EGM/ST/2010/INF.1
18 June 2010
ENGLISH only

United Nations
Division for the Advancement of Women
Expert group meeting on ‘Gender, science and technology’
Paris, France
28 September - 1 October 2010

AIDE-MEMOIRE

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I. Introduction

1. In accordance with its multi-year programme of work for 2010-2014, the Commission on the Status of Women (CSW) will consider 'Access and participation of women and girls to education, training, science and technology, including for the promotion of women's equal access to full employment and decent work' as its priority theme during its fifty-fifth session in 2011. In order to contribute to a fuller understanding of the issue and to assist the Commission in its deliberations, the United Nations Division for the Advancement of Women (DAW) in collaboration with the United Nations Educational, Scientific and Cultural Organization (UNESCO) will convene an expert group meeting (EGM) on 'Gender, science and technology' from 28 September to 1 October 2010 in Paris, France.

II. Conceptual framework for the EGM

A. Background

2. Commitments on women's and girls' access to and participation in science and technology have been made by Governments at the international level. The Beijing Platform for Action, adopted at the Fourth World Conference on Women (1995), calls on Governments and all stakeholders to increase women's access to and retention in science and technology, including by adapting curricula and teaching material and by increasing the share of women teachers in scientific and technological disciplines at all levels of education (paras. 82 (g) and 83 (f)). In addition, stakeholders should provide information on the availability and benefits of training programmes in these fields and funds for special programmes in science and technology to advance opportunities for women (paras. 82 (c), (e) and 85 (b)).

3. The Platform also urges stakeholders to promote gender-sensitive and women-centred health research, treatment and technology, and to link traditional and indigenous knowledge with modern medicine (para. 109 (b)), as well as to create training, research and resource centres that disseminate environmentally sound technologies to women (para. 258 (b)(v)). It emphasizes the need to undertake legislative and administrative reforms to give women equal rights with men to economic resources such as new technology (para. 165 (e)). In addition, it calls for outreach programmes to inform low-income and poor women, particularly in rural and remote areas, of opportunities for market and technology access, and to provide assistance in taking advantage of such opportunities (para. 173 (c)).

4. The outcome document of the twenty-third special session of the General Assembly (2000) highlights the need to encourage and support the education of girls in science, mathematics, new technologies, including information technologies, and technical subjects, and to encourage women, including through career counseling, to seek employment in high growth and high-wage sectors and jobs (para. 82 (i)). It also stresses the importance of providing access to and control over technology, particularly for women living in poverty and for women entrepreneurs (paras. 74 (a) and 82 (g)).

5. The World Summit on the Information Society (WSIS) recognizes, in the Geneva Plan of Action (2003) and the Tunis Agenda for the Information Society (2005), the importance of promoting women's participation in information and communications technologies (ICT),

including at decision-making levels. It calls for equal training opportunities in ICT-related fields for women and early intervention programmes in science and technology, targeted at young girls, in order to increase the number of women in ICT careers. It also highlights the need for gender-responsive ICT policies. In addition, at the United Nations World Summit (2005), Governments committed to ensuring women’s equal access to productive assets and resources, including technology.

6. The Commission on the Status of Women has addressed the topic in a number of its sessions since 1996. The agreed conclusions on women and the environment (1997) urge stakeholders to support the role of women in developing environmentally sound technologies and in influencing the development of new and appropriate technologies, while the agreed conclusions on education and training (1997) call for renewed importance to be given to education in mathematics, science and technology for girls and women, including the use of information technology. They also stress the importance of information services and professional guidance to promote equal participation in these fields, and to encourage women’s participation in development of new technologies, from design to application, monitoring and evaluation.

7. The agreed conclusions on participation in and access of women to the media and information and communication technologies and their impact on and use as an instrument for the advancement and empowerment of women (2003) call for equal opportunities for women and for monitoring gender representation in different categories and levels of work, education and training in ICT. In addition, the agreed conclusions on enhanced participation of women in development: an enabling environment (2006) highlight the need to increase women’s and girls’ equal and effective access to and use of information and communication technologies, as well as applied technology. The agreed conclusions on financing for gender equality and the empowerment of women (2008) recognize the importance of assisting women-owned businesses in participating in and benefiting from technological innovation and transfer.

8. The Commission on Science and Technology for Development (CSTD) has also addressed this issue in its annual resolution on science and technology for development. At its twelfth session held in 2009, for example, the Commission stressed the need for Governments to expand opportunities for science, technology and engineering education and research, and to provide broadband connectivity, especially for women.

9. The Convention on the Elimination of All Forms of Discrimination against Women (CEDAW), in its article 14, requires States parties to ensure the right of women living in rural areas to have access to appropriate technology.

