EGM/ST/2010/BP.2
September 2010
ENGLISH ONLY

United Nations Division for the Advancement of Women (DAW, part of UN Women)
United Nations Educational, Scientific and Cultural Organization (UNESCO)

Expert group meeting
Gender, science and technology

Paris, France
28 September - 1 October 2010

Women's and Girls' Access to and Participation in Science and Technology

Background paper prepared by:

United Nations Educational, Scientific and Cultural Organization (UNESCO)

Overview: Gendering the Science and Technology Agenda

> 'We live in a society exquisitely dependent on science and technology, in which hardly anyone knows anything about science and technology.'
> *Carl Sagan, Scientist and Astronomer (1934-199*6)

Carl Sagan alludes to the vital place held by science and technology (S&T) in our societies and their potential for improving our daily lives. He also pinpoints the crucial caveat that can artificially foreclose their beneficial promise; access to these benefits lies with those who are endowed with knowledge of them.

These benefits play out on many levels. Scientific and technological resources and infrastructures are essential if states are to address their economic, cultural and social needs. In an increasingly competitive global economy, national economies cannot do without access to scientific knowledge and a capable workforce that provides the ability to exploit it.[i]

Providing individuals with access to information about science and technology is a matter of human rights, as well as human capital. Citizens can improve their own lives, as they contribute to national development, but, more than this, a basic level of scientific literacy appears essential for individuals to function in a scientific and technological culture. In different ways, scientific and technological literacy constitute a cornerstone of our participatory democracies. Such knowledge empowers citizens to make informed decisions relating to the many implications that these advances have in national life, including the

ethical dilemmas, which arise as we deploy new knowledge. In a practical sense too, as ICTs are used as tools for social transformation, providing government services electronically to citizens and disseminating vital information about health, access to technology can quite literally mean the enjoyment of full citizenship.

The *potential* of these advances should not be confused with their actual impact on our lives, an impact which is differentiated along a number of lines, one of these being gender.[ii] Gender equality is essential, therefore, to ensure that women and men participate in and benefit from these advances equally as citizens and as contributors to the societies they live in.

Taking the gendered engagement with S&T into account makes it appear all the more urgent to boost the scientific literacy of women and girls, both to address individual inequalities and to benefit society as a whole. Due to the dominant gendered division of labour, much of the daily work done by women involves scientific and technological knowledge that is implied, if infrequently recognized. For instance, women carry out 60-90 % of agricultural production activities in the developing world; women are mostly responsible for the provision of energy for cooking; women often cater for community water and sanitation needs and family healthcare. [iii] Consequently, empowering women to use technologies can benefit social and economic development as a whole.

If women are empowered to operate in the domains of science and technology, they must not be restricted to being passive, if informed, users. On the one hand, women have been missing out as S&T products and innovations have been predominantly male-orientated.

Until now, technological change, especially when it is designed to improve the quality of life, has been more directed to the tasks that men perform, than to those performed by women, both in and outside the home. Strikingly, research has found that:

> "after decades of S&T interventions in development, women's overall position actually declined relative to men's, and women have become disproportionately poor in comparison with men in their communities". (Gender Working Group, cited in UNESCO, 2007).

Knowing that a majority of the world's 1 billion people living in poverty are women and children, it seems that exclusion from S&T and its potential benefits helps to perpetuate the vicious cycle in which these women are trapped. On the other hand, state and communities have been impoverished as fewer women scientists equates to fewer intellectual resources to help boost economic and agricultural productivity and reduce poverty.[iv] Women must also be equally represented at the peak of the pyramid, where the gender disparities that exist are often the most striking.

