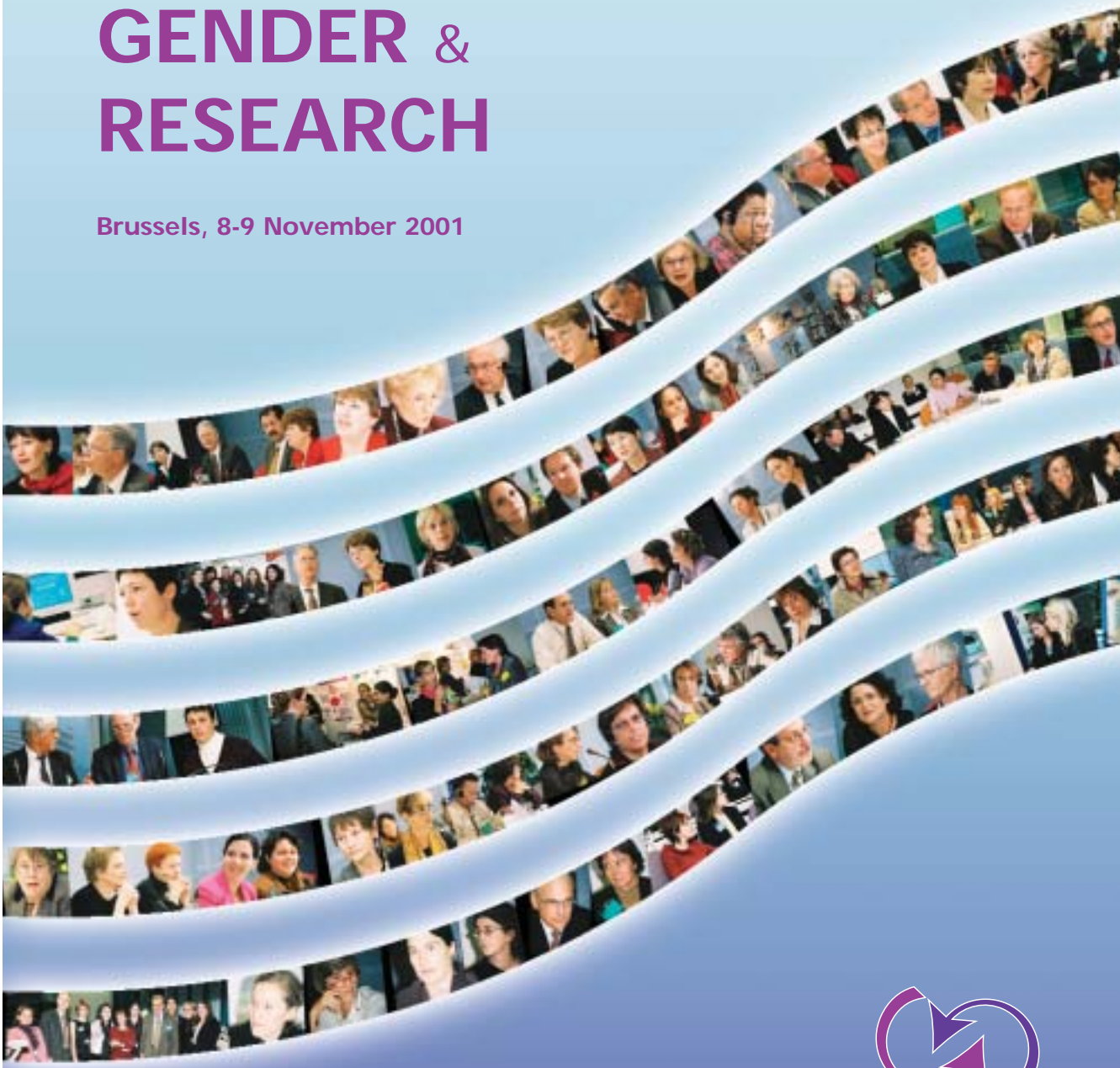




GENDER & RESEARCH

Brussels, 8-9 November 2001



Interested in European research?

RTD info is our quarterly magazine keeping you in touch with main developments (results, programmes, events, etc.). It is available in English, French and German. A free sample copy or free subscription can be obtained from:

Directorate-General for Research
Information and Communication Unit
European Commission
B-1049 Brussels
Fax : (32-2) 29-58220
E-Mail: research@cec.eu.int
Internet: http://europa.eu.int/comm/research/rtdinfo_en.html

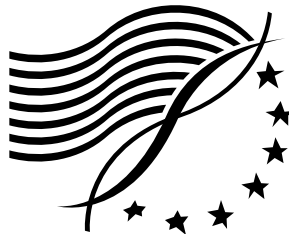
EUROPEAN COMMISSION

Directorate-General for Research / — RTD - C5 - Women and Science
Contact: Nicole Dewandre - Office: SDME 06/79, B-1049 Brussels
Tel: (32-2) 299 49 25 - Fax (32-2) 299 37 46 - E-mail: nicole.dewandre@cec.eu.int
Internet: <http://www.cordis.lu/rtd2002/science-society/women.htm>

European Commission
Directorate-General for Research

GENDER & RESEARCH

Brussels, 8-9 November 2001



Edited by

Linda Maxwell
Karen Slavin
Kerry Young

Published by the EUROPEAN COMMISSION

Directorate-General for Research

LEGAL NOTICE: Neither the European Commission nor any person acting on behalf of the Commission is responsible for the use which might be made of the following information.

A great deal of additional information on the European Union is available on the Internet. It can be accessed through the Europa server (<http://europa.eu.int>).

Cataloguing data can be found at the end of this publication.

Luxembourg: Office for Official Publications of the European Communities, 2002

© European Communities, 2002

Reproduction is authorised provided the source is acknowledged.

Printed in Belgium

PRINTED ON WHITE CHLORINE-FREE PAPER

ACKNOWLEDGEMENTS

This conference was a momentous event, which brought together more than 600 people in Brussels to share their concerns about the need to promote gender equality in scientific research and to explore progress made and the ways ahead. The conference received widespread press coverage, and I hope that these proceedings will allow further debate.

The organisation of such an event is the result of teamwork, involving many people, whose names cannot all be mentioned here. However, I would like to express my special thanks to Brigitte Degen for her huge effort in co-ordinating the organisation of the conference. I would also like to thank all the members of the Women and Science Unit for their co-operation and commitment: Maria Douka, Helga Ebeling, Marge Fauvelle, Vera Fehnle, Tanya Leigh, Linda Maxwell, Lynda Morrish, Gisèle Rodeyns and Karen Slavin.

Last but not least, I wish to acknowledge the continued support that we have received from our Director, Rainer Gerold, and his assistant, Bernd Reichert.

NICOLE DEWANDRE

Head of the Women and Science Unit

FOREWORD

Today, we are at a turning point in our actions on women and science. The last two years have seen great strides in the right direction, but we are still far from having achieved a satisfactory level of equality, or indeed commitment to equality, in scientific research.

From the outset, we have benefited from strong political commitment at European Union level, with the Council and the Parliament backing up the approach set out by the Commission, with resolutions on women and science in 1999, 2000 and 2001.

This support has been instrumental in maintaining the momentum. The consequential achievements in the implementation of women and science actions, as a result, are impressive. The Helsinki Group on Women and Science, in particular, is proving to be a vital and dynamic contributor to the women and science debate, and its statistical correspondents are playing an important role as regards data collection and the development of gendered indicators. The target setting has also proved successful in terms of increasing the number of women taking part in the Framework Programme, in panels and committees, and as project co-ordinators.

Our starting point was essentially a quantitative approach, which consisted of simply counting the number of women and men involved in our research programmes. Today, we are convinced that this approach needs to be backed up by qualitative measures, which tackle structural inequalities, a “transformative” approach.

In the context of the Framework Programme, this means improving our attention to gender at all levels of implementation and in the content of our research agenda. The conclusions of the Gender Impact Assessment Studies will be vitally important in this respect.

The challenge now is to reach out on new fronts. There is enormous potential to be tapped in the private sector, but until now, we have known very little about women in industrial research. This is one area that we will deal with. Within the enlargement perspective, we also intend to look closely at the situation facing women researchers in Central and Eastern European countries and the Baltic States, with a view ultimately to strengthening partnerships and ensuring the transfer of good practice.

I know that we still have a long way to go. I am aware of the resistance that exists in some areas of the scientific community. But I am also convinced that without equality in science, and without a better use of the human resources available, we will never truly achieve quality in science within our European Research Area. We need to work together to reach these objectives.



PHILIPPE BUSQUIN
Commissioner for Research

CONTENTS

INTRODUCTION

ACHILLEAS MITSOS <i>Director-General for Research</i>	13
--	----

CHAPTER 1 15

“A LOT DONE, A LOT STILL TO DO”

LAURETTE ONKELINX <i>Deputy Prime Minister, Minister for Employment and Equal Opportunities Policy, Belgium</i>	17
--	----

ERYL MARGARET MCNALLY <i>Member of the European Parliament, Member of the Parliamentary Committee on Industry, External Trade, Research and Energy, United Kingdom</i>	22
---	----

CHAPTER 2 25

MINISTERIAL ROUND TABLE

FRANÇOIS-XAVIER DE DONNEA <i>Minister President, Government of Brussels-Capital Region, Minister of State, President of the European Research Council, Belgium</i>	27
---	----

FRANÇOISE DUPUIS <i>Minister for Higher Education, Further Education and Scientific Research, Belgium</i>	29
--	----

National Contact Centre “Women and Science” of the Czech Republic

JOSEF PRUSA <i>Vice Minister for Higher Education, Science and Research, Ministry of Education, Youth and Sports, Czech Republic</i>	31
---	----

Women and science in Luxembourg

ERNA HENNICOT-SCHOEPGES <i>Minister for Culture, Higher Education and Research, Luxembourg</i>	33
---	----

Gender and science in Sweden

AGNETA BLADH <i>Secretary of State, Ministry of Education and Research, Sweden</i>	35
---	----

Gender and research in South Africa

BRIGITTE MABANDLA <i>Deputy Minister for Arts, Culture, Science and Technology, South Africa</i>	37
---	----

AÏCHA BELARBI <i>Ambassador, Moroccan Mission to the European Communities, Morocco</i>	41
---	----

RAOUL KNEUCKER <i>Director-General, Federal Ministry of Education, Science and Culture, Austria</i>	43
--	----

KETTY SCHWARTZ <i>Research Director, Ministry of Research, France</i>	45
--	----

DAVID A. KING

<i>Chief Scientific Adviser to the Government, Head of the Office of Science and Technology, United Kingdom</i>	48
---	----

CHAPTER 3	51
FIRST RESULTS FROM THE HELSINKI GROUP ON WOMEN AND SCIENCE: POLICY REVIEW AND INDICATORS	
First results from the Helsinki Group on Women and Science: policy review	
TERESA REES Cardiff University, Wales, United Kingdom	53
Design and collection of statistical indicators on women in science	
RUTH SPRINGHAM Eurogramme, Luxembourg	56
CHAPTER 4	63
GENDER IMPACT ASSESSMENT STUDIES	
SECTION 1 QUALITY OF LIFE AND MANAGEMENT OF LIVING RESOURCES	65
Women, gender and the life sciences: women’s participation in the Quality of life programme	
MINEKE BOSCH Centre for Gender and Diversity, University of Maastricht, The Netherlands	65
Women, gender and the life sciences: research for and about women	
INEKE KLINGE Faculty of Health Sciences, University of Maastricht, The Netherlands	74
Gender equity and health	
PEGGY MAGUIRE European Institute of Women’s Health, Ireland	79
SECTION 2 USER-FRIENDLY INFORMATION SOCIETY	87
Report on the User-friendly information society Gender Impact Assessment Study	
ADRIAN HEALY ECOTEC Research and Consulting Group, Belgium	87
GABRIELE MOHSLER Ericsson, Germany	93
SECTION 3 COMPETITIVE AND SUSTAINABLE GROWTH	95
Women in Growth – Perspectives on gender equality in industrial research	
LUISA PRISTA Materials Unit, Growth Programme, Research Directorate-General, European Commission	95
SECTION 4 ENERGY	98
Engendering energy	
JOY CLANCY Technology and Development Group, University of Twente, The Netherlands	98
Summary of points raised during the “Energy” session discussion	
ANNETTE B. CUTLER Technology Initiatives Ltd, Energy and Global Environment Consultants, United Kingdom	104

