

Women in Science, Engineering and Technology (SET): Strategies for a Global Workforce

Ottawa, Canada, 28-29 September 2006

WORKSHOP SUMMARY



ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

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Foreword

On 28-29 September 2006, the OECD held a workshop on ‘Women in Science, Engineering and Technology (SET): Strategies for a Global Workforce’ in Ottawa, Canada. The workshop was organised under the auspices of the OECD’s *ad hoc* Working Group on the Steering and Funding of Research Institutions (SFRI) in co-operation with the Natural Sciences and Engineering Research Council of Canada (NSERC) and the Austrian Federal Ministry of Education, Science and Culture. This workshop was held in response to a request following the November 2005 SFRI Workshop on Women in Scientific Careers, which was held at the French Research Ministry in Paris.

The major aim of the September 2006 workshop was to explore the outcomes of various solutions that have been put in place in OECD countries to overcome barriers to the education, recruitment, progression and retention of women in SET, from school-age level to university studies and late careers, and to address gender and scientific excellence. The workshop examined best practice examples and identified potential strategies to solve the under-representation of women in SET. Programmes and outcomes were assessed, including the lessons that could be learned from current projects and initiatives. This document presents a summary of the presentations and the main findings from the workshop.

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Summary report of the workshop on “Women in Science, Engineering and Technology (SET): Strategies for a Global Workforce”

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Introduction

On 28-29 September 2006, the OECD held a workshop on ‘Women in Science, Engineering and Technology (SET): Strategies for a Global Workforce’ in Ottawa, Canada. The workshop was organised under the auspices of the OECD’s *ad hoc* Working Group on the Steering and Funding of Research Institutions (SFRI) in co-operation with the Natural Sciences and Engineering Research Council of Canada (NSERC) and the Austrian Federal Ministry of Education, Science and Culture. This workshop was held in response to a request following the November 2005 SFRI Workshop on Women in Scientific Careers, which was held at the French Research Ministry in Paris.

The SFRI Women in Science workshop in November 2005 demonstrated that the under-representation of women in SET has been well documented and the underlying causes of this problem have been well studied. The background paper of the 2005 workshop concluded that:

...women obtain more than half of all university degrees in many countries but only around 30% of university degrees awarded in science and technology, OECD countries face a paradoxical situation: a feminisation of the workforce in general and of university-trained graduates in particular, but continued under-representation of women in the research workforce. ...the available data tend to reinforce results from the academic literature that show women remain unevenly distributed in research occupations and under-represented in senior positions.

In an effort to address these barriers and issues, many OECD countries have developed and implemented policies, structures and programmes on gender mainstreaming and gender equity. Therefore, the aim of the September 2006 workshop was to explore the outcomes of various solutions that have been put in place in OECD countries, and to identify potential strategies to overcome barriers to the education, recruitment, progression and retention of women in SET, from school-age level, to university studies and late careers, and to address gender and scientific excellence. The workshop examined best practice examples and how to solve the under-representation of women in SET. Programmes and outcomes were assessed, including the lessons that could be learned from current projects and initiatives. This document presents a summary of the presentations and the main findings from the workshop.

Session 1: The context of women in the workforce and in SET

The first session of the workshop provided an overview of the main trends and the broader context of women in the general workforce. Mr. Dirk Pilat, Head of Science and Technology Policy Division, OECD, showed that two sets of issues affect the representation of women in science. General factors such as tax and benefit systems, workplace practices and access to childcare affect the participation of women in the workforce. In terms of SET, women continue to be under-represented in the research workforce because of issues such as career paths, workplace practices and performance measures. The share of women in employment lags that of men, and this is heightened in some OECD countries such as Turkey, Mexico, Italy and Greece. In most OECD countries, women are even more under-represented in research careers. Mr. Pilat presented data from the OECD's *Babies and Bosses* study, which showed that countries with high female employment rates also have the highest fertility rates. Policy tools that can be used to address the imbalance of women in the workforce include financial support for families, child and out-of-school hours care support and making the workplace more conducive to female and maternal employment and careers. Investment in family-friendly policies pays off through increased labour supply and child development.