The case for the urgent need to erase the lines of discrimination that impede inclusivity in this important domain only appears stronger when we consider the broad range of development issues in which S&T play a fundamental role. A wide range of development goals, from HIV & AIDS, to climate change, cannot be advanced upon without taking S&T – and discrimination in access to S&T – into account. In the 1990s two key international conferences played a crucial role in making these links explicit. During this decade, the Fourth World Conference on Women in Beijing (1995) and the UN Conference on the Environment and Development in Rio (1992) advanced the global agenda by underlining the invaluable role of women in sustainable development and preserving the environment, and

the need to promote their education and integration into decision-making processes in these domains. The importance of gender issues in Science and Technology has been increasingly given recognition in the outputs of the UNCSTD's Gender Working Group (GWG), the World Conference on Science in 1999, Beijing +5, the World Summit on Information Society (WSIS), as well as initiatives by the European Union (EU) and the (Organization of American States (OAS).

Consequently, the topic of women's and girls' access to and participation in Science and Technology forms a bridge between these two core areas of concern, which have long since held a place independently at the heart of the international development agenda.

UNESCO, Science, Technology and Gender

UNESCO's 2009 Forum on "Gender and Climate" serves as an example of the beneficial powers of combining scientific advances and a gendered approach. An increased recognition of the gendered impacts of climate change is essential if its impact is to be mitigated; the engagement of women in this global battle fought at local level appears all the more urgent in this light.

This initiative demonstrates UNESCO's increasingly holistic approach to tackling issues that frequently involve cooperation between many of the organization's sectors. UNESCO has long been working on the parallel issues of gender equality and science and technology; gender equality is one of UNESCO's current global priorities, alongside Africa, is being mainstreamed throughout the organization's work. The need to promote access to education for girls to science, mathematics and engineering was highlighted as early as 1984, when the organization launched programmes dedicated to promoting girls' education in these disciplines. These efforts have gained further momentum since the 1990s. In 1998-99, UNESCO organized six regional forums on Women, Science and Technology and the World Conference on Science (Budapest, Hungary, 1999), which resulted in the creation of five UNESSCO chairs on this theme. UNESCO has launched numerous projects which bridge the gender-science-technology nexus and address key issues in this area, focusing on subjects from the use of water resources, climate-change and the need to counteract negative gender stereotypes of women in science in the media and in the classroom. Included below are some specific examples of UNESCO's work linking gender, science and technology.

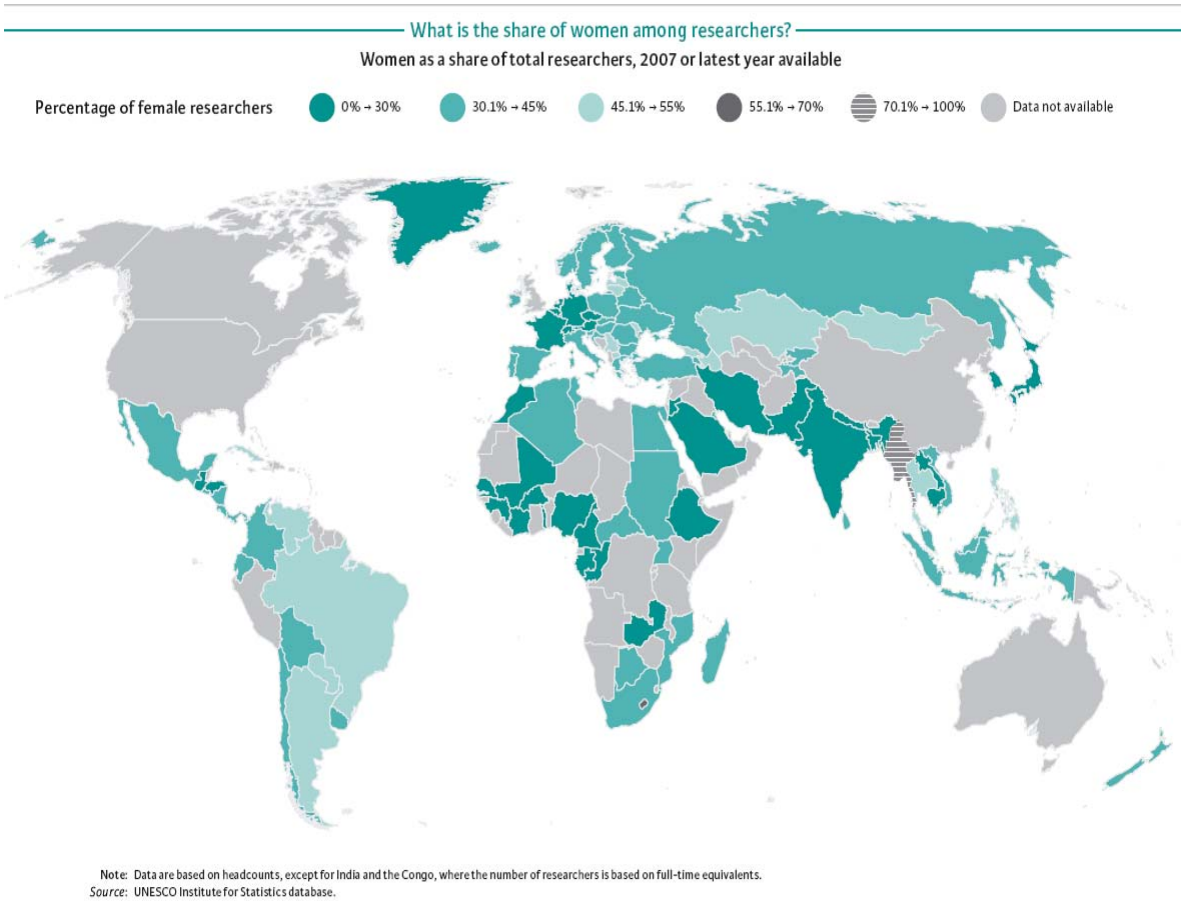
Women in Science and Technology: A Statistical Portrait