B. Overview of issues

10. Science and technology, in its broadest sense, includes disciplines as varied as physics, political science and literature, but it is also commonly used in a more narrow way, primarily to refer to natural sciences and engineering. In this latter sense, science and technology is vital for the achievement of development goals, for instance by facilitating efforts to eradicate poverty, achieve food security, fight diseases, improve education, and respond to

the challenges of climate change. It has also emerged as an important means for countries to improve productivity and competitiveness and to create decent work opportunities, including in new sectors such as green and knowledge-based economies.

11. The contribution of science and technology to the internationally agreed development goals can be accelerated by taking into account its gender dimensions. For instance, greater access to and use of existing technologies, as well as better products that respond to women's needs, can increase women's efficiency in carrying out productive and reproductive tasks. Acquiring science and technology education and training can empower women in all aspects of their lives. Eliminating barriers to women's employment in science and technology fields will further the goal of full employment and decent work.

12. Women's access to science and technology varies from country to country. Women who live in developed nations tend to enjoy the benefits of a wide range of modern technologies. Their access to information and communications technologies (ICT), for instance, has improved over the last decade, and there remains only a small gender gap in internet access in OECD countries. Patterns of ICT use between women and men, however, appear to diverge.[1]

13. The situation differs in developing countries, where many women have limited access to scientific and technological knowledge and applications. For instance, in least developed countries, every fourth married woman has an unmet need for modern contraceptive methods.[2] A woman is 23 per cent less likely to own a mobile phone than a man if she lives in Africa, 24 per cent if she lives in the Middle East, and 37 per cent if she lives in South Asia.[3] Such restrictions limit opportunities to reduce the disproportionate burden of unpaid work on women and to increase women's involvement and efficiency in productive activities.

14. Some groups of women are at a particular disadvantage. For instance, poor women living in rural areas could benefit from greater access to technology as they are responsible for a range of time- and labour-intensive tasks, such as food production, agro-processing, and water and fuel collection. However, technology such as lighter agricultural equipment, solar lamps, mechanized grain mills, or energy-efficient stoves too often remains out of their reach.

15. A number of factors limit women's access to and use of technology. Lack of education and training, and female illiteracy, can make it more challenging for women to take advantage of technologies. Women's disproportionate household and care responsibilities may leave them with little free time to explore technologies and their potential benefits. Socio-cultural norms can constrain women from using certain technologies. Financial and institutional barriers may also place restrictions on women's capability to rent or purchase technologies.

16. In addition, scientific and technological research and development may not adequately take into account the needs of women and girls. Feminist critics have denounced the existence of gender biases in scientific research. A well-documented illustration was the exclusion of

[1] OECD (2008). ICTs and Gender. PowerPoint Presentation at the OECD Expert Meeting held in Oslo, Norway, 2-3 June 2008.
[2] United Nations (2009). *The Millennium Development Goal Report 2009*. New York: United Nations.
[3] GSM Association (2010). *Women and Mobiles: A Global Opportunity*.

women as research subjects in some medical studies and clinical trials in the United States of America up to the 1980s. Research was conducted on men only – partly for financial reasons – and the results were then generalized to women.[4] Similarly, the use of male animals in medical research has skewed results up to the present time, with serious implications for women's health.[5] In addition, gender biases influence which research questions are asked and how results are interpreted. While, in a number of countries, funding institutions now require research proposals to integrate a gender analysis, the extent to which women's needs are reflected in research agendas, and to which scientific knowledge has become less gender biased, remains unclear.

17. Potential female users, particularly poor women, tend to be overlooked in technology design and deployment efforts. Some products, developed by default for men, may not respond to women's needs nor address the various constraints that could prevent their large-scale adoption by women. Examples include agricultural equipment that is too heavy for women to use. Product developers may also fail to take into account the many roles that women can play, for instance as technicians who operate or repair a technology, trainers who teach others how to use it, or owners who lease it to others.

18. Greater access to and more gender-responsive science and technology can empower women. Science and technology knowledge acquired through education can also play an important role in different aspects of women's lives. For example, biology courses may lead to a better understanding, and therefore prevention, of HIV and AIDS. Scientific and technical knowledge also contributes to women's economic empowerment. For example, technical knowledge is necessary for women entrepreneurs to produce the higher-technology products that are in demand globally.

