

WORKSHOP SUMMARY

The policy context

Why should the OECD governments be concerned with women in scientific careers? According to OECD Deputy Secretary-General Berglind Ásgeirsdóttir, who opened the workshop, the available data show that the number of female students enrolled in science courses is much higher than the number of women actually employed in research occupations. There is thus a risk that much of the social and individual investment in human capital is lost if a large part of that investment does not find itself participating in economic activities. Another reason for concern about women in science has to do with achieving equality between men and women in all walks of life, a societal goal with a long historical process in OECD countries. Arguably, women bring in different perspectives and research interests and as such can contribute to improving the quality of research. Furthermore, scientific integrity itself depends on non-discrimination.

For former French Research Minister Claudie Haigneré, OECD countries cannot remain inactive with regard to the need to build human potential in the field of science and technology, and the insufficient participation of women. While women have made progress in participating in the research workforce, progress has been uneven across scientific and technical fields as well as in terms of women's access to senior positions. This point was reinforced by the current French Research Minister, François Goulard, who noted that policy makers would be short-sighted to believe that just because there are now more women with higher education, and in the labour force, the issue of equality would take care of itself. Instead, he added, "policy action" was needed to address the issue of women's participation in scientific careers. For this reason, it is important to continue work to standardise and monitor statistics as well as to study the barriers that cause so few women to go into scientific careers, and to devise appropriate policies. In this respect, an exchange between OECD member countries is timely and can help countries learn from each other's experience and identify good policy practices that have emerged as well as the issues that need further research and policy attention.

Taking stock

The first session of the workshop explored the state of affairs with regard to what statistics can tell us about the participation of women in S&T education and careers. The OECD and Eurostat, the European Commission's statistical office, have worked closely to improve the collection of gender-disaggregated statistics in this area. From the background paper and the expert presentations in the session, it is evident that the share of women in S&T education has increased overall. The data also show that female participation in the labour market varies considerably between countries, age groups, areas of work and educational background. Participation rates seem to be higher in Nordic countries, North America and a few Western European countries, but lower in Asian OECD countries. In the OECD area, the population of female researchers has increased; women account for 25% to 35% of researchers in most OECD countries, with the exception of Japan and Korea (12% each).

However, women tend to be concentrated in fields and industries such as biology, health, agriculture and pharmaceuticals, with low representation in physics, computing and engineering. Women also tend to be concentrated in lower-level positions; just over one-third of US university faculty are women and this figure is even lower in EU countries, Australia, and Korea (only 14.5%). In the EU, women make up less than 20% of senior academic staff in the majority of countries. Despite the importance of such data in assessing the situation, a key message that emerged is that simple statistics on the share of women in certain fields or at the top of the career ladder are not sufficient for policy makers to devise solutions or remedies to the problems. Consequently, there is a greater focus on extending the collection of data, both quantitative and qualitative, to understand the working conditions of women S&T graduates (*e.g.* conditions of recruitment, salaries, mobility) as well as their productivity (*e.g.* publications, teaching, patenting activity) and career paths. In particular, there are important gaps in the data on the participation of women in business sector research and in the creation of science-based start-ups.

Horizontal segregation

The second session of the workshop explored the issue of “horizontal segregation” or the concentration of women in certain fields of scientific research (*e.g.* life sciences as opposed to engineering) and certain sectors of employment (pharmaceutical versus information technologies). This is a concern from a policy perspective as policies to increase the participation of women in science in general may inadvertently contribute to aggravating existing biases in scientific education and employment if the latter are not taken into consideration. In some countries, the share of women in science is increasing more in fields where women have already achieved equality in participation or even in some cases, account for the majority. Experts and participants identified several factors as contributing to horizontal segregation. Among these are:

- *Individual factors.* Women may make a personal and individual choice to pursue a career in a certain field, which may be driven by gender-specific motives and preferences. Gender stereotypes (*e.g.* engineering as being male-oriented and therefore not attractive to women) can also affect the direction of such choices.
- *Ability in mathematics.* One of the most polemical factors considered in explaining the causes behind horizontal segregation is whether differences in math ability between boys and girls plays a role in the participation of girls in scientific education and later on in careers. The presentation by Prof. Xie of the United States, for example, showed that the gender gap in average mathematics achievement is small and has been declining. Gender differences neither in average nor in high achievement in mathematics explain gender differences in the likelihood of majoring in science and engineering fields.
- *Interpersonal factors.* The type of networks that women may be involved in or a lack of networking can influence their choice to seek careers in certain scientific fields. The lack of role models among teachers early on as well as persons actually in the labour force is another factor that can impact on the career choices of women. Research has shown that youth make occupational choices on the basis of adult workers’ experience. Insofar as the choice of role models is gender-linked, the issue of role models becomes extremely important in influencing change.

- *Organisational structures.* The organisational structure of the workplace (e.g. hierarchical) as well as recruitment and promotion practices, the selection and allocation of research funding, and the workplace culture (e.g. male-centred engineering culture) are some of the other variables that affect the career paths of women.
- *Societal attitudes.* A society's broad-based attitudes towards gender equality as well the prevalence of gender stereotypes also affect the conditions in which girls and women are more or less encouraged to choose and continue to pursue scientific careers.
- *Sex discrimination.* From a policy perspective, there is a need to distinguish between discrimination that has a material impact (such as denial of job or tenure) versus covert or perceived discrimination that discourages women. The former is often addressed in the context of equal employment laws but the latter is more difficult to pin down and often involves a complex interaction of different underlying biases.