The difficulty in retaining women and girls through all the steps necessary for a career in S&T has been likened to a leaky pipe. Although not all pipes leak in exactly the same way across the world, a selection of the latest statistics provides a sense of this general trend; tracing girls through different stages of education and their careers reveals consistent gender disparities at most stages of S&T education in most regions of the world and, in particular, the difficulty of crossing the hurdle between higher education and professional life.

Women in Research

The quality, availability and nature of statistical data, an area UNESCO is advocating to improve, constitutes a challenge in assessing the current situation regarding women in science and technology. In the present case, for instance, UNESCO defines 'researcher' as 'professionals engaged in the conception or creation of new knowledge, products, processes, methods and systems.'[v] Although the scope of this term encompasses a broader range of disciplines than science and technology, it can still provide insight into the progression of women into these careers.

Given the constraints of available data, based on a sample of 89 countries, the UNESCO Institute for Statistics (UIS) estimated that slightly more than one-quarter (29%) of the world's researchers are women.[vi] This global statistic conceals strong regional disparities. Women constitute 46% of researchers in Latin America and the Caribbean, compared with only 15% in Asia. Equally, all Central Asian countries with data reported gender parity, whereas in Europe only 32% of researchers are women.[vii] These regional variations hint at the socio-cultural underpinnings of inequalities in these sectors.



"The 2010 Global Education Digest: Comparing Education Statistics Across the World", UNESCO Institute of Statistics

Primary and Secondary Education

Estimating how this picture may evolve in the future implies travelling further downstream along these career paths to the essential foundations of basic literacy and primary education.

In the years since the Beijing Platform for Action was launched, a globally positive, if slow, trend has been observed towards increased primary school enrolment and an increase in the

gender parity index. Once again, however, these trends conceal complex regional and national disparities, which are frequently amplified, as gender inequalities at primary level are often strengthened at secondary school level.[viii] Overall, in spite of the goals set at the World Education Forum and the Millennium Summit, overwhelming gender inequalities continue to haunt education; the latest statistics reveal that 60% of countries have not reached gender parity in primary and secondary education.[ix] It is undisputed that in most regions of the world, women are more likely than men to be uneducated or undereducated, especially in regard to science and technology[x], and statistics show the persistently low participation of girls in these areas through all levels of schooling.