SECTION 5 ENVIRONMENT AND SUSTAINABLE DEVELOPMENT	107
Gender Impact Assessment Study on the Environment and sustainable development sub-programme IRMGARD SCHULTZ & DIANA HUMMEL Institute for Socio-Ecological Research (ISOE), Germany.....	107
SILVANA VALLERGA International Marine Centre, Italy.....	114
SECTION 6 CONFIRMING THE INTERNATIONAL ROLE OF COMMUNITY RESEARCH	116
THOMAS ARNOLD & NICOLE RIVEILL-BOUNAGA International scientific co-operation projects Unit, Research Directorate-General, European Commission.....	116
The Gender Impact Assessment Study on the INCO programme CHARLOTTE MARTIN Royal Tropical Institute (KIT), The Netherlands.....	119
Comments on the INCO Gender Impact Assessment Study STELLA LEIGH-WILLIAMS Third World Organization for Women in Science (TWOWS), Obafemi Awolowo University, Nigeria.....	124
SECTION 7 PROMOTION OF INNOVATION AND ENCOURAGEMENT OF PARTICIPATION OF SMES	131
Gender Impact Assessment Study on “Innovation and SMEs” MARIA AGUIRRE SOCINTEC S.A., Spain.....	131
Women SMEs: gender issues from WEEN and WomenCraft projects HILARY FARNWORTH Association for Women in Science and Engineering (AWiSE), University of North London, United Kingdom.....	136
SECTION 8 IMPROVING HUMAN RESEARCH POTENTIAL AND THE SOCIO-ECONOMIC KNOWLEDGE BASE	140
Gender Impact Assessment Study on “Improving human potential and socio-economic knowledge” MARY BRAITHWAITE Tacitus, Belgium.....	140
Response to the Gender Impact Assessment of “Improving human research potential and the socio-economic knowledge base” NINA LYKKE Linköping University, Sweden.....	144
Gender Impact Assessment Study on “Improving human potential and mobility aspects” MARY BRAITHWAITE Tacitus, Belgium.....	149
Response to the Gender Impact Assessment of “Improving human research potential and mobility aspects” KOSTADINKA IVANOVA SIMEONOVA Academy of Sciences, Bulgaria.....	153
SESSION REPORT	
NICOLE DEWANDRE & TANYA LEIGH Women and Science Unit, Research Directorate-General, European Commission.....	157

CHAPTER 5	163
BENCHMARKING THE PROGRESS OF WOMEN IN SCIENCE	
<i>Integrating processes in eight Swedish research financing authorities – gender research case study</i> LENA TROJER Blekinge Institute of Technology, Sweden	165
<i>Women in science: the Italian legislative and institutional framework for gender mainstreaming</i> FRANCESCA CANTÙ University of Rome and Ministry of University and Scientific Research, Italy	168
<i>Obstacle without obstacle</i> JOANNA PININSKA Warsaw University, Poland	174
<i>Benchmarking gender, science and technology in Latin America: current position and prospects for the future</i> GISELA ARGENTI Gender, Science and Technology Secretariat for Latin America (SEGECYT), Uruguay	184
<i>Women in science in Israel: past, present and future</i> HAGIT MESSER-YARON Ministry of Science, Culture and Sport, Israel	190
<i>The policy foundations of the Women’s programme in South Africa</i> BOTLHALE TEMA Department of Arts, Culture, Science and Technology (DACST), South Africa	193
SESSION DEBATE	196
SESSION REPORT	
<i>Promoting change through changing structures</i> BARBARA HARTUNG Lower-Saxony Ministry of Science and Culture, Germany	197
CHAPTER 6	201
SHAPING GENDER IN RESEARCH	
<i>Sexism, support and survival in academia: the Finnish experience</i> LIISA HUSU University of Helsinki, Finland	203
<i>Gender in the career paths of Ph.D. women scientists in the scientific workforce</i> ANNE J. MACLACHLAN Centre for studies in Higher Education, University of California Berkeley, United States	208
<i>Between stereotype and reality: the need for a debate on the diverse nature of the academic career</i> KOEN VERLAECKT Science, Technology and Innovation Division, Ministry of Flanders, Belgium	214
ROSSELLA PALOMBA National Research Council (CNR), Italy	217
SYLVIE MOREAU National Centre for Scientific Research (CNRS), France	219
SYBILLE KRUMMACHER Centre of Excellence for Women and Science (CEWS) and Forschungszentrum Jülich GmbH (FZJ), Germany	223
SESSION DEBATE	226
SESSION REPORT	
KNUT FAEGRI University of Oslo, Norway	227

CHAPTER 7	229
REACHING OUT TO SCHOOLS AND SOCIETY AT LARGE	
ANNE-MARIE BRUYAS <i>City of Science, Italy</i>	231
Girls' views of science and choices in education	
BARBARA MAPELLI <i>University of Milan II, Italy</i>	235
Why are too few girls choosing to study science?	
MIEKE VAN HAEGENDOREN <i>Limburg University, Belgium</i>	241
A minority within a minority: mathematics, science and technology studies among Israeli and Arabic female students	
HANNA DAVID <i>University of Tel-Aviv, Israel</i>	248
Reaching out to schools and society at large	
HARRIET AURELL <i>Swedish Labour Market Board, Sweden</i>	256
UTE WANZEK <i>Gender Institute of Saxony-Anhalt, Germany</i>	261
SESSION DEBATE	263
SESSION REPORT	
TERESA PATRICIO <i>Ministry of Science and Technology, Portugal</i>	264
CHAPTER 8	267
RESEARCHING GENDER AND SCIENCE	
The new politics of knowledge – Making (sustained) change happen	
ELISABETH GULBRANDSEN <i>Research Council of Norway</i>	269
Is the hierarchy in universities (un)fair?	
GRETA NOORDENBOS <i>Leiden University, The Netherlands</i>	275
Women in science – The Danish case	
INGE HENNINGSEN <i>University of Copenhagen, Denmark</i>	283
Researching gender and social science – The case of Greece	
MARIA STRATIGAKI <i>Research Centre for Gender Equality (KETHI), Panteion University, Greece</i>	288
Defining a gender and science research agenda	
NICKY LE FEUVRE <i>Equipe Simone-Sagesse, University of Toulouse-Le Mirail, France</i>	290
ROSI BRAIDOTTI <i>Utrecht University, The Netherlands</i>	300
SESSION DEBATE	306
SESSION REPORT	
HILDA RØMER CHRISTENSEN <i>University of Copenhagen, Denmark</i>	307

CHAPTER 9	311
BEYOND FACTS AND FIGURES: PHILOSOPHICAL PERSPECTIVES	
GENEVIÈVE FRAISSE	
<i>Member of the European Parliament, Philosopher, National Centre for Scientific Research (CNRS), France</i>	313
<i>How can women's standpoint advance the growth of scientific knowledge?</i>	
SANDRA HARDING <i>UCLA, United States</i>	316
ANNEX	323
BIOGRAPHIC DETAILS	

INTRODUCTION

This publication is the result of a two-day conference, organised by the Women and Science Unit of the Directorate-General for Research, in November 2001. The objective of this event was to present the results achieved since the women and science activities were launched in 1999. It also served to give new momentum to work undertaken to integrate the gender dimension into European research, and provided a context for discussing how the place and role of women could be strengthened in the European Research Area.

During this conference, we heard about the political commitment that has been made to promote equality in scientific research at European Union level and beyond. We also heard about the great efforts that have been made to date by the European Commission to integrate the gender dimension into research policy in a practical and concrete way. It was generally agreed that the women and science debate at European level has “moved up another gear”.

The conference discussions demonstrated quite clearly the many different factors contributing to the under-representation of women in science and the lack of attention to gender in scientific research. They also illustrated the need for co-ordinated and determined action if the situation is to be improved. In this regard, I would like to set out here the areas of action that we intend to pursue in the coming years. These will clearly only be fruitful if we can count on the support and commitment of all the stakeholders involved.

The Helsinki Group on Women and Science is a wonderful example of co-operation between national and European levels, and this is largely due to the energy and commitment of its members. The Commission will, of course, continue to support the work of this vital group, and also to encourage transnational and trans-regional co-operation.

We now need to broaden the debate and step up the dialogue. No one, person or institution, can alone be responsible for change, each has its own important role to play. We also need to recognise that the promotion of women in science is a crucial factor in improving the science/society relationship. Clearly, we will not be able to close the gap between science and society effectively, until science better reflects the diversity of the population as a whole. In this context, the Commission's Action Plan on Science and Society, adopted in December last year, contains four new women and science actions designed to widen the horizons of our work and to *extend the policy debate* to include new actors.

Until now, our action has focused on the situation facing female scientists in academic institutions and public research bodies. However, the *private sector* is responsible for at least 60% of scientific research and almost no data exist on the women working there. We have therefore created a high-level expert group to analyse the situation and enable us to draw upon the great potential offered by women in industrial research.

Our second new line of action will focus on the *enlargement process*. The initial ETAN report, which provided the basis for launching our work on women and science, looked essentially at the situation in the European Union Member States. Hence it did not take account of the specific characteristics of the situation facing female scientists in Central and Eastern Europe and the Baltic States. Here again, we intend to set up a high-level expert group in order to develop a coherent strategy to promote equality in science in these countries.

Thirdly, we will consider how to better involve and mobilise women in their research labs. For this, we intend to bring together networks at European level, with the creation of a *European Platform of Women Scientists*. Such a structure would provide a means for supporting and empowering female scientists in their careers, promoting their participation in European research and enabling them to push for change in the policies and processes governing research policy.

Our fourth area of action involves the production of *gendered indicators* to monitor progress towards gender equality in European research. These will correspond to the following key policy objectives: increasing the number of women in science; reducing both horizontal and vertical segregation; eliminating pay gaps; and ensuring fairness and equity.

In parallel, we also intend to *step up our efforts to integrate the gender dimension* into the Framework Programme. We will maintain the 40% target for the participation of women in panels and committees, which has proven a successful strategy, and seek to implement the recommendations of the Gender Impact Assessment Studies. This will include encouraging contractors to contribute to more gender equality within their projects and taking account of the gender dimension in the evaluation process. Finally, and in order to remain ahead, we need to develop *a better understanding of the gender issue in scientific research*. In order to do so, we propose to focus efforts along the following lines: measurement and qualification of women's presence in scientific research; analysis of the functioning of the scientific system to understand and challenge horizontal and vertical segregation; assessment of policies implemented to promote gender equality in scientific research; and analysis of the history, sociology and philosophy of science to the extent that it improves the understanding of the gender issue in science.

To conclude, I think we can sum up the situation as follows: "a lot done, a lot still to do"! The work accomplished to date has been considerable, but considerable inequalities remain. The pace of change needs to be tackled now. As Director-General for Research, I can confirm that the Commission will continue to act as a catalyst, pushing for equality in scientific research at European level and beyond.

A handwritten signature in black ink, consisting of a large, stylized 'A' followed by several vertical and horizontal strokes, all enclosed within a large, sweeping oval shape.

ACHILLEAS MITSOS

Director-General for Research



CHAPTER I

“A LOT DONE, A LOT STILL TO DO”

The opening session of the conference set the scene with regard to recent progress made in gender and research. Representatives from the European Commission, the European Parliament and the Member States – notably Belgium, which, at the time, was holding the Presidency of the Council of Ministers – outlined the importance of women in science and the role being played by the various institutions to further this issue. It was recognised that, while the percentage of women is increasing in a range of fields, it is not increasing across all sectors or at all levels of the hierarchy. Much progress has been made, but there is still much to be done, with the European institutions having a key role to play. In particular, the forthcoming Sixth Framework Programme for research was seen as offering an opportunity to integrate more deeply the gender dimension into European research, particularly in the context of setting up the European Research Area.

LAURETTE ONKELINX

Deputy Prime Minister, Minister for Employment and Equal Opportunities Policy, Belgium

“Lines of scholars, maverick prize winners, forgotten women...” This is how the French newspaper *Le Monde* headlined an article devoted to the history of the Nobel Prize. The *Le Monde* journalist went on: “Nobel Prize winners are just like the members of any family. There are some well-behaved children and some black sheep. Then there are the unloved ones, the forgotten ones, those who – unfairly? – have been left out in the cold.” (*Le Monde*, 5 October 2001).