Stephanie Monroe, Assistant Secretary for Civil Rights, Department of Education, United States, spoke about gender issues in the sciences. According to Assistant Secretary Monroe, under-representation starts early. In the United States, at the high-school level, girls make up only one-third of advanced placement physics students, and only 15% of those enrolled in advanced placement computer science classes. At the post-secondary level, female bachelor's degree recipients are much less likely than their male peers to major in computer science, engineering, and physical sciences. In 2000, women accounted for less than one-third of graduate students in the sciences, and less than one-fifth of engineering majors. These trends have an impact on women's choices to pursue careers related to maths and science. There are few female full-time professors in science and engineering; the percentages range from 3 to 15%. In 2003, women constituted 14% of engineers and only 33% of mathematicians in the United States.

Assistant Secretary Monroe discussed a 2005 study conducted by Catalyst, which examined the number of women in executive positions in the United States to determine whether diversified "leadership teams" affected the productivity of top-earning *Fortune 500* companies. Catalyst found that *Fortune 500* companies with the highest percentages of female corporate officers experienced, on average, a 35.1% higher return on equity and a 34% higher total return to shareholders than those companies with the lowest percentages of female officers. In other words, companies with "diversified teams" – or higher percentages of female officers – produced better products and performed at higher rates than companies with more homogenous structures. Assistant Secretary Monroe highlighted a number of initiatives in the United States aimed at increasing women in the sciences including *The American Competitiveness Initiative* and the Department of Education's *National Summit for the Advancement of Girls in Math and Science*.

Professor Susanne Baer, Vice-President Academic and International Affairs, Humboldt University Berlin, Germany, spoke about the trends and issues within disciplines that facilitate or inhibit the participation of women. Career paths, workplace practices and performance measures are some of the underlying reasons why women are under-represented in SET. Science is a social activity that is influenced by gender, so "cultural dynamics" within specific disciplines can inhibit

the participation of women by subtle strategies of exclusion against “new” groups. As a consequence, the common good of “knowledge” is not produced and distributed fairly and the quality of science suffers from such closures (*i.e.* slow innovation, little fresh talent, little responsiveness to outside demand, little interaction with others and competitive disadvantage). Hence, any policy to create gender equality and gender sensitive quality in science needs to address these “cultural dynamics” and the social dimension of science. This includes the definition and assessment of excellence as this also plays a decisive role. As gender is a category of knowledge (with “male”/“female” disciplines), this means that science is gendered. As a consequence, the criteria used in assessing excellence as well as the decision-making processes are not objective but socially negotiated and need to be reconsidered. Potential solutions are to set up gender-sensitive criteria of evaluation and distribution, to give women access to distributive decisions and to give women access to science and science policy in order to create role models (*e.g.* a change occurs with more than 20% presence). Professor Baer highlighted that change occurs when discrimination costs money.

Session 2: Programmes and initiatives focusing on changes in the scientific system

The presentations and discussions in the second session of the workshop focussed on the science system, including universities, research institutes, funding agencies and industry. A range of strategies were presented and discussed including the provision of grants towards gaining professor qualifications, “start” packages for newly recruited women, mentors for women in research and the gender-based assessment of budgets. The incorporation of a gender perspective at all levels of the budgetary process was seen as an effective tool that allowed targeted intervention and the monitoring of equality.

2A: Institutions, decision-making bodies, policies

Dr. Arnfinn Andersen from the Equality and Anti-discrimination Ombud, Norway, discussed the need for a broader approach in reducing the lack of women in science and academia. The Committee for Mainstreaming was established by the Ministry of Education and Research in January 2004. Its main goals are to promote mainstreaming of gender equality work in the general activities of academic institutions, contribute to increasing the general knowledge of issues related to gender imbalance in the academic world, and promote action. The Committee has a number of strategies including grants towards gaining professor qualification, ‘Start Packages’ for newly recruited women, and mentor schemes for women in research fellowships and associate professorships.