Tertiary Education

Predicting whether the female researchers of tomorrow will outnumber their present-day counterparts crucially involves looking to today's young women graduates of sciences disciplines. Two key observations are of note regarding female tertiary level students of sciences and technology. First, there is evidence of horizontal, gender segregation by sub-discipline *within* the Sciences. Second, it appears to be a breaking point at Master's level after which a number of successful female graduates disappear and fail to reach PhD level and research posts.

Although, the overall number of women enrolled in tertiary institutions has been growing rapidly – over twice as fast as that of men – since the 1970s,[xi] this does not translate to uniformity and parity across all academic disciplines. The ROSE (Relevance of Science Education) Project's finding that there are clear differences between girls' and boys' interest in science education in developing and developed countries appears to hold true. Although one-third of countries reported gender parity at Bachelor's degree level or equivalent, this figure plummeted when focusing specifically on science and engineering disciplines. In these, men outnumbered women in 91% of the countries with data. Strong variations persist between sub-disciplines; engineering and computing remain almost exclusively male preserves, whereas life sciences, including medicine, are dominated by women in nearly three-quarters of countries. [xii] To provide but one example of this variation, recent statistics from the UK show a decline in female students studying engineering (now fewer than one in seven), in contrast with the female domination of medicine and dentistry courses (58% of students are women).[xiii] It appears that, in many if not all cultural contexts, S&T, with the notable exception of the life sciences, are statistically masculine disciplines, which fail to attract or retain capable and competent female students.

Whilst women appear to be catching up at Bachelor's level and outnumbering men at Master's level,[xiv] the situation abruptly reverses at doctoral level and beyond. Gender inequalities return in force, as men account for 56% of those graduating from Ph.D. programmes (ISCED 6), and 71% of all researchers.[xv] As a result, UNESCO's latest Global Education Digest concluded that 'women face considerable barriers as they move up the educational ladder to research careers.'[xvi]

Breaking Barriers

Various recurrent themes appear in literature that strives to explore why the pipe continues to leak, in particular as qualified women fail to enter the job market or to attain positions of responsibility in S&T careers.

The canvas against which these debates play out is the familiar backdrop of gender inequality that often combines with other factors of discrimination leaving women at a disadvantage in terms of accessing basic education and literacy, the foundations for all future learning. These multiple factors include: child labour, early marriage, teenage pregnancy, HIV & AIDS, geographic location, armed conflict, gender-based violence in and around schools, ethnicity, multilingualism and cultural barriers. The first leak in the pipe can, therefore, be related to the manifold factors that lead to gender discrimination in poverty, basic literacy and other fundamental areas touching on women's basic human rights.

These issues, whilst providing the broader discriminatory context, do not suffice to explain the gender inequality suffered by women in the highly specific domains of science and technology. More subtle equity issues must also be addressed that lead to specific groups' having unequal access to science and technology education and careers must also be explored. An integral part of the current programme of work, the Expert Group Meeting is held in this spirit of collaborating in order to improve our understanding of the factors that may encourage or prevent women from entering careers in science and technology.

Shaped by individual histories, everyday realities and material conditions, educational and career choices can be seen as a combination of macro- (international and national), meso- (institutional) and micro- (personal and family) level forces, which affect which disciplines are seen as 'suitable' for men and women and which career path is eventually chosen and pursued.[xvii] An exploration of the barriers to women's inclusivity in science and technology must take place on all these levels and shed light on the structural, gendered inequalities inherent in the world of science and technology itself. In the context of this paper, it is worth citing the most frequently evoked barriers to women's equal access to science and technology.

Negative stereotypes of women in science and technology

Gendered understandings of male and female roles in society, and the extent to which these are compatible with women holding a science career, form a common thread running through all the barriers explored below.