Of the 469 Nobel Prize medals awarded in the three main scientific disciplines (medicine, physics and chemistry), only 12 have gone to women, including Marie Curie, who was awarded the Nobel Prize on two occasions: for physics in 1903 and for chemistry in 1911. In their defence, the Nobel Prize judges could say that this under-representation of women is merely a reflection of women’s place in the world of research. They share their marginal position with the southern countries which, with a few rare exceptions, are generally excluded from the Nobel Prize ceremony. Awarding a scientist from a southern country would undoubtedly be a victory for our efforts to promote equality. Pending that, it is necessary, more than ever, to try to understand better the reasons why women continue to get a bad deal in the field of science, and to take the measures needed to remedy the situation.

How can we explain that, despite an unprecedented boom in the last 30 years in women’s higher education and activity in all European countries, women still play a minor role in higher scientific and technical studies and professions? While it is true that some changes have occurred – women have progressed in life sciences (biology, medicine, pharmacy) and related fields (chemistry, agronomy) and architecture – male hegemony persists in the study of “difficult” sciences. These “difficult” sciences, such as mathematics, physics and engineering, still attract more male scientists. The scarce data at our disposal indicate that men are in the majority in private sector professions (industry, business services) and slightly less so in public sector professions that are allegedly more egalitarian (higher education and research). It has now been established that this sex-based segregation, in education and professional fields, is partly due to another form of segregation: the gradual elimination of girls and women throughout the more selective education and professional courses, which lead to positions with power. In most countries and most fields, including those in which women are represented at the bottom of the ladder, qualified women rarely get to the very top. They represent a large majority of primary teachers, nurses, laboratory workers, half of the secondary teachers (though there are often fewer of them teaching mathematics, physics and technology), 10 to 30% of young engineers and fewer than 10% of university professors and top researchers. Only exceptionally do they occupy the chairs of universities, scientific organisations or large firms.

Some figures concerning the situation in Belgium are revealing. In 1999, the Belgian Royal Academy of Science, Letters and Fine Arts had only two women among its 29 members (7%). At the National Scientific Research Fund, only 13 of the 26 scientific committees have a woman among their members, and only 11% of the members of those committees are women. Similarly, there are four times as many applications from men as there are from women for grants from that body, and the grants that are awarded are split between the two sexes in similar proportions. These findings raise the question whether there are clearly identifiable factors which could be influenced to initiate the desired change. Clearly, in this area, as in many others, we are confronted with the notorious “chicken and egg” situation. Far from there being a single cause, we have to deal with a series of factors which interact to form a complex chain of causality, making it necessary to take diversified action on a number of fronts.

Thus, I wish to express my full support for the initiative that the Commission has taken in organising this high-level European conference, which is stimulating in two ways:

- It opens the prospect of change by highlighting the results of the Women and Science action plan implemented by the European Commission since 1999 – in particular, the Gender Impact Assessment Studies and the work of the Helsinki Group – outlining new perspectives for the 6th Framework Programme.
- On the basis of the results, it will give a fresh boost for integrating the gender dimension and equality into European research, particularly in the context of establishing the European Research Area.

It is crucial that the changes resulting from these actions are exploited to counter the tendency to regard inequalities between women and men as being inevitable, especially at the workplace. I would like to single out two points that I consider are priorities, both in Belgium, as Minister for Employment and Equal Opportunities Policy, and at European level, in the context of the Belgian Presidency of the European Union. The first point is the production of statistics broken down by sex and quantified indicators and the second is action to make science and technology more attractive to girls.

1. Production of statistics broken down by sex and quantified indicators

The tendency to regard inequality as being inevitable is usually rooted in the ignorance of facts and the absence of quantified data. Science and technology is no exception. For too long, inequality in terms of access and position of women and men in science and technology, was virtually impossible to measure accurately because of the absence of data broken down by sex.

Despite the major efforts undertaken by the European Commission to encourage the production of reliable statistical data at European level and in the Member States, we still do not have all the data needed to diagnose the problems encountered and formulate suitable policies.

Consequently, it is still difficult to portray accurately the situation of women in science, engineering and technology, or make systematic transnational comparisons or even record the trend over time. Statistics broken down by sex should therefore be collected, compiled, analysed, harmonised and regularly circulated at institutional, local, regional, national and EU levels. We can look, for example, at the results of a survey that I requested to be carried out on the employment of women in private sector research in Belgium. The results reveal that the question concerning the sex of employees was introduced by the federal services for scientific policy only in 1998! The first figures indicated that, in 1999, women represented just under 30% of the research and development personnel of the firms concerned.

Given the considerable potential regarding jobs for women in the research and development departments of private European firms, it seemed worthwhile to include “women and science” in the activities to promote equality within the Belgian Presidency. Accordingly, an exploratory study was launched to make a first quantitative and qualitative assessment, on a European scale, of the situation regarding the employment of women in private sector research. This complemented various gender mainstreaming exercises undertaken by Belgium, as part of the follow-up on the implementation of the Platform for Action, adopted by the EU at the Beijing World Conference in 1995¹. The exploratory

¹ These exercises are aimed at strengthening women's socio-economic position. In particular, they intend to develop indicators of wage inequalities between women and men, taking into account the gender and equality dimension in the Broad Economic Policy Guidelines (BEPGs) and to organise a high-level international conference on integrating a gender and equality approach into governmental budget policies.

research proposed to the Commission by the Belgian Presidency aims to improve basic knowledge concerning the participation of women in private sector research in the EU by:

- highlighting existing data and studies;
- building or improving comparable high-quality databases;
- identifying good practices;
- recommending policy measures, and
- proposing monitoring indicators.

This research would be a first step to fill the current information gaps concerning the situation on the employment of women and men in the public and private sectors. So far, most of the data collection and analysis work has related to the public sector where government responsibility is more directly involved. In this area, there are still some deplorable shortcomings at EU level with regard to the systematisation and harmonisation of data, and work should be carried out in order to:

- unravel the complex mechanisms which produce and reproduce inequalities;
- develop a non-sexist concept of scientific excellence and merit;
- develop the scientific agenda on the basis of the new prospects opened up by women's studies and research, which now exist in most European universities. (These are arousing great interest among male and female students in both human sciences and exact sciences), and
- develop indicators in order to monitor and benchmark the trend of women's situation in university research.

It is not enough to know how many men and women are working at a given time in a particular sector and what sort of job they are doing. In order to describe the status of women and men in scientific careers and to guide policy in this area, it is necessary to establish a genuine system of interconnected indicators which, in addition to providing information, can become an efficient policy planning and evaluation tool. Given the enormous investments in research and development by private firms, supported by considerable public aid, it seems clear that it is equally essential to have more detailed knowledge concerning scientific career possibilities for women in the private sector.

2. Making science and technology attractive to girls

For many years questions have been asked about the lack of interest among girls and young women for scientific or technological studies and careers. This is obviously a major challenge for the educational community. Many successful experiments have been attempted, but few of them have been reproduced on a sufficiently wide scale to generate significant effects. It has been demonstrated that awareness of the diversity of learning methods, in particular sex-based, may result in using new teaching approaches that are more attractive to girls. Locating computer studies within mathematics departments, for example, is prejudicial to girls since they are often not particularly attracted to maths. But it is possible to hate maths and love computer studies!

Study programmes, teaching schemes and the media must combat sexist stereotypes about science and technology. The aim is to enable boys and girls to opt for subjects of their choice and succeed, irrespectively of any stereotype. Young people need to refer to role models when they chose a particular line of education. The comparative absence of women from science departments is therefore a problem. The example of the Nobel Prize winners mentioned earlier is also significant. Several strategies to encourage young women to take on a scientific or technical career should be pursued simultaneously: enhancement of role models, establishment of mentoring systems and

networks, promotion of scholarships for scientific and technological studies and jobs for women, and back-to-work modules for unemployed women, etc.

In Belgium, several large-scale schemes have been launched to encourage girls and women to opt for studies and training to carry out a career in the information and communication technologies sector, which is expanding and where there is a constant shortage of qualified workers. The European Commission estimated that 1.6 million jobs would need to be created in Western Europe by 2002 to satisfy the demand for information and communication technologies, and that 35,000 jobs would need to be filled in Belgium alone. However, these technologies are to a large extent used and mastered by men. Less than 30% of Belgian Internet users are women² and only 17% of the firms in this sector are run by women³. It is therefore likely that there will be an increase of both horizontal (almost only men in these sectors) and vertical (only men in decision-making positions) segregation, and hence a social division.

On the basis of this, in partnership with various women's training associations and with the assistance of the European Social Fund, the Ministry for Employment and Labour has set up the Electronica project comprising:

- a wide-ranging information campaign;
- an inventory of existing training opportunities for new information and communication technologies;
- awareness-raising modules for institutions for the placement of job seekers, training centres and ultimately firms and human resources managers, and
- collaboration with the network of bodies for the training of women in computing.

The awareness-raising campaign is intended to encourage women of all ages to go on training to access careers in network management, programming and telecommunications and not only in office automation as is often the case at present. This campaign also intends to sweep away employers' prejudices such as "computer experts are always men", and thereby encourage them to take on women.

Further action was taken following the first interministerial meeting on equal opportunities, in November 2000, which was attended by representatives of the Belgian Federal State and the three language communities and regions. The responsible ministers, at these different governmental levels, agreed that it was necessary to co-operate in order to guarantee effective equality of access to information and communication technologies for both women and men. The action to be taken under the agreement signed in November 2001 will address equal access for women in three areas:

- information and communication technologies;
- trades which, as a result of the digitisation of production, have undergone considerable technological changes, and
- "e-government" which is designed to enable all citizens and firms to be informed in a user-friendly way and to carry out transactions with all the authorities in an environment combining confidentiality and security.

At the level of the Belgian Federal State, assistance will be provided from a new technologies adaptation fund. This fund was created by the Council of Ministers in 2000 and will be managed and

² InSites figures 1 May 2000.

³ Vacature figures July 2000.

financed jointly by the regional and federal authorities. The aim is to fund schemes addressing more effectively the needs imposed by the information society and by information and communication technologies. A gender dimension will be introduced in the selection of funding applications by means of quantitative targets (participation rate of women in funded schemes and/or proportion of funded schemes specifically intended for women).

By giving a few examples of measures introduced in Belgium, I wanted to emphasise Belgium's desire to continue the efforts undertaken to promote the role of women in science and technology, concordant with the Council resolution on women in science of July 2001. In this resolution, the Council strongly urges the Commission to achieve its objective of 40% participation for women at all levels of implementation and management of the research programmes. By way of conclusion, I would like to reiterate my support for this approach based on quantified targets which, whatever people may say, has shown to be the only realistic approach towards equality between women and men.

ERYL MARGARET MCNALLY

Member of the European Parliament, Member of the Parliamentary Committee on Industry, External Trade, Research and Energy, United Kingdom

I am delighted that a “Women and Science” unit has been established in the Directorate-General for Research. This recognises the importance of the work in this area. Without the collection of statistics, initiatives all over the world, benchmarking exercises, we wouldn’t know if we have made any progress.

The European Parliament is far more feminised than most parliaments, except those in the Nordic countries: it is 30% female. Just as it’s important to have female scientists and researchers, it’s important to have female decision-makers.

The Committee on Research, as well as the one on Women’s Rights, have carefully examined the proposal for the 6th Framework Programme and have submitted many amendments to it. It has been ensured that there are references to the importance of women in science and more money has been put in strategic places. We hope this will be accepted by the Council of Ministers. The European Parliament is a co-decision legislator for research. This means that, together with the Council of Ministers, it looks at the suggestions made by the Commission and, where necessary, amends them. These amendments are thus considered by the research Ministers from each Member State. Although the European Parliament fully commends the idea of a European Research Area, its amendments are largely reminding the Commission and the Council of the importance of focusing actions and having targets. We also hope to double the amount of money dedicated to science and society, where women and science is incorporated, from € 50 million to € 100 million. It is still not enough, but would be a good help. We are also trying to increase the budget foreseen on international activities. I very much hope that if this is agreed, a proportion of the money will be earmarked to ensure that the good work on women and science, undertaken in countries outside the European Union, is encouraged. Networking, benchmarking and special initiatives are part of that expenditure. That is the intention of the European Parliament.