19. Acquiring science and technology skills can open up a broad range of employment opportunities for women, both as professionals in highly-skilled, specialized positions, and as technicians in jobs that require skills in science and technology. Girls and women, however, remain underrepresented in the fields of study that lead to such employment. Despite progress, there remains a gender gap in access to primary and secondary education. Among those who do attend secondary school, there is little discrepancy between the number of girls and boys who study scientific subjects, but inequalities emerge at higher levels of education. Globally, in tertiary education, the median share of female students was 41 per cent in science and 21 per cent in engineering, manufacturing and construction in 2007.[6] In addition, women's participation varies by sub-field of study. Female students tend to opt for life sciences, and in a number of countries dominate this discipline, while they generally are severely underrepresented in physics or computing.[7]

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[4] Schiebinger, Londa (2007). Getting More Women into Science: Knowledge Issues. *Harvard Journal of Law and Gender*, Vol. 30:2. Summer 2007, pp. 365 – 378.
[5] Wald, C. and Wu, C (2010). Of Mice and Women: The Bias in Animal Models. *Science*, Vol. 327, No 5973, pp. 1571-2.
[6] 'Science' includes life sciences, physics, mathematics, statistics, and computing, while 'engineering, manufacturing and construction' includes engineering and engineering trades, manufacturing and processing, architecture and building. UNESCO (2010). *Reaching the Marginalized*, Education for All Global Monitoring Report 2010. Paris.
[7] UNESCO (2007). *Science, Technology and Gender: An International Report*. Paris.

20. Educational and career choices are shaped by a range of factors, including students' performance, enjoyment and interest in given subject matters. There appears to be little basis to the widespread belief that girls lack ability in mathematics and science. International tests found, on average, no gender difference in performance in science, while evidence on mathematics is mixed.[8] In addition, 15-year-old girls and boys displayed similar levels of interest and confidence in science, but girls had lower levels of enjoyment and interest in mathematics. Girls were more likely to envision a future in health sciences, including nursing, while boys wished to become computer scientists or technicians.[9]

21. In many countries, people tend to associate men with mathematics and science, and women with humanities and care-oriented fields. These gender stereotypes are sometimes unconscious, and may prevail even in people who support gender equality in science and technology. Such stereotypes affect girls' and women's performance, self-assessment, and interest in mathematics and sciences. The prevalence of the gender-science stereotype in a given country appears to be correlated to gender differences in performance in eighth grade science, as measured by the Trends in International Mathematics and Science Survey (TIMSS) 2003.[10] Such stereotypes may be reinforced by biased textbooks and curricula, as well as discriminatory teaching practices.

22. In addition, studies and careers in these disciplines may be unappealing to women for their perceived culture of "dominant masculinity".[11] Women also tend to express a preference for professions that directly benefit society or individuals, but scientific fields, to the exception of life sciences, are often viewed as lacking a clear social purpose. This perception is reinforced by curricula that emphasize technical aspects rather than the broader applications of a discipline.[12] The male culture of these fields not only influences women's initial study choices, but may also lead them to leave science and technology disciplines during the course of their studies, or to find work in other sectors after graduation. The link between equal access to science and technology education at all levels and employment within these disciplines is significant in understanding the underrepresentation of women.

23. Women are underrepresented in science and technology employment. On average, across 121 countries with available data, women account for 29 per cent of researchers, and only 15 per cent of countries have achieved gender parity.[13] These statistics, however, are of limited use as the term 'researcher', encompasses not only science and technology but all fields, including social sciences and humanities. While there are no global figures on the share of women in science and technology employment, regional data indicates that 32 per cent of

[8] OECD (2009). *Equally Prepared for Life? How 15-year-old Boys and Girls Perform in School*. Paris.
[9] The Programme for International Student Assessments (PISA) 2003 focused on mathematics and surveyed students from 40 countries and economies, while PISA 2006 was on science and covered 57 countries and economies. OECD (2009), op. cit.
[10] American Association of University Women (2010), op. cit.
[11] Lynch, K. and M. Feeley (2009). *Gender and Education – Lessons from Research for Policy Makers*. Brussels: European Commission.
[12] American Association of University Women (2010), op. cit.
[13] UNESCO-UIS (2009). A Global Perspective on Research and Development. *UIS Fact Sheet*. October 2009, No. 2. Montreal.

scientists and engineers in the European Union (EU) were women in 2007.[14] Similarly, entrepreneurship in innovative sectors tends to be dominated by men.

24. Women scientists and engineers face a number of obstacles in the workplace. Like many other working women, they grapple with work-life balance issues and unequal pay, but they also have to confront specific challenges, such as being isolated in a predominantly male environment. Unconscious biases play a role too. Women employed in traditionally 'male' sectors find themselves in a double-bind, as they tend to be viewed as either less competent than men, or when their competency cannot be challenged, as less likeable than men. The combination of competency and likeability has been found to be key to obtaining promotions.[15]

25. Whether in academia, in the public sector, or in private companies, women scientists and engineers face difficulty in progressing in their career and accessing decision-making positions. For example, in the EU in 2006, while women represented 36 per cent of PhD graduates in science and engineering, they only accounted for 11 per cent of senior academic staff.[16] Similarly, it remains rare for women to lead scientific institutions or to become members of scientific boards.