Although the above statistics hinted towards socio-cultural diversity in the experience of and attitudes towards women in science and technology, a dominant view prevails linking the lower participation of girls and women with societal and cultural assumptions concerning women in science-related professions. Projecting an image that the current statistical male-domination of these disciplines is normal and natural socializes girls in a way that does not encourage them to make educational and career choices in this direction. As career choices are shaped by personal, familial and social expectations, it cannot be a coincidence that studies have found that women scientists more frequently have fathers or mothers who are scientists, compared with male scientists.[xviii]

The mass media and, more specifically, the way science and technology issues and events are reported, perpetuate the social construction of science and technology as the preserve of boys and men. In turn, an absence of women in decision-making positions within the media sector, including on governing boards and bodies (both in the government and private sector)[xix] that influence media policy, contributes to perpetuating this vicious circle of negative gender stereotypes. To remedy such negative media representations of women and girls, UNESCO is about to undertake a survey of "science and technology media reporting in Africa" which will

further unravel the gender dynamics involved in such reporting. A related activity concerns the development of gender-sensitive indicators for media.

These negative images are compounded by an absence of positive role models, whether in the science classroom or renowned science researchers, who could otherwise help to create a virtuous circle, whereby girls will be encouraged to follow in the footsteps of successful women scientists.

UNESCO's work on Science, Technology and Gender: Rewarding Excellence; Fostering Positive Role Models

UNESCO has sought to promote the image of women in Science and Technology on an international level via the creation of five UNESCO chairs on this theme and an innovative partnership with L'Oreal honouring women scientists across the globe. Raising the visibility and recognizing the important work of these outstanding women contributes to the promotion of positive role models for young women.

Despina Sanoudou won the 2007 UNESCO-L'Oreal Award for "Best Young Female Scientist in Greece". As a result, she has seen her career flourish, as it leads to her becoming a university professor in the Medical School of the University of Athens. She has not been the only person to benefit, however; she has actively worked to encourage other young women to follow in her footsteps. Winning the award inspired her to establish a high-school outreach program with 1 200 participants to date. Several of the students have subsequently informed her that they have decided to change their career as a result. In addition, she has used every opportunity talking to the mass media in Greece to encourage young women to realize their ambition.

Education and Careers Orientation

Poor quality, irrelevant science and technology education poses a dual threat, with dire consequences especially for developing countries. First, as stressed further above, in creates a systemic weakness as knowledge of science and technology is a vital foundation for a wide range of technical careers, which in turn can have a negative impact on economic growth. Second, it deters students from pursuing studies in these subjects, by creating fear, failure and disinterest.

Millions of girls and women remain un-served by the formal education system, especially in developing countries. Non-formal education (NFE), which has proved effective in responding to their learning needs in other areas, has so far lacked the resources (institutional arrangements, well-defined capacity development programmes, qualified teachers) to integrate science and technology.

The quality of learning – and the motivation of students – rests heavily on the quality of teachers and the positive or negative messages transmitted, consciously or otherwise, in the classroom. In developing countries, teachers are likely to be trained only to secondary level and may lack some of the basic competencies required to teach science and maths.[xx] Even where teachers are capable, studies have shown that girls are often discouraged from learning S&T, whether consciously or unconsciously. Teachers tend to answer boys more often than

girls in maths and science classes, whilst giving girls more attention in non-science classes, practices which bear strong gendered messages.[xxi] Education materials, such as text-books, often serve to perpetuate the gender-bias that these careers are more suitable for males. The general shortage of science and mathematics education teachers reinforces this message as there are very few female teachers to whom female students can look up to as role models.

In this sense, any discussion of education cannot be detached from the important question of school-to-work transition; all too often the bridge that could lead some girls into science careers is missing. Career guidance may also suffer from gender-bias and the quality of education once again plays a role; courses may fail to respond to job market needs for particular professions or skills or issues may arise concerning the quality of the training and its certification.

UNESCO's work on Science, Technology and Gender: Combating Negative Stereotypes in the Classroom

UNESCO has created a training module entitled 'Girls and science: a training module on motivating girls to embark on science and technology careers' designed to help reduce gender disparities in the field of science and technology in Africa and to provide women with the possibility of embarking upon science careers in the quest of self-dependence and poverty reduction. Aiming to address the socio-cultural dynamics of the issue directly, the module seeks to sensitize key educators (teachers, teaching support staff and school administrators) to counter negative gender stereotypes, to promote a positive image of women in scientific and technical careers, and to provide necessary career guidance tools for female learners interested in these careers.