The European Union isn’t a fortress looking only within its own borders. It has 370 million inhabitants and it’s very important that we, as a reasonably large block of people in the world, look elsewhere to see where there is good practice. I am delighted to see representatives from countries throughout the world, including Candidate Countries, who I know have made enormous efforts. We do need to learn from them.

Moreover, it would be easy to be self-congratulatory and complacent these days, but that would be a mistake. Some people, usually not female, say “Women’s rights? Didn’t you do all that in the 1970s?” There is a long way to go and the tools which are going to be presented in more detail, such as the Gender Impact Assessment Studies and the benchmarking will show us how far we still have to go. I am looking forward to the reports of the thematic sessions of the conference where we will learn about what has happened in practice. It will be interesting to look, for example, at the field of energy. One day, I would like to come to the conference and hear of enormous progress in women’s role in that sector.

We shouldn’t imagine that women and science is restricted to research. We are emphasising that aspect here, but science affects almost every policy of the European Union and I would like to see areas such as environment, health, transport and agriculture, to also be subject to gender

assessment carried out in the research field. Those areas are strongly science-based. The issues to be considered here are those of ethics, priorities and choice and difference of impact. The members of the European Parliament, not only within the Research Committee, are constantly urging all Directorates-General to ensure that they are mainstreaming gender issues. Some are doing it better than others, and I hope that Mr Prodi will soon call those Directors-General and Commissioners, who are responsible for mainstreaming, to account for it.

We need women as scientists. But flanking measures means that we also need female entrepreneurs. Scientists and entrepreneurs are not mutually exclusive. Why aren't some female scientists setting up their own businesses and industries based on their technical knowledge? What is preventing entrepreneurship from flowering fully in the case of female scientists?

We need women as decision-makers. We need women where laws are passed and funding allocated. As it's not easy to operate in the world of politics as a woman, in some countries and under some circumstances, political parties have a role to play to make that easier. We particularly need female decision-makers in areas such as economics and finance. Unless money is placed where the ideas are, success is unlikely.

We need women as opinion formers. In order to be a good opinion former, we need the tools. That means understanding the physical world and how it operates, and it means understanding technology so that we can explain and make decisions.

Well, as my much travelled Prime Minister often says, "a lot done, a lot still to do". I think that could be our motto for the day, but let's not be discouraged, we have done a lot.

The background of the page features a series of light gray, wavy, horizontal lines that sweep across the upper half. On the right side, there are several light gray, five-pointed stars of varying sizes, arranged in a pattern reminiscent of the European Union flag. The overall aesthetic is clean and modern.

CHAPTER 2

MINISTERIAL ROUND TABLE

The ministerial round table provided an opportunity to hear about a wide range of policies affecting women in science, not just in the European Union and Candidate Countries, but also in Morocco and South Africa. Each country has a different perspective and different experience, from those with a long history of gender equality issues to the unique socio-political history of South Africa. Besides looking at historical developments, information was provided on current statistics, work in progress and new initiatives being taken at a political level.

FRANÇOIS-XAVIER DE DONNEA

Minister President, Government of Brussels-Capital Region, Minister of State, President of the European Research Council, Belgium

First of all, I would like to express my satisfaction with the importance given to the place of women in research within the European Union, as shown by the growing and intense inter-institutional debates on this essential topic, between the Commission, the Council and the European Parliament.

Appropriately, the Commission launched a debate on women and science through its Communication of 17 February 1999 and its Working document on 15 May 2001. The Commission also set up the Helsinki Group on Women and Science in November 1999, which I would like to congratulate on its excellent quality of work. The Council has adopted two resolutions, on 20 May 1999 and 3 July 2001 respectively, in order to maintain political pressure. The Parliament has also been active as it adopted a well motivated resolution on 3 February 2000 about this issue. These initiatives are only part of the actions that have been carried out. On this basis, progress has already been noted in favour of a wider participation of women in research activities. This progress must, however, be considered as insufficient when comparing it with the objectives to be pursued, so efforts must therefore be maintained.

It is a crucial issue. The reasons are neither emotional nor sentimental; the main purpose is efficiency. Women are excellent at research, probably because research activities not only require a great deal of creativity, but also long-term energy, tenacity, endurance and abnegation, that is, qualities which women – let's admit it Gentlemen – are often stronger at. I am convinced that historical studies would easily demonstrate the extent of women's contribution to research and science, in spite of the very small space society left to their initiatives. Society should encourage women to find their vocation in sciences. The question is to decide which strategy to adopt in order to reach that goal.

The reference documents I have mentioned describe in detail the ways to proceed. Of course, fixing percentages and figures to define the goals, enables a statistical assessment of the improvements resulting from the initiatives, as well as an assessment of their impact. Of course, it is wise to encourage women's participation in research committees and expert groups. But, beyond these indispensable measures, I would like to emphasise the necessity to change mentalities. It is necessary to inform young girls and young women, schoolgirls and students, on how women contributed to the scientific process and, above all, to make sure they become sensitive and motivated to embrace a scientific career.

An essential tool consists of integrating the gender dimension into research. With respect to this, I would like to praise the initiative of the Commission to establish a European network of scientific women. This is an initiative that will give a higher profile to this essential dimension. In terms of visibility, it is also a question of valuing areas in which this dimension is most clearly present. Women should perceive the attractiveness of research careers through this privileged channel. These areas concern, for instance, research about the quality of life, ethics and public health, especially when there are specific concerns for women, but also urban development and transport policies where the particular needs of women must be integrated. These areas can at least attract more women to science so that they can be widely integrated in research. Furthermore, the Belgian Presidency, as you know, has insisted very much on the necessity to encourage the mobility of researchers. In this respect, women are frequently confronted with numerous obstacles that are difficult to

manage. Women must be given the tools which will allow them to overcome these obstacles and thereby facilitate their mobility which is crucial for the vitality and creativity of scientific work.

Society as a whole will benefit from all the advantages brought about by the participation of women in research. But there are two important conditions to fulfil: one is to eliminate all the obstacles preventing the participation of women in research and, secondly, one has to make science and research careers more attractive to women. These are the two main objectives to which we should be giving our attention today.

FRANÇOISE DUPUIS¹

Minister for Higher Education, Further Education and Scientific Research, Belgium

Belgium is a complicated country. It comprises a federal body and federated bodies and, at the behest of Ms Onkelinx, it has become a specialist in mainstreaming. We have 17 Ministers who signed a co-operation agreement on women and technology, which reaches beyond the area of education as it also affects people who are involved in career guidance and the fight against unemployment. I think it is very important to mention this initiative as it underscores the importance of women in technology.

As for the sectors for which I am responsible under the present government, from an administrative point of view, we've been able to increase our funds for actions by 33%. Equal opportunities for the French speaking Community has received a 33% increase in financing. We are undertaking work which will improve our educational system in respect of equal opportunities. We do this on a basis of "transversalité" in French, which is called mainstreaming in English.

I have been working actively on the issues of women in research and women in science for the last few years. There are considerable deficits in a number of European Member States. At a higher educational level it would appear that students, mainly female, are more and more resolved to engage in "difficult studies", those related to science and technology. But I think that there is a degree of pessimism, which reigns amongst youth in this respect. We need to multiply specially targeted and research-oriented actions as well as consciousness-raising exercises to overcome the problem of increasing female participation in science and technology studies.

One example is a study which aims to describe and analyse those processes which govern the access of female professors to science and technology posts in academia. It's a stocktaking exercise. It has allowed us to develop a list of cases of discrimination that will serve as a further source of study. Women represent only 13% of academic professorial staff (expressed as a percentage of full time employment posts). Furthermore, women are less and less apparent as one moves up the hierarchical ladder. Progress needs to be made: 41% of the teaching staff are women but they only represent 7% of ordinary professors, that is, the highest level of teaching staff in higher education. This should be compared with the fact that girls represent 52% of the student population. This disparity can be explained by a number of reasons, but my comments are just that this is an area where our efforts need to be better focused. Classical analysis has indicated that in science, engineering and technical studies, only 2% of the professors are women. This is considerably less than in the humanities and the social sciences. A gap or division has developed over time.

Another type of basic research, carried out by the department of science at university level, aims to develop a number of instruments, which will facilitate access of young women, particularly among immigrant populations, to these areas. In Belgium there are many female students who are from third countries. They are immigrants, or from immigrant backgrounds, and thus have particular characteristics to be addressed. We need to encourage them to engage in more scientifically oriented studies so that scientific research can serve as a vehicle for social mobility for individuals from less favoured socio-economic groups. A number of actions are being set up to that effect. For instance, we have carried out a study, which will allow us to understand the way in which these

¹ This contribution is based on the tape transcription of the simultaneous interpretation of the presentation given in French during the conference and has not been revised by the speaker

women perceive scientific studies and career positions. The aim, ultimately, is to facilitate women's access to these. We will then carry out pilot actions for raising awareness amongst female students in the professional circles, academia and even in basic elementary or primary education.

I should add that scientific studies are not more difficult than others are, and constitute a source of diversity and richness. A great deal remains to be done to change people's perceptions of what scientists, chemists or physicists do.

I should conclude by mentioning the working group that has been set up for those who are interested in institutions of higher education. I have a few years mandate, which I will try to use to get to the root of the matter. I am also in favour of promoting activities to increase the percentage of women in professions. We have to do as much as we can to rectify the situation and make progress.

National Contact Centre “Women and Science” of the Czech Republic

JOSEF PRUSA

*Vice Minister for Higher Education, Science and Research, Ministry of Education, Youth and Sports,
Czech Republic*

Let me thank you for the interest shown concerning the support of female scientists in the Czech Republic and their participation in the 6th Framework Programme. I confirm the principle interest of the Czech Republic in developing all the gender-related activities in European research. The scientific policy in the Czech Republic comprises some new initiatives and I would like to provide an overview of these developments.

First of all, there has been the creation of the new National Contact Centre “Women and Science” which opened this year and which is supported financially by the Ministry of Education, Youth and Sports. The decision to establish the Centre was not accidental but related to the resolution of the Government on the National Policy of Research and Development in the Czech Republic. This resolution “binds all the state-supported bodies and agencies financing research and development to gradually develop procedures to ensure equal opportunities between men and women in this field of human activity”. The Centre is a specialised, independent institution, set up by the Minister of Education to establish a national scientific policy and has the following tasks:

- To implement binding European standards on equal opportunity policies for men and women in the field of Czech Research and Development.
- To provide institutional support for women entering research and development;
- To support the expansion of the option for Czech female scientists to participate in scientific projects and programmes within the European Union (EU).

The Centre will also mediate the inclusion of Czech women working in research and development in the networks of EU institutions in this field. This should result in strengthening the compatibility of the strategies of Czech research and development institutions with similar processes in EU countries. Our goal is to take as much advantage as possible of the potential which women in science hold for the modernisation of Czech research and development. We understand our modernisation not only as a redefinition of priorities so that they become compatible with the European intentions for individual fields of research and development, but also as a change in the quality of human resources. The concept of an extensive modernisation of human resources is the key to the realisation of the above mentioned objectives concerning equal opportunity for men and women in this demanding sector of research and development. In this entire process, the Centre is not only to play an irreplaceable role as the carrier of an information database but also as the initiator to correct relations between the sexes; it should have a positive impact, increasing the efficiency of Czech research and development.

In addition, the “Women and Science” Centre will also:

- stimulate the participation of female scientists in projects specifically dealing with women’s issues and which have so far been perceived as problematic, that is, they have faced problems obtaining grant support;

- create alphabetical directories of women in research and development in the Czech Republic, allowing the provision of information on their opportunities and specialisation, both to national and European institutions in research and development;
- provide assistance to women, in particular graduates and Ph.D. applicants, when applying for projects under European scientific programmes;
- offer consultations about programmes and scientific educational programmes for women in Czech science;
- create similar regional centres in three other cities in the Czech Republic.

One concrete example of the activities of the newly created Centre “Women and Science” will be the publication of an interactive online information bulletin “Women and Science in the Czech Republic” in 2002.

For the development of its activities, the Centre is counting on co-operation from other contact organisations in this field, the organisation of open presentations of its own activities and multilateral support for the development of personal contacts between Czech women in research and development. Therefore we decided that the central activities should be guaranteed by the Czech Steering Committee, which I believe we have accomplished.