The *interplay* of these factors in the decision-making process makes it extremely difficult to address the problems. For example, increasing the number of role models among teachers or among senior researchers can help but it may not be sufficient if changes in the other areas, such as the participation of women in academic selection committees or among research funding agencies, do not evolve in the same direction.

Vertical segregation

The third session addressed the issue of vertical segregation, which refers to the low share of women among senior research staff and faculty in many countries. OECD data show that female scientists and engineers are less successful than their male counterparts in moving along the academic career path. In Europe, for example, the percentage of women in the top grades of academia rarely exceeds 20%, and men are three times more likely than women to obtain professorships or their equivalent. The factors which may contribute to the less rapid advance of women in their scientific careers are multiple and well established by academic research: the difficulty to reconcile professional careers and child-rearing responsibilities; the use of research evaluation methods which may be gender-biased (e.g. a focus on research activity rather than on teaching); research agendas that may not be attractive to women's research interests or within their areas of specialisation; and a work environment that excessively favours competition over co-operation. Another factor identified by Prof. Pigeyre was the career structures in academia which are characterised by few positions at the top and specialised institutional profiles that determine recruitment strategies (e.g. a preference for external versus internal candidates). One implication is that funding special research posts, in partnership with industry, such as Canada's NSERC Chairs for Women in Science and Engineering, could be a way to bypass institutional constraints and open up career paths for women. Other factors identified by experts and participants alike include:

- *Employment conditions gap.* Women may enter research careers at a later stage; women are also more likely to work on temporary work contracts and on a part-time basis.
- *Career management gaps.* Senior recruitment committees may not include women. There may also be organisational attitudes towards family/work balance issues (*e.g.* taking parental leave or working part-time being seen as a disadvantage in promotion possibilities); a lack of leadership role models and mentors in the workplace that could encourage women.
- *Scientific excellence gap.* There is some research that suggests that there are dysfunctions or gender bias in the system for the evaluation of scientific excellence which may impact on the possibilities for career advancement.
- *Research productivity gap.* Lower research productivity may explain differences in promotion between men and women, but productivity is also affected by access to team leader positions, where women are under-represented. The implication here is that without access to team leader positions early on, the incentives and opportunities for the promotion of women may be reduced.

Instruments for change: existing policy and programmes

With regard to women in S&T most OECD countries have policies and programmes in place to increase the participation of women in science and engineering. These policies and programmes include a large variety of measures ranging from grants to support senior positions for women at universities to preferential recruitment policies towards equally qualified women candidates. On the employment side, equal opportunity policies, flexible working hours and parental leave are also important for encouraging women to pursue research careers in the public and private sectors. Experts presented a range of programmes and strategies to promote women in scientific careers.

- Gender mainstreaming research programmes (*e.g.* in Austria)
- Coaching and mentoring (*e.g.* in Germany)
- Partnerships with employers (*e.g.* United Kingdom, Canada)
- Work and family balance initiatives – flexible hours, part-time for senior staff
- Support for returnees to the S&T labour force (*e.g.* in United Kingdom, new programmes in Japan)
- Specially funded chairs for women faculty (*e.g.* in Canada)
- Targeted awards/fellowships (*e.g.* United States, Norway, France)
- Awareness-raising measures at research institutions (*e.g.* in the United States)
- Data collection efforts and programme evaluations (*e.g.* in Austria, United States, Netherlands)
- Comprehensive policy strategies, from initiatives at schools to S&T careers (*e.g.* Norway, Finland, France)

Conclusions

Short of endorsing specific “action” measures, experts and participants agreed that without a voluntary and active policy towards the recruitment of women among senior research faculty and management at universities, public research labs and in technology-based companies, the participation of women in the scientific labour force would not improve fast enough to meet the growing demand for S&T workers. It was also agreed that more had to be done to address the underlying causes behind the low number of women in top science positions, including the difficulties for women to reconcile professional careers and child rearing; the demands for mobility early in research careers; the system for evaluating researchers which often favours research outputs over teaching; a lack of participation by women in the setting of research agendas and hence the predominance of male-gendered research agendas and more importantly, the scarcity of female role models among senior researchers and faculty. In terms of solutions, the participants pointed to the following issues as important steps forward:

- Encourage the nomination of women to top senior positions so as to increase the number of role models for younger women.
- Foster the development of formal and informal networks of women researchers, including partnerships between researchers in firms and in universities.
- Ensure that gender-mainstreaming initiatives at research institutions and in firms are result-oriented and are supported at the highest levels of the research institution/firm.
- Use scholarships and research grants to encourage young women researchers to pursue careers in fields of science and technology where women are under-represented.
- Link initiatives to promote women’s entrepreneurship with those targeted to women in science so as to promote alternative career opportunities for women S&T graduates.
- Evaluate public programmes and initiatives to promote women in science so that results feed back into policy and programme design.
- Disseminate “good practices” for attracting and retaining women in science careers among and within public research institutions and firms.
- Improve the collection of sex-disaggregated data on the careers of researchers, especially through longitudinal studies.

Participants also urged the OECD to continue work in this area, especially with regard to the evaluation and effectiveness of policy measures and initiatives. Participants also noted the need for further disaggregating statistics (aggregation masks important differences) but noted that this can be costly and that the OECD should strengthen its co-operation with the European Commission in this area. In general, delegates felt the OECD should now move beyond documenting the problems of vertical and horizontal segregation and focus on practical solutions as well as understanding the career paths of women researchers in the business sector. To address these issues, a follow-up OECD conference, hosted by Canada with support from the Austrian authorities, is planned on 28-29 September 2006 in Ottawa, Canada.