Women with disabilities

It is well-known that gender intersects with multiple forms of discrimination, such as age, class, race or ethnic group, sexual orientation, and disability. Increasing attention has been drawn to women with disabilities, who are particularly vulnerable to violence and abuse and are subject to additional discrimination in the workplace. According to the World Health Organisation, 10 % of women worldwide are living with a disability, a total of approximately 300 million women. As with the general population of women, there is great diversity amongst women living with disabilities. In general, though, for these women, additional barriers exist that further limit their access to the benefits of science and technology. The stigmas and exclusion resulting from limited knowledge and understanding of disabilities intersect with gender-based discriminations to place these women even at more risk of exclusion.

Public perceptions of girls and women with disabilities as a burden rather than as potential contributors to society mean that their potential is too often overlooked. Girls with disabilities often do not benefit from any schooling or education in less developed countries. Where they do go to school, the education they receive is often segregated, and they are unlikely to receive high quality education in science or technology. As a result, many girls and women with disabilities are illiterate. UNDP estimates that literacy rates for women with disabilities globally may be as low as 1%. Furthermore, because education and training are seen as investments for higher value employment, this training, especially science and technology

training, is too often denied to women with disabilities in the belief that they will not make use of it.

Without adequate education or training, women with disabilities have little chance of finding decent work, and statistics show that their access to the labour market in general remains limited. Only around one quarter of women with disabilities is in the global workforce, and this figure is clearly much lower in science and technology based employment. Moreover, women with disabilities are frequently victims of discrimination or abuse in the workplace.

For girls and women with disabilities to enjoy their right to benefit from access to scientific and technological progress, there is a vital need to ensure that these girls and women have access to education which is properly suited to their needs, including vocational and technical training. More efforts must also be made to ensure that these women have access to decent employment and that discrimination within the workplace against them is addressed.

UNESCO's work on Science, Technology and Gender*:* Improving the Status of Women with Disabilities

UNESCO works towards combating discrimination and violence against women with disabilities, by disseminating tools with a Human Rights Based Approach for vulnerable populations including women and girls with disabilities. Moreover, within the framework of the Research and Documentation Centre for Women, Gender and Peace-Building in Kinshasa, the Democratic Republic of Congo, UNESCO will undertake research on the right to participate in cultural life and the role of culture in improving the status of women with disabilities in African societies.

'Work-life balance': Retaining and Promoting Women Scientists

Vertical segregation describes first the fact that qualified women translate their qualifications into science or technology related employment less often than men and second that those women who do enter such a career are less likely to reach the highest, managerial levels than men are.

Even when girls have overcome the apparent initial barriers and have gained sufficient education to enter a science or technology career, they are faced with discrimination in terms of chances for advancement and retention in these careers. Women in research are often paid less than equally-qualified men, are less likely to be promoted and are consistently clustered at the lower-ranking levels.[xxii]

A key factor evoked in relation to the difficulties of career advancement and progression is that of work-life balance. Why does this factor, which plays a role in female employment in all spheres, seem to dominate the debates surrounding women in science? It is essential to acknowledge the biological and social roles of women and the unequal division of labour within the household, whereby women frequently carry the heaviest responsibility for housework and childrearing.

That most women scientists retain their role as primary care giver in the home has various, negative consequences for their careers. Women tend to leave the job market during their child-bearing years; if their careers are characterized by less stable, temporary work and the field is dominated by younger women, it is not surprising that fewer women reach the highest

levels. Prioritizing their roles as wives and mothers impedes the fieldwork and travel that are essential for developing professional opportunities, creating networks and finding funding and publication opportunities. [xxiii]

Although difficult to extrapolate to other cultural settings, research in America, the UK and Latin America has provided thought-provoking case-studies, which touch on some of these issues at the centre of women's lives.