All the activities at the Centre “Women and Science” will contribute to the efforts of the Czech academy of science, universities and other structures of research and development. I believe that the founding of the Centre will bring about a significant qualitative change. We expect that it will contribute both to integrating the gender dimension into Czech science as well as to the further interconnection of the Czech Republic within European research.

Women and science in Luxembourg²

ERNA HENNICOT-SCHOEPGES

Minister for Culture, Higher Education and Research, Luxembourg

I would first like to congratulate the Belgian Presidency on having put this issue on the agenda. We have made quite some progress since 1998 when the Commission and Minister John Battle, President of the Council at that time, launched the first conference of this kind. In 1998, we were focusing on equal opportunities for the Fifth Framework Programme. Today, we are putting the finishing touches to the Sixth Framework Programme. Furthermore, the 2001 Council resolution on Science and Society and Women in Science invites us all to take an active role in the integration of gender equality at a national and international level.

Regarding the development of public science in Luxembourg, it is only quite recently, in 1987, that legislation was passed to set up public research centres whereby the State budget would fund research. Research was already carried out in Luxembourg, but it was funded by private business. At the turn of the last century, the steel industry was particularly famous for its research on problems connected with the industrial revolution.

In Luxembourg, we don't have a fully fledged university yet: students from Luxembourg can spend one to two years at the "Centre universitaire" and then leave to continue their university studies in another European country or outside Europe. Students can apply for special financial aid, a loan and grant system that enables them to fund their studies. Currently, the necessary steps are being taken to develop our university system towards a real University of Luxembourg in co-operation with universities in other countries. We will make sure that the mobility aspect will be built into our system and we want our university to take full account of inter-university co-operation. This new structure will be based on the principles of equal opportunities.

Our National Research Fund was set up in 1999 as an instrument designed to fund multi-annual, multi-disciplinary research programmes. It is currently developing a programme in the socio-economic area in which gender and research on women's issues will play an important role. There will be a first call for tender for projects by summer 2002. Since 1995, at the initiative of our Prime Minister, Jean-Claude Juncker, Luxembourg has a Ministry responsible for promoting women's issues, the Ministry for the Advancement of Women. There is close co-operation between this Ministry and the Ministry for Research concerning issues relating to women and science. I would also like to mention that the number of women awarded national research training grants has increased from 16% in 1987 to 43% in 2000.

The gender issue doesn't only affect adults and adult students. We also have to bear in mind young people who are starting a career, those who are just thinking about a career, and those who have not even started thinking about it. Women's interest in science has a lot to do with how girls feel about their role in society. Our Ministry for the Advancement of Women has started a project focusing on pre-school children entitled "Sharing Equality". The main aim is to undermine stereotypes so that we have de facto equality between men and women, right from the outset,

² This contribution is based on the tape transcription of the simultaneous interpretation of the presentation given in French during the conference.

when they start their education. One example of a way to reach out to young people is the highly successful Commission exhibition “The other half of science”, which is presented to schools throughout the country. As part of the efforts to raise girls’ awareness, we recently launched the programme called “ADA LOVELACE”. Ada Lovelace was the daughter of Lord Byron and the first information technology expert. The Higher Institute of Technology in Luxembourg and the Polytechnic in Trier, Germany, are working together on this project. The idea is to have women working in a technical field playing a mentoring role for young girls wanting to become engineers. Progress has already been made and more young women have signed up to the Higher Institute of Technology: 10% in 2000 compared with 4% in 1995. In 1999, a private organisation, the ZONTA club, launched a prize for women undertaking science and technology studies, and in 2000, that prize was awarded to a Chinese student working in the electronic department in the Higher Institute of Technology. This award to an immigrant young woman demonstrates our wish for co-operation beyond the frontiers of Europe.

I’d like to end by emphasising that the role Europe has to play, when drafting legislation and putting principles in place, is vital. We would not have made the progress we’ve made, without the European equal opportunities directives. We should be grateful for this initiative on women and science, because it really is an issue that has to be addressed. Is it normal that women are not present in high-tech areas or finance? In finance, very few women are in charge or are influencing the stock exchange. They are there to report on financial results but they are not involved, they’re not “in on the act”, when they are entitled to be. This is why we have to remain firm and resolute on this issue.

Gender and science in Sweden

AGNETA BLADH

Secretary of State, Ministry of Education and Research, Sweden

One of the most important factors contributing to gender equality in society is the understanding of social and cultural constructions of gender, that is, how we create gender and from time to time change the use of gender in ordinary life. Research, especially gender research and research with gender perspective, gives us knowledge to improve gender vision and take away gender blindness. Therefore, the Swedish government is very pleased that the Commission has taken the initiative to study the gender impact in the Fifth Framework Programme. We hope that the European Commission can implement some of the structural findings from these studies in the Sixth Framework Programme.

It must be made clear that gender research is a horizontal issue and funding of gender research projects must be carried out in all priority areas. We must mainstream gender in the European Research Area. It is often easier to see gender perspective relevance and positive implications in the humanities and social sciences, but gender perspectives are also highly relevant in medicine and in technical and natural sciences. Technical research forms the basis for the development of new technical products and industrial applications and, in that way, also to societal development. A society consists of both men and women. A gender perspective brings the experience of both men and women to medicine and technical and natural sciences. Culture and values influence knowledge and science. A gender perspective can help understanding values that are of great importance when it comes to the choice of scientific problems and issues. The person who defines a scientific problem, he or she, also influences the result of the research, as well as the conceptions of the world that science builds up and the techniques that it develops. Gender statistics and gender research are means to get an equal society.

Sweden considers gender equality issues an area of high priority. Gender equality is no longer a women's issue: it is a policy area affecting us all. It requires active efforts from both men and women in the public sector as well as the private sector. The Statement of Government Policy presented annually by the Prime Minister in the Swedish parliament is the fundamental document showing that the government considers – has to consider – equality between women and men in all decision-making. Every year since 1994, the Prime Minister has stated that a gender perspective shall be mainstreamed in all areas of policies and politics. This is of course also the case regarding governmental research policies.

I will give you an illustration of how values have changed over time regarding women and science. Uppsala University, the oldest institution in Sweden, was inaugurated in 1477, but the Swedish Universities only partly opened for women as late as in 1873. This means that men have had almost 400 years of advantage in higher education. The first post-graduated woman in Sweden obtained her degree in 1883 and, in 1923, a special law gave women the right to hold official positions, including positions at universities. The State's secondary schools were only for boys so a girl's possibilities of getting access to higher education were almost non-existent. The first professorship to be held by a woman was not until 1937. Fifty years later, at the end of the 1980s, female professors had increased in number to 84, which is 5% of the professors in Sweden. Today, approximately 13% of the professors in Sweden are women, that is more than 400. This shows that the direction is the right one but also that the process of change is slow.

This increase of female professors has not happened by itself. Measures were taken already in the 1970s and 1980s. Research councils set up positions for women and women organised themselves for women and gender studies in the universities. Several changes regarding family, social security and study allowances were also made during this period. These changes made it easier for women to do research but practical barriers still exist today. Even if the lack of female researchers is connected to elements outside the universities, informal rules within the universities and the scientific community play a decisive role. In the 1990s, the government found the promotion of women in science too slow and several measures were taken to increase the numbers of women in different positions at the universities and to make equality and gender issues transparent. The mainstreaming concept, which is the main strategy, was added to promote women in science. However, Sweden has also used the concept of double strategies, which means that both mainstreaming and special measures are used to make the gender equality work progress.

The most well known informative action in Sweden is the so-called THAM professorships, named after Carl Tham who was the Swedish Minister of Education and Research from 1994 to 1998. In 1995, the government created 32 special posts at full professor level. Men were allowed to apply but could only be given any of these positions if there were no suitable female candidates. In July 2000, after complaint, the European Court of Justice turned down these special efforts. Following the Court's decision, no new positions of this kind will be announced. Later investigations show that the Swedish court might have asked the wrong questions to the European Court of Justice.

Another way to increase the number of women in research, especially as professors, is to set targets. The Swedish government has set quality percentage targets in respect of the distribution of sexes among newly recruited professors. The goal is to have 25% female professors by the year 2008. The evaluation of recruitment targets from 1997 to 1999 indicated that most universities reached their target: universities in the technology field have the most successful recruitment rate of female professors compared with the recruitment base. New recruitment targets have been set for the period 2001-2004.

Recently, the Swedish legislation on appointing professorships as positions has changed to the appointment of professors according to merit. In other words, instead of having a certain number of professor chairs at the universities, one can get the title of professor when reaching a certain level of expertise assessed by a pair of individuals. We have been worried that this new legislation would counteract the efforts to increase the percentage of female professors. However, it seems to have positive effects on gender equality at the universities.

Though Sweden has a long tradition of working on gender equality issues, a lot still remains to be done. It is the structures that we hardly see that we have to change. It is social and cultural structures which take such a long time to change. We have to be persistent and continue to find solutions to speed up the process. Gender and science, both regarding the composition of personnel and gender research, are one of the most important ingredients in a strategy aimed at high quality research and a good research environment. Having more women in science contributes to diversity and broader perspectives. We have to take advantage of female scientists. But this is not enough, both men and women have to wear new glasses, so to speak, in order to detect gender perspectives in all types of research.

Gender and research in South Africa

BRIGITTE MABANDLA

Deputy Minister for Arts, Culture, Science and Technology, Republic of South Africa

1. Introduction

In this paper I intend to:

- sketch the status of women in science in South Africa;
- point to ways in which the unique socio-political history of South Africa has impacted upon gender and research;
- describe some of the current challenges, and
- point to policies and interventions that attempt to address these challenges.

2. The status of women in science in South Africa

An analysis of the quantitative indicators shows the same trend as in most countries around the world, namely, the higher the status and reward, the lower the percentage of women. In South Africa, universities constitute the domain most occupied with the development of scientific research. Therefore, the gender patterns evident in the national university system may be used as an important indicator of women's status in science.

2.1. Female university students

In general, the overall trends for female university students in South Africa seem to resonate with trends reported in several countries across the world, which may be summarised as follows:

- Rapid growth in the total number of female students since the early 1990s.
- Thinning out from undergraduate to postgraduate levels with the sharpest decrease at doctoral level.
- Gender bias in fields of study such that men still constitute the larger percentage of students in the natural sciences and engineering. According to a 1997 report, women constituted the majority in the fields of education, arts and social sciences and health sciences at universities. Women were a minority in sciences, business, law, architecture and environmental design and engineering. The gender gap was by far the greatest in engineering and engineering technology (Gender Equity Task Team, 1997).

2.2. Female academics

Internationally, the percentage of female academics has grown at a slower rate than for female students. South Africa is no different. The overall trend is that the higher the position in the academic hierarchy, the fewer the proportion of women. In South Africa, most female academics are clustered at the lower levels of the academic hierarchy as junior lecturers and lecturers, and for both part-time and permanent staff. However, there is a dramatic decrease in percentage as the rank increases in status with a stark gap at professorial level. At the lower level of lecturer women comprise about 50% but only about 10% of all professors are women. In management ranks, since the mid-1990s, there have been appointments of women at the level of vice-chancellor and deputy

vice-chancellor, but women are still in a minority at this level. Moreover, at the less visible middle-management level, men still form an overwhelming majority.

On the whole, the position of women in the South African universities mimics the international trend. This has been summarised simply as “the greater the status and monetary reward, the less likely there are to be women in organisational positions; and the greater the intellectual approbation, the less likely it is that what women do will be included within it” (Stanley, 1997, p. 5).

2.3. Research resources and gender

Annually, the Department of Arts, Culture, Science and Technology allocates a budget to the National Research Foundation, which is the single public funding agency responsible for research support to all the sciences in South Africa. Researchers apply for funding to the National Research Foundation, which allocates its budget on a competitive basis. A gendered analysis of the funding allocations gives a snapshot of gender and science in South Africa. In the 2000/2001 funding period, female scientists received only 20% of the total budget. An analysis of these figures by race and gender revealed that black women received only 5% of the total. This raises the issue of the impact of Apartheid and of the ways in which the unique socio-political history of South Africa has impacted upon gender and research.