Dr. Regina Frey, Consultant and Trainer from Genderbuero, Germany, focused on gender budgeting and how it is an effective strategy to achieve gender equality in SET. Dr. Frey began by providing a definition of gender budgeting, which means: “a gender based assessment of budgets, incorporating a gender perspective at all levels of the budgetary process and restructuring revenues and expenditures in order to promote gender equality”. She then provided examples of gender budgeting projects by the Austrian Federal Ministry of Education, Science and Culture and the Freie University, Berlin. The Austrian project assesses research programmes in relation to gender effects and assesses *inter alia* employment effects/job creation for women and the “gender quality” of the research, whereas the Berlin example is based on yearly targets between the university president and faculties. Budgets in the university can increase by up to 20% if gender criteria are met. Dr. Frey concluded that gender

budgeting is an effective strategy because the process monitors allocations between women and men and gender disparities in research, it allows the monitoring of equality and it facilitates targeted intervention.

The third speaker in this session, Ms Norma Jarboe, the Director of Opportunity Now in the United Kingdom, discussed best practices in companies and industry. Opportunity Now shares best practices of employers and offers benchmarking tools because the implementation of specific actions has to be measured to ensure it is being done. Opportunity Now mainstreams equity practices and motivates employers to take action. The motivation of senior managers is most important as diversity has to be seen as a leadership competence. (In the United Kingdom in 2011 only 20% of the work force will be white, male and under the age of 45). Ms Jarboe also provided a number of industry examples: British Aerospace has a special programme to recruit and retain women while Microsoft introduced a work-life balance programme to avoid burn-out syndromes. Shell introduced an outreach programme and went into schools to attract women into their company.

Following the presentations, participants agreed that employers need to create a workplace that supports women, by implementing initiatives such as flexible working policies, maternity benefits, an appropriate work-life balance and the formation of women's networks. In terms of recruitment, it is important to set targets that are aggressive but realistic. Targets should address the under-representation of both males and females in research areas traditionally dominated by the other gender. These targets should be employed in hiring, for membership on grant selection committees, and for participation on policy committees. Participants recognised that these targets will vary according to country and discipline area. It is important to have a monitoring mechanism in place to follow the progress of achieving targets, and to have clearly defined incentives for succeeding, or penalties for failing to reach targets.

2B: Research agenda and programmes

The first speaker in Session 2B, Dr. Johannes Klumpers, Head of the Women and Science unit at the European Commission, spoke about gender aspects in the European Research Framework programmes. Planning for the European Union Research Framework Programme includes a strong consideration of gender aspects. This is done to enhance the scientific excellence and quality of the proposals, and to promote the participation of under-represented groups, both male and female, in certain discipline areas. Gender action plans will be included in big research projects. The objective is to formulate ambitious but realistic participation targets, and put in place monitoring mechanisms to ensure that such targets are reached.

Dr. Riitta Keiski, from the Academy of Finland, spoke about improving women's access to the research agenda and funding in Finland. The objective of the Finnish efforts is to reverse under-representation by women and men in non-traditional areas. For example, in university appointments, policies aim to ensure that the minority gender representation is 40%, applied to both men and women, depending on the discipline area. Policies and practices aim to appoint equal numbers of men and women on evaluation panels. Participation of women as experts on committees now varies between 10% and 30% depending on the discipline.

The Academy of Finland has been supporting women's research careers since the 1980s through its various programmes and review processes. The Academy of Finland Equality Plan 2005-07 plays an integral part in this, establishing a mainstreaming principle that prohibits discrimination and harassment. Universities

must apply the 40% rule and must have in place equality plans, paternity and maternity leave policies, and policies that eliminate age-based discrimination. The objectives are to ensure equality in programme funding, equality in research training, equality in instructional and research posts, and appropriate representation of science policy advisors and decision makers. Monitoring and producing statistics in areas such as gender of grant applicants and recipients, success rates, and staffing of research posts will play an important role.

The third speaker in Session 2B, Dr. Maki Kubo, from the Japan Society for the Promotion of Science, highlighted the current actions of Japanese funding agencies to assist female researchers. The strong influence of the traditional view and role of women must be overcome in Japan if more women are to choose scientific and engineering research careers. Some statistics were given with respect to female representation, such as the Japanese Society for Promotion of Science proportion of female directors (1.5%), the ratio of female to male researchers at Japanese universities (11%), the reality of who does most of the household chores, and the ratio of working women in various age groups. These data showed the extent of the imbalance in male and female representation in Japan.