- The American National Science Foundation found a relationship between marital status and the presence of children in the home and a woman's chances of earning tenure and holding an associate or full professor rank. [xxiv] In their study, 27% of women with science and engineering doctorates who were unemployed or out of the labour force cited family responsibilities for not working, compared with 1.5% of men. Women scientists and engineers are more likely than men to be divorced or separated and are less likely to have children living with them.[xxv]
- Longitudinal research in the UK on the retention of highly qualified women scientists in science-based employment in England and Wales,[xxvi] found a contrast in retention between women with health-related degrees compared to those with degrees in science, engineering technology. The latter had significantly lower retention rates in science-based employment; those who did remain in the sector tended to have children later than other graduates and displayed higher rates of non-motherhood. In contrast, most health-related graduates remained in the sector and 'four-fifths of women in health-related occupations were mothers, compared to only two-fifths in science, engineering and technology.'
- A UNESCO study[xxvii] entitled Women, Higher Education and Development explored the question of why there are so few women in senior administrative positions in Latin American universities. One of the many factors examined was dubbed 'women's complex lives': the strong expectations that women hold of themselves and related feelings of guilt as they place as much emphasis on their family as they do on their career and struggle to dedicate themselves enough to both. Married women reported spending between 20 – 39 hours per week on family activities, in addition to 40 – 60 hours per week on professional work, with those who taught or carried out lab work adding an extra 20 hours to these commitments.

Therefore, the work cultures and institutional infrastructures of science and research organizations, far from being gender neutral settings where gender relations play out, are themselves gendered and fail to allow space, or practical support, for women's responsibilities. This has lead researchers to suggest that it is these normative, masculine organizational structures and cultures that need to be challenged.[xxviii]

Recommendations

Access to formal education, technical and vocational education and training (TVET) and non-formal education should be promoted as the essential foundation for women's careers in science and technology.

Teacher education policies should be reviewed to i) provide quality pre-service and in-service gender sensitive training opportunities in science and mathematics for a greater number of teachers to match the rising demands for science and mathematic education; ii) ensure gender balance with regard to teaching personnel in science and mathematics.

Socio-cultural factors, that may disadvantage girls from entering and pursuing a career in the sciences or technology both implicit and explicit, must be taken into account when formulating policies, including how gender may combine with other factors of inequality and which may leave girls doubly disadvantaged.

Science and technology should be integrated into Non-formal Education (NFE), supported by the appropriate policy-frameworks, capacity-development programmes and trained teaching personnel, to reach out to girls and women in rural or depressed urban areas in particular.

Effective, high-quality science and technology education programmes should be developed in order to foster personal and societal interest in these disciplines and to ensure that curricula are socio-culturally and environmentally relevant.

Negative gender-stereotypes concerning the perceived suitability of women in science and technology careers must be tackled at all levels:

- **Via the media, at national and international levels:** the transformative power of the media to shift negative stereotypes should be harnessed. Specifically, science journalists, alongside science communicators more broadly – including scientists themselves - should be sensitized to the non-'technical' issues (democracy, development, gender equality) at stake in their communication with the aim of promoting a positive image of women and girls as scientifically and technologically competent and capable.

- **Via national education policies, in particular through gender-sensitive teacher training and educational material –** education materials including text-books should be gender-sensitive; teachers should receive gender-sensitive courses as part of their professional development to ensure that negative representations perpetuating inequality not retransmitted in the classroom.

Positive female role models should be enlisted, starting in the classroom; it is important to address the underrepresentation of female science and technology teachers in this light.

Girls should be encouraged to go into careers in science and technology by developing support structures, including mentoring programmes. **Career guidance** should encourage girls into these careers, with the support of their families and local communities, including via post-course job placement services. Gender-sensitive career information should be provided on possible careers in sciences and technology and appropriate materials developed in this light.

Relevant, internationally comparable sex-disaggregated statistics are essential. Efforts should continue to encourage and accelerate the development of these statistical indicators and data to allow for more nuanced tracking of these goals; in this spirit, UNESCO continues its efforts to assist countries to improve their data collection capacities.