3. The impact of Apartheid – unusual career profiles

Although there are similarities in the international and South African trends on gender, there is an important difference, and this relates to the significance of race. Women comprise about 54% of the total population in South Africa and black women comprise the majority of this group. Yet, in the domain of science, black women comprise a very small minority. The figures show indisputable evidence of gender discrimination but the impact thereof on women was filtered through a rigid system of race discrimination. This means that white women would have been negatively affected, but black women would have been subjected to the combined negative impact of both gender and race discrimination. At the formal demise of Apartheid in 1994, the South African University system was deeply divided along racial lines with gender disparities criss-crossing these divisions. Although quantitative data provides important information about trends and patterns, understanding gender relations requires an approach that goes beyond the figures. Numbers reveal only part of the story. Recent research on interviewed women in higher education has provided some important insights into the issues faced by South African women trying to succeed in the world of scientific research.

In many respects, many women, who are currently in higher education in South Africa, have a highly unusual career profile in comparison with international norms. A Ph.D. is generally considered a normal entry requirement for many of the high-level positions that these women hold. In South Africa, several women do not conform to these traditional standards having master degrees as the highest qualification. Furthermore, many women currently holding senior positions have not followed traditional career paths to their current positions. These apparent anomalies are explicable largely in terms of the major shift in South Africa’s recent socio-political history. Since the very beginning of higher education in South Africa, women, especially black women, were systematically excluded from positions of power and authority. During the years of Apartheid many black women had prioritised their activist responsibilities above their personal careers, of which very few had been planned. Although some black women now hold influential positions, formal career opportunities were stymied under discriminatory Apartheid circumstances. Overall, the lack of formal, technical knowledge can be ascribed to unconventional “struggle” career paths.

However, many women have noted the value of their years of informal, experimental learning through actual involvement in a wide range of organisations outside the academic field as equipping them with the skills to do their current jobs effectively. South Africa has a pool of women who have had a history of participation in a range of community activities including paid policy work, unpaid political/community work, union work, board memberships and paid work in non-governmental organisations. As one participant in a study commented: “we all do so many things in South Africa, because there’s so much that needs to be addressed in our society”.

Although South African women also express concerns that resonate with the concerns of women in similar positions in other parts of the world, such as gender-role conflict, there are certain aspects, which are specific to the current South African context. Chief amongst these is the high level of extra-institutional political experience that most participants bring to their leadership positions. A related aspect is the unconventionality of their career paths. These extraordinary socio-historical circumstances provide an important background for understanding the current challenges in relation to policy and implementation.

4. Challenges, policy and intervention

The institutionalisation of Apartheid in higher education was so entrenched that the eradication of its legacy is an ongoing task of monumental proportions. South African leaders in higher education face enormous challenges in the management of these concurrent change processes and their reverberations. All this in a climate of increasing funding pressure. Nonetheless, due to socio-political changes since 1994, gender and race are receiving more attention than ever before. Recent employment equity legislation has ensured that the climate is more conducive than it was previously to a focus on strategies for advancing women in science.

4.1. Professional development as a strategy

Because of the unique socio-political circumstances that meant that many women did not have access to formal skills development programmes, professional development targeted at women has been identified as a particular need. Apartheid resulted in many women having seemingly unconventional constellations of skills and competencies without necessarily having acquired basic technical skills. In a recent audit of professional development needs, the following sets of skills were identified.

4.1.1. Academic skills

Many women did not feel they were sufficiently competent in some academic areas. Research was a highly prioritised skill and even senior academic women holding professorships felt that there were gaps in their academic skills. Demand for academic skills was driven by the imperative to publish or perish, and by the emphasis on qualifications as a route to promotion and credibility in a competitive, critical and hierarchical environment. From several there was a demand for basic statistical skills. Other participants expressed a lack of confidence about writing and publishing.

4.1.2. Management skills

In the increasingly managerial climate of South African higher education, managerial skills such as financial management and systems planning skills, have become increasingly important. These technical skills are seen as markers of efficiency and criteria for promotion, advantaging men and

marginalising women. In the audit, the acquisition of financial acumen was seen as a means to boost senior women's credibility in a masculine context. Strategies for managing institutional politics, managing conflict, understanding policy and networking were all highly prioritised areas of expertise required by women who are aspiring to senior positions.

4.1.3. *Managing the time consequences of role-conflicts*

Stress and a constant battle against the clock were symptoms of gender role conflicts related to being professionals, mothers and wives. Conflicts included tensions between professional and domestic lives, which were predictably more severe for the mothers of young children. Participants' comments about stress and time management and career planning were linked, and were clustered around a series of role conflicts. Some women who had previously given much of their time to activist activities were now refocusing on their individual careers and expressed a need for career planning and mentoring.

4.2. *Policy and organisational change*

Although professional development programmes are worthy of support, it is important that we recognise the limitations of professional development as an individualistic strategy to address the issue of the structural exclusion of women from positions of power. Such a strategy is perhaps best employed in the context of a "multi-pronged" approach to address the issues.

In South Africa, as in other parts of the world, science in higher education is hierarchical and ostensibly meritocratic. Great emphasis is placed on the evaluation of capacities through peer-reviewed scholarships and graded levels of professional qualifications and professional advancement. Much of professional life in this sector, then, involves a *de facto* emphasis on individualist self-improvement through the development and demonstration of professional skills. Overt and continuing assessment of professional adequacy, versus deficit, is a feature of this environment, for which badges of academic competence are conditions of entry and ostensible, if not actual, criteria of legitimacy.

Although there is clearly a need for interventions aimed at professional development, there is also a need for changes in organisational policies and procedures. Since 1994, the South African government has enacted a range of policies and legislation towards the creation of an enabling framework. The employment equity legislation has already been mentioned. Equity has been identified as a priority in all policy documents on science and technology and it is identified as an imperative in the White Paper on Science and Technology and the National System of Innovation.

5. Conclusion

It is now time for South Africa to go beyond the stage of merely listing gender equity as a priority, we need to develop a national strategy on engendering science policy. This we need to do in collaboration with international governmental agencies, for as I noted at the outset, even though we have some unique factors, in many respects we show the same trends and patterns with regard to women in science.

References

- Gender Equity Task Team (GETT), *Gender equity in education*, Department of Education, Pretoria, South Africa, 1997.
- Stanley, L. (ed.), *Knowing feminisms: On academic borders, territories and tribes*, London Sage, 1997.

AÏCHA BELARBI

Ambassador, Moroccan Mission to the European Communities, Morocco

I would like to start by thanking Mr. Busquin and the organisers for involving Morocco and South Africa in this initiative. As a result, I hope that Europeans will become more aware of what's happening outside Europe, particularly in the Mediterranean area. I would also like to thank the Belgian Presidency for the particular attention that has been placed on women.

When women are involved in decision-making and policy-making, we find that women's issues gain in status. When dealing with gender and science the starting point is scientific knowledge. This is a world where power is wielded. To date it is men who wield power, women have been virtually invisible. The programme of the Helsinki Group for Women and Science speaks for itself. The question is, what chance do women have to help develop scientific knowledge? Furthermore, how much are they involved in decision-making with respect to scientific policy?

Let me make a brief aside into Greek mythology. Athena was an important goddess: patroness of the arts and sciences and political life. The move from science to politics is inevitable because once you have scientific knowledge you exercise influence on economics, on culture and, of course, on politics. Mythology tells us that Athena, who represented knowledge, came out of the head of her father, Zeus, the god of gods. This is very symbolic, the man gives birth to knowledge, so the direct transmission of knowledge is via the paternal line. Moreover, Athena was born when the god of war broke the head of Zeus, so science is violent. Athena was a warrior goddess and also a virgin. Do you need to be a virgin in order to have access to science and politics? Is it the chastity of the goddess that enabled her to access knowledge? To be chaste you have to have control of your body, to neutralise it, that is, you have to deny your feminine body.

These symbolic images are still relevant today, despite many economic, social and political changes. The question is, do women who devote their life to science and who succeed in science have to be strong? Do they need to have rich parents, a very powerful lineage? Does the force of science engender violence? Well, in the world today, when you look at what happened in the United States on the 11th of September, you can make a link between science, violence and men. It could also be said that scientific women shouldn't marry and have children because they have to devote themselves to science. It's hard to marry science and being a woman in science. While science is still masculine by nature, must a woman deny her feminine identity to get access to science as a researcher? Is it possible to maintain a feminine identity and yet make an impact in science? This would involve making changes in the world of science from the ground, bringing it feminine sensitivity and introducing different ways of doing things.

We are at the beginning of a new millennium and the world is currently in a process of multi-dimensional change; globalisation is multi-faceted. In addition to commercial and financial flows there are communication and information flows. We are getting more models of women in science testifying that research is an area which should be neutral. Science should be an area in which both men and women can produce, create, flourish and participate in society and the prosperity of that society. However, one of the concerns of our century is how to establish positive and solid relations between science, technology, gender and human rights. Another question is how science can contribute to the creation of synergy between further activities, including solidarity and peace, because these are the foundations of any development that is to be sustainable.

The fact that half of the women are working in public life and science is a sign of the second half of the 20th century for democratisation in society and more respect for human rights. Society is committing itself to equal opportunities and giving everyone access to citizenship. Back in the 19th century, progress was envisaged in the principle of equality between individuals. Another determining factor is that the rights of women, the increasing role of women, have gone hand in hand with the decline in patriarchy and patriarchal mentalities. Changes such as more girls going to school, women working, contraception and the emergence of social movements with women at the forefront have contributed towards wearing down the dominant patriarchal ideology and the scientific technological revolution and ideas. The changes in behaviour, democratisation, all these things that are underway, lead people to target different values, namely tolerance, dignity and respect of difference.

Let us look at the situation in Morocco. You cannot address scientific research and science without bringing up basic education. The advent of women in education was relatively late in Morocco. When Morocco became independent in 1956, 6% of girls went to school. These were urban girls, living in the cities. In the rural areas 0% of girls were in school. In 1956, there were 10 people with a “baccalauréat” or A level equivalent. In less than 40 years much has changed. The very powerful movement of 1956 to rush into education bore fruit in the 1980s, when 40% of our girls went to university. This happened because of the decentralisation of higher education in the 1980s which made it easier for girls to get to university (it is easier to go to a university close by than when you have to move to a big city 200 km away from your parents).

Since then, there has been considerable progress in respect of women’s role in science, scientific research and in scientific departments in universities. In 1998/1999, the percentage of girls taking the “baccalauréat” was 52% for literary studies, 40% for scientific studies and 43% for technical studies. This is huge progress. When it comes to university education, women account for 20% in mathematics, 16% in physics, 30% in chemistry and nearly 50% in biology. The Helsinki study has demonstrated a similar trend, namely that women are more active in the life sciences and areas that are closer to home life, like biology and medicine. 45% of the students in medicine are now girls and 45% of doctors are women. However, you don’t have similar figures in engineering and mathematics. Large numbers of women are teaching, particularly in scientific areas: 36% are teachers in science and 40% in literary subjects, but there are only about 6% of women teaching in the technology sector. Although women are now in the scientific sphere in larger numbers, they had to start at the grass-root level, so they’re not at the top of the hierarchical ladder yet, where men are still in majority. There are also literacy issues and family constraints on women having careers, just as in Europe but to different degrees.

North-South co-operation is needed in scientific research. Without assistance and co-operation, and not just some sort of North-South transfer, what we’re trying to build, as men and women, will not be completed. It will be a disabled world. We want to make sure that the Mediterranean area becomes a vast research field where women are more involved than ever before.

The conclusions that we reached at the Mediterranean ministerial conference, to integrate Mediterranean women in economic life, speak for themselves. In 2003 there will be another Euro-Mediterranean ministerial conference devoted to women’s issues. The question of women in research will be incorporated and there will also be a focus on training young people. Young people, after all, constitute the future, and we have to mobilise all young Europeans, including those of non-European background.

Athena is not alone anymore. We are opening up new ways of being, of behaving and acting and new ways of fulfilling ourselves, focusing on peace, tolerance and dignity, rather than on conquest and war. Science must not serve war in the future. Science must serve peace and friendship between peoples, and solidarity between the countries of the North and the South.

RAOUL KNEUCKER

Director-General, Federal Ministry of Education, Science and Culture, Austria

The Austrian Federal Minister for Education, Science and Culture, Elisabeth Gehrler, whom I have the honour to represent, suggested to me that I try to avoid the standard governmental speech, particularly the “national report” – even if Austria may be proud of recent developments with regard to its gender policy. We should rather address how to put research findings and recurring political promises into effective measures, at national levels as well as at European level. What will matter is making gender “*sense and sensibility*” a part of proactive governmental policies for science and technology. We still debate a European “work in progress”. My contribution is intended to add a new element to the spectrum of measures already mentioned by the panel members.