The recognition of the declining birth rate in Japan, and the demographic shift in the population (36% of the population will be 65 years or older by 2020), have provided the incentive for change. Targets have been established for female participation in various disciplines by 2010 (20% in science, 15% in engineering, 30% in agricultural research and 30% in medicine). Many incentives have been established to encourage women to return to the laboratory after maternity leave. Financial support has been announced for model programmes promoting female participation in research, and for hiring and promoting female faculty. Programmes aimed at K-12 age groups have also been put in place to spark and sustain the interest of girls in science, mathematics and engineering.

During the discussion participants agreed that reliable statistics, and in particular sex-disaggregated statistics, are important and are needed to support decision-making. The discussion also highlighted the need for recruitment targets and the need to increase the number of women on evaluation committees. The media still portrays women as homemakers rather than scientists and these traditional stereotypes are problematic and need to be addressed.

2C: Measuring and assessing scientific excellence

Dr. Valerie Davidson, the NSERC Chair for Women in Science and Engineering, University of Guelph, Canada, focused on measuring scientific excellence. Dr Davidson identified three critical components for fairness in the measurement of scientific excellence: clear criteria and guidelines that recognise different contributions; recognising all of the processes that are part of the measurement system; and monitoring of outcomes by gender, as only with this evidence will there be appropriate action. As an example of a best practice, all applicants for NSERC grants are given the opportunity to describe any circumstances that have delayed their research or affected the dissemination of results, and selection committees give serious consideration to the information. Individual “best practices” must be combined with mentoring and advice. Gender analysis of the nominations and awards for the Canada Research Chairs programme has been a contentious area of discussion. Universities vary greatly in the nomination of women candidates and the search processes at some institutions have not succeeded in recruiting evenly from pools of qualified women.

Mr. Wolfgang Polt, of the Viennese Office InTeReg – Institute of Regional Policy and Technology of Joanneum Research, Austria, spoke about the discourse on scientific excellence and its gender dimensions. Measuring excellence is very prevalent in current discussions in Austria and they have started looking into gender bias in the selection process. The first observation is that excellence is not well defined and a workshop was held in Austria to define excellence and look at criteria for measurement. Their findings indicate that the current use of the notion of excellence is largely ignorant of social and disciplinary differences. Suggestions for policy action included: challenging the traditional excellence criteria; modifying criteria to capture diversity; and evaluating current measures against their gender impact. Moreover, Austria has introduced the FFORTE programme to foster women in science and is undertaking an initiative (Excellentia) to double the number of professors at Austrian universities as well as creating centres of high quality research led by women.

Dr. Maya Widmer, from the Swiss National Fund, focused on Gender Equality in the Swiss National Science Foundation. The Swiss National Science Foundation (SNSF) established the SNSF Equality Commission in 2001. Actions have been taken and an operational unit for gender equality has been established to ensure that gender equality is represented on the management board. This initiative will help with the systematic introduction of gender management issues in all areas of SNSF. The Swiss National Research Council is being proactive in hiring women, but this has not made a major impact to date as the participation of women has only increased from 18 to 20%. In addition, women represent only 12% of university professors. In 2007 SNSF will introduce better monitoring and assessment procedures and prepare guidelines for gender equality. Specific methods include the use of quotas, changes to programmes and support for balancing family and career. SNSF also recently launched a study on gender to address the “leaky pipeline” issue. It will trace career paths and conduct an analysis of gender-specific rates of loss.

Following the presentations of this session and referring to the presentation of Dr. Susanne Baer of the introductory panel (Session 1), there was general agreement during the discussion that scientific excellence is not a neutral concept and the evaluation of excellence can be subjective and gendered. It was pointed out that biases in the science and technology culture that define excellence are well documented and therefore the focus must be on how to respond to this. Many of the participants gave examples of problems with measuring scientific excellence and the potential for bias. It can be subjective *i.e.* “you know it when you see it” and the results often mirror those making the selection. Applying the criteria for excellence depends on who makes the decisions and currently men dominate scientific selection committees. The discussion also focused on “unwritten rules” and how men know these rules but women do not. Rather than coaching women to behave like men, participants stressed that changes to the rules should be made. A range of approaches for change were suggested during the discussion. Some participants suggested better defined requirements for PhD degrees, performance, and promotion while others thought greater flexibility in criteria was needed.

