public limelight i.e. emphasize the 'ideal male personality' **X**
- Alter the patriarchal structures of STEM field itself, asserting that there are many positive values within the traditional feminine sphere

1. Reinforce the educational system at all levels

Prepare boys and girls for all their major adult roles as parents, workers and creatures of leisure
Future family roles of boys
Future occupational roles of girls

2. Be aware of the differences between the specific groups

Better results/progress in an environment that strives for supporting them or where they can feel confident being different

3. The sense of belonging to the group

Greatly influence on student involvement in class and their performance

4. Entrust specific individuals responsible for meeting the targets of promoting diversity

Role of the tutor
Break the traditional way of learning from authority

Figure 7. Tasks ahead in order to achieve the goal of having more women scientists.

5. Conclusion

The **impact of gender inequality** and how it affects not only women, but also men, are issues that haven't been addressed because this has been predominantly a women's movement. As gender inequality is developed in early childhood, majority of the society has been ingrained for this to be the social norm, but we need to fight it back **having an open-mind** and **not having gender-related expectations**.

Though the numbers have improved over the last years, there is still a long way to go before women are equally represented. There is a need to further gender mainstream interventions and **promote women integration without disseminating gender stereotypes**.

To conclude, the dilemma of women and science is both a problem of women in science and one of science without women. The ultimate resolution of this controversy will involve huge changes in the way both the organization and development of knowledge are seen. Although, the unlimited changes open to us may at times seem overwhelming, it is a chance to do a whole worth-watching transformation.

Bibliography

- (1) Christiansen J. & Hobbs A. *Diferencias por razón de sexo: mujeres y hombres con estudios de doctorado en el mundo*. Investigación y Ciencia. 2014: 459-28-29.
- (2) Clark Blickenstaff*J. *Women and science careers: leaky pipeline or gender filter?* Gend Educ. 2005;17(4):369- 86
- (3) Etzkowitz, H., Kemelgor, C. and Uzzi, B. *The advancement of women in science and technology*. Cambridge University Press. 2000;1-48