References

Blackwell, Louisa and Glover, Judith, 'Women's Scientific Employment and Family Formation: A Longitudinal Perspective', *Gender, Work and Organization*. Vol. 15 No. 6 November 2008.

Bonder, Gloria, 'From access to appropriation: Women and ICT policies in Latin American and the Caribbean', United Nations Division for the Advancement of Women (DAW) Expert Group Meeting on "Information and communication technologies and their impact on and use as an instrument for the advancement and empowerment of women" Seoul, Republic of Korea 11 to 14 November 2002, 29 November 2002.

Garforth and Kerr, 'Women and Science: What's the Problem?', *Women and Science*, Fall 2009, pp. 379-403.

Gurumurthy, Anita, Bridge Report: Gender and ICTs, IDS, 2004.

Huyer, Sophia & Westholm, Gunnar, Gender Indicators in Science, Engineering and Technology: An Information Toolkit, UNESCO Publishing, 2007, pp. 80-81.

National Science Foundation, 'Thirty-Three Years of Women in S&E Faculty Positions', June 2008.

UNESCO, Global Education Digest: Comparing Education Statistics Across the World, 2010.

UNESCO Institute for Statistics, Sex-Disaggregated Data: A Brief Analysis of Key Education and Science Indicators since the Beijing Declaration and Platform for Action (1995), 2009.

UNESCO, Science Education Policy making; Eleven emerging issues; by Peter J. Fensham, 2008.

UNESCO. Science, Technology and Gender. An International Report. Paris: United Nations Educational, Scientific and Cultural Organization; 2007.

UNESCO, Gender Indicators in Science, Engineering and Technology: An Information Toolkit, by Sophia Huyer & Gunnar Westholm, 2007b.

UNESCO, Girls and Science: a training module on motivating girls to embark on science and technology careers, 2006.

UNESCO Institute of Statistics, Women in Science: Under-Represented and under-measured, November 2006b.

UNESCO, Guidelines for Policy Making in Secondary School Science and Technology Education; by Edgar W. Jenkins, 2003.

UNESCO, Science, Technology and Mathematics for Human Development: International Experts Conference on Science, Technology and Mathematics Education for Human Development, 2001.

Notes

[i] UNESCO, 2007b.
[ii] See 'Introduction' in Bonder, 2002.
[iii] UNESCO, 2007b, pp.23-24.
[iv] UNESCO 2007.
[v] GED 2010, pp.77
[vi] UIS, UNESCO, 2009.
[vii] The reference year is 2003; UNESCO, 2006b.
[viii] UNESCO, 2009.
[ix] UNESCO,2010.
[x] Science, Technology and Gender, An International Report, UNESCO 2007.
[xi] GED, 2010, pp. 68.
[xii] The reference year is 2003; UNESCO, 2006b.
[xiii] Higher Education Statistics Agency, cited in the Guardian, 'Women students stick to traditional subjects', 13/07/2010.
[xiv] Women are then more likely than men to pursue their second degree, representing 56% of those graduating from Master's programmes (ISCED 5A second degree). Souce: GED, 2010, pp. 76.
[xv] GED 2010, pp.76
[xvi] GED 2010, pp. 77
[xvii] GED 2010, pp. 74
[xviii] UNESCO 2007b, p. 15.
[xix] Gurumurthy, 2004.
[xx] GED 2010, pp. 57.
[xxi] UNESCO 2007b, p.15.
[xxii] GED, 2010, pp. 77
[xxiii] UNESCO 2007b, Chapter 2, 'The Leaky Pipeline', especially pp. 19-20.
[xxiv] National Science Foundation, 2008.
[xxv] Cited in The UNESCO Courrier, 2007, Number 2.
[xxvi] Blackwell and Glover.
[xxvii] Study undertaken by Sheryl Bond for the UNESCO Special Project on Women, Higher Education and Development cited in Huyer & Westholm.
[xxviii] Wajcman (1991) cited in Garforth and Kerr.