Participants agreed that specific programmes to address gender bias have had limited impact and what is really needed is a change in culture. The scientific community must be made aware that the definition and evaluation of excellence is not neutral and that bias against not only gender but other factors such as negative results, language and even emerging topics exists.

Three vital components for fairness in measuring scientific excellence were identified:

- i. The need for clear criteria and guidelines for recognising different contributions (for example, broaden criteria and include teaching, management and team building capacities and so on).
- ii. The recognition of processes that are part of the measurement system (for example, assessing excellence is not value-free).
- iii. The consistent monitoring of outcomes on the basis of gender.

Although the measurement of scientific excellence was deemed very important, the current measures of excellence do not consistently capture social, gender and disciplinary differences. Assessment criteria need to be modified in order to capture diversity. A range of initiatives and approaches were presented and discussed, including the need for more flexible measures. One of the main points to emerge during the discussion was the need for a critical mass of women in decision-making positions in order to create change, and that this required the adequate representation of women on selection and advisory committees.

The discussion led to some general recommendations and some specifically for the OECD. It is not possible to do everything, therefore it is important to prioritise and focus initiatives. For example, national data bases of women scientists and engineers should be created, since these can be useful in identifying women for vacant positions and for serving on selection committees and advisory bodies. Some participants stressed that the OECD could play an important role in identifying best practices in programmes, policies and evaluation criteria and sharing them.

Session 3: Programmes and initiatives focussing on the advancement of women

The presentations and discussions in session three covered the different stages of education and careers from kindergarten, secondary school and university through to scientific careers. The presentations focussed on the initiatives that have been put in place to improve education, recruitment, retention and progression for young girls and women in SET, and the possible solutions that could be explored in the future.

3A: Primary and secondary school age-level

Session 3A explored initiatives for primary and secondary school age-level children. Dr. Yukiko Miura, from the National Institute of Science and Technology in Japan, spoke about Japanese measures to encourage young girls into S&T fields. Dr. Miura reported that in Japan very few women (11%) opt for science-based education; often they are discouraged by their parents and surveys show that at a very young age girls decide that science is not the sort of thing that girls do. Girls typically do not see themselves as scientists and engineers, nor do they have a positive view of the careers in these fields. These perspectives are set in the girls' minds at a relatively young age (9-10 years old). Dr. Miura spoke of a Japanese science camp for girls where 100 girls (of 300 applicants) had the opportunity to interact with young women in science and do hands-on experimental work.

The second presentation was by Jennifer Flanagan, President of ACTUA, a Canadian NGO promoting science and mathematics to 225 000 young people each year through science camps, tours, visits and other activities to stimulate their curiosity, creativity and interest and build up their confidence in scientific matters.

The discussion focussed on the challenge faced by young women who are interested in science and the challenges of those who want to increase their numbers. In many countries there are several programmes and activities promoting science and engineering and careers in these fields to girls and young women. These activities tend to be run from and through charitable and voluntary organisations with sponsorship funding from industry and government. The programmes cover a range of activities, including camps, tours, visits, lectures, assistance to teachers and involvement of communities. Activities organised exclusively for girls were noted as being more effective in building up girls' confidence. It was observed that teachers, especially in elementary schools, were typically not well versed in science and mathematics and tended to project their fears and discomforts on to their students. Teachers did, however, appreciate the help of the volunteer organisations. Students who volunteered in science promotion programmes often became interested in being teachers. The workshop session participants concluded that everyone engaged in S&T needs to recognise that they have a role in science promotion.

Participants agreed that outreach is important to encourage consideration of science and engineering research as a viable and desirable career path. Outreach is most necessary early in childhood, but should be reinforced at various stages where decisions are being made (during kindergarten to high school years, around the transition from high school to university, from undergraduate to graduate studies). Outreach must also target parents so as to break down traditional stereotypes. The mass media also play an important role in shaping opinions and must therefore be part of the outreach solution. Institutional policies and practices must foster a more equitable work environment and an improved work-life balance. Men and women must be able to share the responsibilities associated with work-life balance without fear of compromising professional goals.