I would like to underline the view expressed by State Secretary Bladh of Sweden: gender mainstreaming is the most significant recent advance in gender policy. However, in implementing gender mainstreaming, we have to embed it in the organisational development undertaken in all (science) institutions:

- a fresh approach to information on gender questions as needed;
- training as being vital, and
- personnel and recruitment policy to be adjusted.

In order to be successful, the personnel departments, especially in state offices, will have to take gender neutrality into consideration whenever structural or organisational changes or reforms are designed and carried out. Every major recruitment or training measure is also to be analysed in terms of its effects on gender neutrality. Particularly in state offices, at the policy-making level, that is, ministers, governors, heads of divisions, etc. must make gender neutrality their personal concern in a credible way and ask for a monitoring of the developments. I strongly advocate the setting up of a training programme at European level, combined with benchmarking processes. Collecting the appropriate statistical data and elaborating indicators for comparative analyses are prerequisites.

Making gender mainstreaming a part of organisational development permits proper attention to be paid to each specific institutional situation – organisational theory teaches us that each situation, or each stage of institutional development, will have to be individually assessed and analysed before effective measures can be introduced. Indeed, it would not be sufficient to simply order gender mainstreaming to be a priority of organisational development. For instance, the context of the labour market is equally important as is restructuring departments in order to allow gender mainstreaming, or (re)training of personnel or making adjustments to working hours and salary schemes.

Gender mainstreaming in science institutions is inter alia confronted with the different institutional situations of universities and Fachhochschulen, of academies of science, of research institutes and industrial laboratories. It may also be confronted with the situation of personnel in research projects or programmes funded by the research promoting councils. These particular situations are the ones to be addressed and mended. Measures such as making gender mainstreaming one of the criteria for funding research may change personnel recruitment or restructuring departments very quickly.

The universities' responsibility will remain to carry out research on women's studies, gender studies and cultural studies. Innovation policy will have to appreciate that changes through gender mainstreaming will be innovative by themselves, as organisational development is a decisive element

of innovation in all institutions. In the school system, we need to change curricula, or establish special programmes for girls in technical professions, at an early age; or reform the teaching of mathematics and natural sciences in order to ensure gender neutrality in the curricula and in the class rooms. Universities and schools should be challenged to work jointly on such reforms. Last but not least, parents should be informed and become involved in the reforms.

I conclude on a personal note: I am delighted to be able to participate in this event. For me, as one of the responsible persons for gender mainstreaming in the Federal Ministry, it is a welcome personal training session, and not only a welcome opportunity to listen to interesting reports of research groups and discussions about gender and research.

KETTY SCHWARTZ

Research Director, Ministry of Research, France

On behalf of Mr Roger-Gérard Schwartzberg, French Minister for Research, whom I am honoured to represent, I would like to highlight the long path that has brought us to the conference in Brussels. The event signals the full awareness of the lack of equality between men and women in the scientific and academic worlds. It is also a call for the implementation of a staunch policy in each Member State in relation to its history and its culture.

Although France has made a major contribution to developing the concepts of the philosophy of human rights, which have become universal principals, and the foundations of our democracies, French Republic law is based on “the neutrality of humankind” and is strengthened by the French language. Sometimes, one cannot distinguish feminine from masculine words. Perhaps this is the starting point that explains why France has fallen behind in recognising the issue of gender in society. The analysis must, of course, be taken further. The recognition of the word “genre” as a translation of the English “gender” is still a subject of debate. With energy and determination, the Prime Minister, Lionel Jospin, and the French government have initiated a far-reaching programme to combat all forms of inequality and to promote real equality between women and men in all sectors of French society. This decision required that our Constitution be modified to include the principle of parity in politics.

In the scientific and academic areas, equality between men and women has long been an established right. However, only now is it starting to take on reality, thanks to the impetus given by the closely linked actions of both the Ministers for National Education and Research. Measures taken at the institutional level, expressing this determination, must go hand in hand with a general evolution in mentalities and cultural behaviour. When children start going to school, they must gain the awareness that both girls and boys have equal opportunities and are offered equal possibilities to create the conditions to favour the equitable advancement of education and scientific careers. In order to transform the current situation, Mr Schwartzberg has established a policy that aims to wipe out, irreversibly, general discriminatory practices. To ensure that this policy is carried out, in September 2001, the Minister established a “Mission for Parity in Science and Technology” at the Research Directorate for which I am responsible. This Mission has been entrusted to Ms Françoise Cyrot-Lackmann, physicist and research director at the CNRS, and shall monitor and apply the decisions of the Government to ensure equality in research organisations under the administration of our Ministry, such as the CNRS, INSERM and INRA. Its main tasks are:

- to monitor the extent to which the issue of equality of opportunity is integrated into the research policy;
- to identify the French legal and statutory texts in order to make them compatible with those of the European Union;
- to take action to increase awareness of the issue among the various players involved in scientific research, scientific and technical culture and information and museums;
- to launch initiatives to provide information by means of an appropriate statistical system that uses relevant data according to sex. This will provide a more accurate diagnosis of these inequalities and thus help to identify the needs and evaluate the actions undertaken and those required.

The Mission may take any initiative that will bring forward this new stage of the relationship between men and women by supporting the organisations already working in the field. It will help

to put in place representatives whose task will be to promote the situation of women in the research organisations under the administration of the Ministry. On behalf of the Ministry of Research, it will monitor the inter-ministerial agreement, signed on 25 February 2000, to promote equality of opportunity between girls and boys, women and men, in the educational system. It will undertake co-ordination with the “Observatoire de la Parité” (Observatory of Parity) and the Steering Committee for the Access of Women to the Senior Civil Service, chaired by Mr Anicet Le Pors. It will support the actions which our representatives, men and women, carry out with the European Union in the field of research.

Last year, the Ministry promoted an agreement mobilising the other ministries concerned. In February 2000, the Ministers for Employment and Solidarity, National Education, Research and Technology, Agriculture and Fishing, School Education and Women’s Rights and Vocational Training signed an agreement to promote equality of opportunity between girls and boys, women and men in the educational system. This agreement aims to improve the educational and career guidance of boys and girls, ensure that the training offered is appropriate to employment prospects, promote education based on the mutual respect of both sexes and strengthen the tools to promote equality and training.

The Minister calls on women to contribute with their skills. The report drawn up in 1999 by Ms Anne-Marie Colmou, at the request of the Minister for the Civil Service, State Reform and Decentralisation, reviewed the representation of women in senior civil service positions in France. Women make up the majority of the French administration, but as one examines the upper levels of the administrative hierarchy, it is clear that their number diminish considerably. Statutory law is completely egalitarian and need not be put into question. However, the reality of the situation (the glass ceiling) leads to women being excluded from the highest positions, including those in research. The Ministry does not accept that this situation, where women are kept from responsible positions, is inevitable. The prejudice should be partially rectified by promoting certain models: the presence of women – whose skills are acknowledged by their peers – at the head of institutional authorities that are traditionally directed by men. For this reason, and without circumventing the principle of excellence in any way, women candidates were given priority in the appointments made in 2000 and 2001. Not only were several women appointed as directors of research organisations, but also the proportion of women in key positions was greatly improved in the central administrative services, major institutions and various decision-making committees. Although complete equality has not yet been attained, it is gradually reaching the 40% advocated by the European Commission. The Ministry wishes to lead the way for the scientific and academic world in this new conduct.

Similar indications have been given to the establishments under the Ministry’s administration and to the universities. I would like to give you some figures for the public scientific and technological research establishments (the “EPST”, such as the CNRS and INSERM). Although women hold over 38% of the posts as researchers, women only hold 24% of the positions at the level of “research director”, in all disciplines combined. In the universities, 37% of senior lecturers are women, but only 16% of university professors are women. In the pure sciences, the figures are even more damning: women hold 30% of senior lecturer positions, but only 10% of professorships. This means that men are two to three times more likely to become professors and to reach a sufficient level to take the responsibility of a research team or direct a laboratory. We must combat these “losses” of female forces – including, where necessary, in internal electoral procedures. It should be made mandatory to improve the balance between the sexes in selection and promotion boards, as well as in institutional authorities such as boards of governors, committees, scientific sections and commissions and joint administrative commissions. The Minister for Research recommends that

scientific institutions cite women as researchers, engineers, technicians and administrators when proposing appointments and promotions.

Finally, at the scientific level, we are examining an effective funding policy for research on, for, and by women. In conjunction with the Ministry of National Education, we have already launched a survey of teachings and studies on the issue of gender in public research, particularly in the universities. In 2002, I plan to make a call for proposals, open to all scientists and teaching scientists, for inter-disciplinary research projects addressing the issue of gender, in all fields of knowledge. I will give you an example I consider particularly eloquent: some therapeutic trials of drugs for women are still conducted only on men. Clearly, new practices in these fields of research are to be encouraged!

I will end by emphasising that we can only truly make headway in these new relationships between the women and men in our countries by drawing support from the European Research Area. This must be imaginative and sustainable, and must remain open to both sexes equally, in order to serve the generations to come.

DAVID A. KING

Chief Scientific Adviser to the Government, Head of the Office of Science and Technology, United Kingdom

In the United Kingdom, the starting point for where we are now can be traced back to a Government White Paper that was published in 1993. To quote from the paper “Women are the most under-used and under-valued human resource in science” Not so many words were dedicated to women’s contribution to science, but they triggered an awareness that something must be done and, importantly, action – the impact of which we are still benefiting from today. As a direct result of that, one of my predecessors, Bill Stewart, undertook a review of the situation published in the Rising Tide report. One of the key recommendations implemented was to set up a specialist unit, the first of its kind in Europe. Today, the Promoting Science Engineering and Technology for Women Unit is still hard at work and we are committed to supporting it until 2007. A key area for our attention now is making a step change in effectiveness.

Science is a key to our economy’s success and to our general standard of living. In a high-tech society, we need to keep ahead by further promoting science and technology. In the UK, the government has announced that we’re going to increase the science budget in real terms by 7% per annum over a 4-year period. However, as much as funding for science is needed, at the heart of excellent science are excellent people. It’s all very well to say “we’re going to invest in science”. We must now invest in people. In terms of hard economics, we need the skill base. Quite simply, we cannot afford to progress if we don’t have women contributing, as we know they can, if we don’t value them and make sure we don’t lose them once they are trained, and that really underlies the position. Let me just amplify this point.

In the United Kingdom, there is a significant drop in the enrolment of undergraduates in universities in the physical sciences. In the life sciences, there is no drop. The numbers are increasing, not at a sharp rate, but they are increasing. When we analyse the numbers by gender in the physical sciences women’s participation is almost steady whilst for men it is declining. In 1970, in the life sciences 47% of our undergraduates were women and now, we’re around 62-63%. Significant numbers, but we still don’t see a significant number of women at the professorial level in any sciences, let alone in the life sciences where there has been a strong female presence for over 30 years, and that concerns me.

We also have a gender pay gap and I’m afraid to say that here we’re falling back. Specifically, the gender pay gap for university lecturers has increased from 15 to 16% in recent years, but studies of women physicists and engineers show that women at the highest level are out-performing the men in salary. This is both an issue of numbers and the fact that the women who stay in to reach these levels are both excellent and remarkably dedicated.

I would like to make a personal statement. I’d wish to see an education and employment environment in higher education in which women participate equally with men in every way. That is, in creating excellence in science, in benefiting fully from opportunities afforded by careers in science and engineering and in contributing fully to the development and implementation of science policy.

The UK statistics are in general close to those of other Member States. We’ve seen the scissors plots. What I of course would like to see is that we monitor those scissors plots carefully. Are the scissors closing and how fast are they closing? The rate of change is obviously vital. So statistics are important because, if we’re trying to put policies into place, the only way we can evaluate them is

to gather the proper statistics. But what is obvious is that we have to raise the pace of change. We have to tackle the underlying culture, and here I'm simply repeating what others have said: I support gender mainstreaming as a tool to achieve that and I support examining methods to remove institutional sexism. In the United Kingdom we are working to bring people together to make sure that we are effective in our efforts to drive change and ensuring that gender in science is considered in all aspects of our science and engineering policy-making. We're doing this on a European scale and I applaud that.