26. In some countries, the persistence of gender-segregated labour markets, combined with high levels of discrimination affecting women in non-traditional sectors, could be an important motivation for women scientists to migrate and pursue professional opportunities abroad. Indeed, women with secondary or especially tertiary education from developing countries have a relatively high migration rate, which is on average 17 per cent higher than that of men.[17]

27. Questions have been raised about possible gender biases in the measurement of performance and scientific excellence.[18] Studies have evidenced varying degrees of gender differences in research productivity, as measured by scientific publications.[19] In addition, the gender gap in patenting, as evidenced by research in life sciences, may limit recognition of the work of women scientists.[20]

28. Differences in access to research funding are also apparent. Data from the EU on all fields of study – not solely science and technology – suggests that more men apply for research funding than women, relative to the pool of potential male and female applicants. In addition,

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[14] This includes professionals in physical, mathematical and engineering occupations as well as life science and health occupations. European Commission (2009). *She Figures 2009: Statistics and Indicators on Gender Equality in Science*. Luxembourg: Publication Office of the European Union.
[15] American Association of University Women (2010), op. cit.
[16] Data by age group shows that this discrepancy is not due to an influx of young women in these fields. European Commission (2009), op. cit.
[17] Doquier, F. et al (June 2008). *Are Skilled Women More Migratory than Skilled Men?*
[18] UNESCO (2007), op. cit.
[19] Prpic, K., and others (2009). Gender Differences in the Research Productivity of Natural and Social Scientists. In *Women in Science and Technology*, Prpic, Oliveira and Hemlin, eds. Institute for Social Research – Zagreb and Sociology of Science and Technology Network of European Sociological Association.
[20] Ding, W., and others (2006). Gender Differences in Patenting in the Academic Life Sciences. *Science*, Vol. 313. No. 5787, pp. 665 – 667.

men have a higher success rate in obtaining funding in a majority of countries. There was, however, no clear relationship between women's success rate in obtaining research funds and their relative representation in a given field.[21]

29. It is important to overcome the various barriers to women's participation in science and technology employment. These dynamic fields are a significant source of job creation, and help widen the range of decent work opportunities available to women, thereby reducing occupational segregation and the gender pay gap. In addition, women represent an important pool of talent, and foregoing their contribution restricts the volume and quality of innovation. Scientific and technological innovation, however, is crucial to accelerate progress toward development goals, and paying due attention to its many gender dimensions is necessary to maximize its potential. In particular, it is imperative to include a gender equality dimension in national science, technology and innovation policies, and to ensure that women participate in shaping this agenda.

III. Objective of the EGM

30. The EGM will explore the gender dimensions of science and technology, and identify policies and programmes that can accelerate progress towards the internationally agreed development goals, including the MDGs. It will examine strategies for:

- Increasing women's access to and use of technology, including more gender-responsive products;
- Increasing women's access to and participation in science and technology education and training;
- Eliminating barriers to women's participation in science and technology employment.

31. The EGM will assess the situation in different parts of the world, identify good practices and formulate concrete recommendations for policymakers

IV. Profile of the participants

32. The EGM will be attended by 10 to 12 experts appointed by the Secretary-General of the United Nations. In selecting the experts, the criteria of geographical balance and, to the extent possible, gender balance, will be taken into consideration. Experts will include academics and practitioners from relevant fields, in accordance with the objectives identified above. The United Nations will provide travel and daily subsistence allowance to appointed experts.

33. Observers from Governments, the United Nations, inter-governmental organizations, non-governmental organizations and academia are welcome to attend the EGM at their own expense.

V. Documentation

[21] European Commission (2009), op. cit.

34. The documentation for the meeting will include:

- A background paper commissioned by the Division for the Advancement of Women, outlining the major issues to be discussed;
- Expert papers prepared by experts on specific issues in line with their expertise;
- Papers prepared by observers, which will be made available but not formally presented at the EGM.

VI. Organization

35. The EGM will be organized by the Division for the Advancement of Women (DAW) of the United Nations Department of Economic and Social Affairs and will be hosted by the United Nations Educational, Scientific and Cultural Organization (UNESCO) in Paris, France, from 28 September to 1 October 2010.

36. The EGM will be conducted in English and all documentation will be in English.

37. The EGM will meet in plenary and in working groups. Presentations by the experts in plenary will create the framework for discussions. The plenary will be followed by in-depth discussion of specific issues in working groups.

VII. Expected outcome

38. The EGM will prepare a report, containing a summary of the discussion and recommendations. The report will be made available at the fifty-fifth session of the Commission on the Status of Women and on the website of the Division for the Advancement of Women.