3B: College and university students

Session 3B centred on strategies aimed at recruiting more women students in information technology, computer science and engineering. The first speaker, Dr. Beate List from Austria, outlined the strategy of the Vienna University of Technology (VUT) to encourage women to undertake PhDs in Internet technologies. A Women's Postgraduate College for Internet Technologies (WIT) pilot programme was formed in response to the Austrian Council for Research and Technology Development statement, which highlighted that "despite the lack of highly trained and qualified people in research and industry women are underrepresented in education as well as professional life". At the VUT only 4% of Professors and 8% of Associate Professors are women. The aim of the WIT pilot programme is to supply a source of women researchers for careers in teaching and research in academia as well as in industry. The WIT is totally staffed by women and consists of eight positions for PhD students, an administrative assistant, a senior researcher, a Head of Group and a project manager. The strengths of the programme are that it is dedicated to women and takes a comprehensive approach to the PhD curriculum and integration into VUT. The programme demonstrates that good women scientists are available. The opportunities are that a model has been provided that can increase women researchers in an organisation. This is on the provision that there are long-term career development policies at scientific institutions that provide tenure track and permanent contracts, with promotions being performance based. There are women who are available in computer science, however, retention appears to be a key issue with changes to more favourable employment conditions required. This short-term project alone does not solve the problem of lack of retention of women in research.

Dr. Capitolana Diaz, from the Women and Science Unit at the Ministry of Education and Science in Spain, outlined the DONA programme that was aimed at increasing women's enrolment in engineering and technology at the *Universidad Politecnica de Cataluna* (UPC). This was carried out by targeting female secondary students with career information on technology courses and their suitability for women, and by changing employers' attitudes towards participation of women in technical fields. The programme centred on providing information through measures such as summer camps for 15-17 year olds, the creation of visual aids for use by secondary school teachers, and the balanced use of language in all promotional activities. There were also conferences, public debates, round tables and the participation of regional media. Diverse activities were developed to interest women in the technological professions and to influence those who would influence women in making decisions concerning their careers. However, at UPC the initial evaluation demonstrated little or no impact on women enrolling in technology courses. Generally, it was too short a time in order to have a proper evaluation of the impact of the programme on numbers of women students in the technological courses. The programme was a one-off and to be truly effective would require continuous activities over a number of years. It is proposed that for the programme to be really successful all education authorities need to be involved at primary and secondary school level in revising the technology curriculum, demonstrating technology as a positive component of life, and providing gender aware careers advisors. A second proposal concerned changes to universities that involved welcome programmes, mentoring of women, more female professors and an equality plan that looks at setting and monitoring targets.

The third speaker, Dr. Kelly Lyons from the IBM Corporation's Toronto Centre for Advanced Studies, gave a presentation on innovation and collaboration. There was a peak in enrolment in computer science in the 1980s and then again in 2000. Now there is a decline in enrolments in computer science with an even greater decline demonstrated for women. The view was held that 50% of enrolments should be women. The changing nature of innovation in technology is favourable for empowering women world-wide. However, in order for this to occur, collaboration among business, academia, government and non-government organisations is critical to take advantage of the changes.

The discussions within session 3B centred on the changing nature of innovation and the way it could empower women. A comment was made that women thrive better in a collaborative open environment with trans-disciplinary activities. Concern was raised that there is a possibility that courses could become too feminised and that a balance would need to be struck. It was noted that a number of prejudices also need to be overcome. For instance, in Mexico, scholarships are given to students to work alongside researchers in the summer (the programme has been in place for 15 years). It was found that students preferentially chose males to work with because of an unsubstantiated reflection that females were considered as being less available due to family commitments. There was general agreement that secondary schools are important for influencing career choices. In summary, two intensive programmes were outlined in this session but singular programmes are not enough to bring about the sustained structural change required to increase the participation of women in SET. A major strategy is required.

3C: Scientific career (early, mid-, late career)

The session began with an observation from the Chair, Dr. Cecilia Moloney, NSERC Chair for Women in Science and Engineering, Memorial University, Canada, that the timing of career stages varies with the career path chosen. For people working in industry, early career begins after completion of a Bachelor's degree, whereas in academia, early career begins for new faculty after completion of their PhD or postdoctoral work. Following the Chair's introduction, three speakers presented information on programmes aimed at increasing the participation of women in the SET workforce in Korea, Germany and Canada.

Dr. Ki-Wan Kim from the Korean Institute of Science and Technologies provided a socio-economic perspective for implementing policies to increase women's participation in science and technology. Korea has an aging population and low birth rate compared to many other countries. Although it is not yet a serious problem, predictions are that there will be a lack of highly qualified personnel for the workforce. Increasing the number of women in the workforce, and particularly in S&T areas, will help address this problem. Various statistics were presented which showed that while the percentage of women students in colleges and universities is increasing, the gender gap is greater in engineering, and few women graduates work in SET areas.

Some effective initiatives from the Korean experience were: meeting a government-set target of 25% women in SET public sector jobs by 2010 (progress towards achieving this goal has been very good); universities have increased recruitment of female professors; a National Center for Support of Women in S&T provides information, re-education, re-entry and support networks; and the WATCH 21 programme provides hands-on science experiences for high school students to work with graduate students and university professors. A future need identified was to focus more on policies to support women on leave for childcare and re-entry to the workforce.

Isabel Beuter described Germany's Center of Excellence – Women and Science – which is a national node networked with others in Europe. The Center is a think-tank focusing on knowledge transfer, evaluation, policy development and advice. One particular challenge noted was bringing more women into the discussion, development and implementation of SET policy. The Center is also an important, centralised source of information, including a database of women scientists, a daily news scan of women in science, a literature database and a monthly newsletter with a circulation of about 3 000. Their client base is mainly scientists, administrators and gender equality officers from universities. Career planning seminars focused on helping female candidates prepare for faculty position selection processes have been very successful.

Dawn Kelly, from Golder and Associates, Canada, provided a private sector perspective. Golder and Associates is an employee owned and operated company with offices worldwide providing engineering and environmental services. It has been recognised as one of the Top 50 companies to work for in Canada. Forty per cent of the 2 100 employees in Canada are women. Successful initiatives within this company are: flexible work hours and environment; parental benefits; career planning and networking; and comprehensive training and development focussed on employees' needs and preferences.

The group discussion following the presentations focused mainly on two issues: leadership and training. Both women and men need appropriate experience, mentorship and training in management, leadership and communication in order to progress into more senior positions, where they will have more opportunity to influence change within institutions and structures. Professional skill training is embedded in private sector culture, but not in academia. Leaders in all sectors must know themselves and their role, as well as those of the people they work with and mentor. They must be prepared to effectively address problem situations, including effectively communicating concerns about barriers to women in SET, and to address these issues.

The group concluded that in this context of career progression, excellence in research was not enough to ensure success. Several examples of good programmes, policies and practices were identified during the group discussion. Overall, there was a high level of commonality between countries, regarding trends in statistics and the types of programmes, policies and practices that have been implemented. Broader social trends to redefine career success and career paths may impact on academia and research in the future.

Summary and policy recommendations

The workshop demonstrated that substantial change in the position of women in SET and research will not be possible without changes to the scientific system. A wide range of initiatives, programmes and policies from industry, academia and the policy community were discussed. These included the implementation of gender responsive budgets by governments, gender-balancing the composition of decision bodies, integrating gender in research agendas and programmes, implementing diversity management in industry and also in academia, and re-defining the assessment of excellence with respect to funding and recruiting policies and practices.

Many topics were covered, and some issues recurred in each session, however, three main policy recommendations emerged from the workshop:

- i. The production of sex-disaggregated statistics is essential. Without such data it is impossible to analyse trends and outcomes and monitor progress.
- ii. The evaluation of performance needs to be addressed. Even though assessment criteria may have subjective biases, evaluation methods need to be fair, transparent and gender neutral.
- iii. More rigorous research is needed to assess the relationship between gender diversity and firm and/or research performance. Does gender diversity, particularly at senior levels, affect performance? This type of work may be able to demonstrate that gender equality has quantifiable benefits that can be linked to economic growth or improved social outcomes. However, this task should be carried out in conjunction with the preceding recommendation, namely equitable performance evaluation.

The workshop programme and PowerPoint presentations can be viewed at:

http://www.oecd.org/document/15/0,2340,en_2649_33703_37361295_1_1_1_1,00.html