Within the higher educational institutes, our focus is our Athena project that has been running since 1999. The project aims to uncover barriers and best practice and promulgate it across the whole sector. There have been two rounds of demonstration projects focusing on the individual and, in the second round, also on changing the organisation and culture. We now also have six regional networks of female academics flowing out of these projects. Next year, we will be announcing ATHENA Awards to encourage, raise the profile of and disseminate a range of creative approaches and good practice in promoting women in science and engineering in higher education. The success of the project, in my view, is the fact that it raised awareness of the issue of poor human resources practices and lack of rigorous recruitment and promotion practices. In all, the fact that we weren't looking after one of our greatest assets, people, but above all that it was the women who were losing out. In a further positive step we have now expanded the equality focus in the higher education sector and set up the Equality Challenge Unit. With an initial guaranteed period of five years for this unit to run, we should see a significant change in the systems within our universities for recruitment and promotion that will benefit all, but importantly, women.

I would also like to mention that we are being proactive on women in policy-making as well. We are to increase the pool of nominees and we have a programme of national seminars for women to help them understand how they can contribute by serving in a public body. We are encouraging female scientists and engineers to attend the seminars and we have had a few recent high-profile successes. The Chairman of our Economic and Social Research Council is a woman and the very recently appointed Chief Executive of the Biological and Biotechnology Research Council is a woman. We also have two recently appointed vice-chancellors who are women and the membership of the Council governing bodies is now an average of 35% women. Having said this, there are some rather pitiful areas which still need action. In some areas of science, for example the NERC, our Environmental Research Council has only 25% women, and PPARC, the Particle Physics and Astronomy Research Council has only 10%.

We were instructed not to be complacent. I think we all know that we cannot sit back on our laurels. Our programme has been running for five years, but we've still got five to go. The aim is that, one day, we should no longer need that programme. We have to set targets to aim for, and I think, once again, the Swedish have given us an example.

I would like to end by referring to Minister Mabandla's presentation. I was born and educated in South Africa, but it was a very different South Africa from the one represented here. I just want to end on a positive note, because South Africa has shown us, in a most remarkable way, how change can be brought about.

The background of the page features a series of overlapping, wavy, light gray lines that create a sense of movement and flow. Scattered across the lower right portion of the page are several light gray, five-pointed stars of varying sizes, reminiscent of the European Union flag's design.

CHAPTER 3

FIRST RESULTS FROM THE HELSINKI GROUP ON WOMEN AND SCIENCE: POLICY REVIEW AND INDICATORS

The Helsinki Group on Women and Science, set up in November 1999, was convened by the Women and Science Unit of the European Commission's Directorate-General for Research. The idea was to learn about initiatives going on in the name of women and science and to benchmark policies and practices designed to promote gender equality in the culture of scientists and in scientific careers. The Helsinki Group has delegates from 30 European countries, mainly civil servants with responsibility for women and science in their respective countries.

This session provided an overview of the activities carried out by the Helsinki Group and future issues for consideration. It included a look at the initial results of the project "Design and Collection of Statistical indicators on Women in Science" for which the members of the Helsinki Group provided and validated data.

First results from the Helsinki Group on Women and Science: policy review

TERESA REES

Cardiff University, Wales, United Kingdom

The Helsinki Group has delegates from 30 European countries: the 15 Member States of the European Union (EU) and 15 countries associated with the Commission's Fifth Framework Programme, the Associated States. The Associated States are Bulgaria, Cyprus, the Czech Republic, Estonia, Hungary, Iceland, Israel, Latvia, Lithuania, Malta, Norway, Poland, Romania, Slovakia and Slovenia. Apart from Iceland, Israel and Norway, all other Associated States are Candidate Countries seeking membership of the EU. The Helsinki Group delegates are for the most part national civil servants with responsibility for women and science in their respective countries.

The Helsinki Group was set up in November 1999 and its first meeting was held in Helsinki during the latter part of the Finnish Presidency, hence the name "Helsinki Group". It was convened by the Women and Science Sector of the European Commission's Research Directorate-General. The idea behind it was that we might learn from each other what initiatives are going on in the name of women and science to benchmark policies and practice designed to promote gender equality in the culture of scientists and in scientific careers. The Helsinki Group has achieved a considerable amount in a short time. However, as Ms Eryl McNally reminds us, there is still a lot more to do. I've been enormously impressed by the commitment of the members to contribute to the work of the Group and listen with an open mind to the contributions of others.

So what have we learned about women and science from such a diverse range of countries? The first point to emerge is that there is a huge diversity in the approach to women and science among these countries. Indeed, the support for scientific infrastructure itself is very variable. In the Central European countries, we see universities being given more independence now than they have had for some time. In other countries, in Nordic ones particularly, there has been tremendous progress with gender mainstreaming. So there is considerable contextual diversity but there are also commonalities. These are some of the key issues to be identified.

Firstly, there is a lack of harmonised sex-disaggregated statistics on women and science across Helsinki Group countries: we shall be learning more about this from Ruth Springham from Eurogramme. Secondly, there is the issue of gender balance – or rather, the lack of it – in decision-making. For example, in decision-making about what constitutes science and scientific excellence, how science budgets should be allocated, who awards grants or prizes, who makes appointments or decides on promotions. There is a lack of gender balance, to a greater or lesser extent, in all these areas in the Helsinki Group countries. Thirdly, there is the issue of the leaky pipeline. This was highlighted in the ETAN report on women and science. Whatever discipline we're discussing, whatever the proportion of women among the undergraduates and whatever equality measures are put in place, we still see a disproportionate leakage of women from scientific careers at every stage in the academic hierarchy in every country. Finally, there is the issue of the need to modernise human resource management policies in universities and research institutes. The Group drew attention to a lack of transparency in appointment procedures, the over-reliance on old boy networks, nepotism and patronage among the people working in science and a concern that old boy networks may be more important than merit in determining the allocation of opportunities.

What has been done about all these issues? The Helsinki Group has worked trans-nationally on developing comparative statistics and indicators but also in terms of sharing experience. Each delegate of the 30 countries has written a national report describing the national context, policy frameworks and measures to avoid the wastage of women in science in their country. I am currently preparing a report summarising the national policies on women and science in the 30 Helsinki Group countries. Here are some of the developments.

At national level, members of the Helsinki Group have set up inter-ministerial committees on women and science with representatives from science, education, equality ministers and so on, to focus on the issue. This is “joined up thinking”, if you like.

In terms of positive action, there have been a number of initiatives: supporting networks of women and science, role models, mentoring schemes and, in some countries, setting targets and quotas, earmarking research budgets, earmarking particular opportunities for winning prizes or chairs. This latter kind of approach is highly contentious of course, but it seems to be important to kick start progress where there is a blockage. Such a “kick start” was used in the part of the United Kingdom I come from, Wales. The Labour Party used positive action (“twinning”) to select its candidates for the new National Assembly for Wales. This contributed to the fact that 41% of Assembly members are women. In the Cabinet, women hold just over 50% of the places! A friend of mine, recently promoted into the Cabinet, said that in school the next day, her son Richard was approached by a friend of his, who asked if his mother was all right. “Well yes”, said Richard, “why shouldn’t she be?” “Well”, the boy replied, “My mother heard on the radio that your mother had put her head through a glass-ceiling...”

Some countries have also introduced gender mainstreaming. Gender mainstreaming is, I think, one of the most talked about and least understood concepts I’ve ever come across. To me, it’s about the integration of gender equality into all systems, structures, strategies, policies, projects, processes, programmes, into organisations and their cultures, into ways of seeing and ways of doing things. Here are some gender mainstreaming initiatives that have been identified in the Helsinki Group national reports.

First of all, gender and women’s studies have been identified as highly important. This is the academic arm of the women’s movement. These disciplines are very important in helping us to understand things like the “leaky pipeline” of women in academic careers and how what is designated as scientific excellence may be biased in that social processes that determine “merit” and what is regarded as “excellent” may not necessarily be gender neutral. So, there is an enormous contribution to be made from feminist scholarship to our understanding of the women and science situation. Secondly, gender mainstreaming has contributed to the modernisation of human resource management in higher education. Universities, I think, tend to regard themselves as liberal institutions, objective, neutral. It is a shock for those in universities to find that they may be guilty of institutional sexism, albeit inadvertently or subconsciously. The way to tackle this is to modernise our human resource policies, to have transparency in recruitment and promotion, to have awareness raising about equality matters and equality training for recruitment panels. Thirdly, gender mainstreaming can help in improving the pedagogy of science education, to ensure that it is not, in effect, focused only on boys (or indeed, girls). How is science taught? What can we learn from trying to make the pedagogy of science education interesting and relevant to women and men – in all their diversity? A fourth area of action is trying to attract back women returnees to scientific careers. This is very important, as significant public resources have been invested in educating female scientists. It is much more cost effective to ensure that we have proper routes for women

to pursue their scientific careers after a career break. Finally, it is important to address the issue of work/life balance in scientific careers. Some scientists would like to work 24 hours a day, seven days a week, because they just love it! But we need to enable scientists to be rounded people and who have time in their lives to care for others. A survey at Cambridge University recently found that well over half the academics there had no caring responsibilities at all. Is it really impossible to reconcile having a family and being a good scientist? We need very good policies to privilege personal and family lives as well as scientific lives.

What will the Helsinki Group focus on in the future? On modernising the culture of science and ensuring that the highest standards pertain in peer review. Female scientists aren't looking for a dilution of quality, on the contrary. If it is quality, excellence and merit that we regard as important, then the fact that you're a man or a woman really shouldn't matter. However, at the moment, being a man or a woman is all too important in determining who succeeds in scientific careers. Very few women are involved in determining what constitutes excellence. It's helpful to look at the portrayal of science and scientists in the media and to use the findings of gender studies in this regard. Secondly, the Helsinki Group wants to see scientific careers modernised, with flexibility, merit (not patronage), more ports of entry into scientific careers, support for dependants, more diversity and fewer clones of existing senior scientists. Thirdly, monitoring and evaluation are regarded as highly important. Let's take a scientific approach to evaluating positive action and mainstreaming measures. Lastly, the Helsinki Group is very concerned and committed to gender mainstreaming being integrated into the Sixth Framework Programme, so that women can participate on an equal basis.

The support from Mr Busquin, the Commissioner for Research, and from the Belgian Presidency, in all these areas of work, is extremely important. The existence of the Helsinki Group provides a unique opportunity for benchmarking policies and for the exchange of good practice. There is a strong commitment to continue to work together and a new work package is emerging to tackle the key issues that the Group has identified. So, for the Helsinki Group, all I can say is watch this space for more to come.

Design and collection of statistical indicators on women in science

RUTH SPRINGHAM

Eurogramme, Luxembourg

I. Introduction

The project entitled “Design and collection of statistical indicators on Women in Science” has been developed by Eurogramme and is monitored by the Women and Science Unit while funded for a three-year period by the Directorate-General for Research (DG Research). Eurostat’s unit A4, Research and Development, methods and data analysis, provides the technical assistance. Members of the Helsinki Group on Women and Science and its statistical correspondents co-operate by providing and validating data.

This paper gives a brief outline of the project’s objectives, sets them in context and then illustrates some key issues with initial results. Examples will be used to show two things: firstly that data on women in science are available at a European level and, secondly, that these data are rather patchy, that is, in some areas data are available while in others little can be obtained on women in science.

The project’s objectives are:

- to collect data on women from tertiary education level through to employment for the 15 EU Member States and the 15 countries associated to the Fifth Framework Programme;
- to build a database from the collected data which relates to students, graduates, academic staff, research staff, applicants and beneficiaries of funding, and memberships of boards and scientific academies;
- to propose a set of indicators on women in science.

In turn, these objectives must relate to policy issues. Five key policy issues have been identified as follows:

- how many women are there in research in Europe?
- horizontal segregation;
- vertical segregation;
- pay gap;
- success rate.

The policy objectives, which these five key issues seek to address, are:

- to increase the number of women in research;
- to decrease the gender imbalance in the fields of science;
- to improve the position of women by narrowing the gap between the sexes in terms of the “leaky pipeline”;
- to decrease salary differentials between the sexes for the same job and qualifications;
- to increase women’s chance of being promoted, of making successful applications for research funding, and of becoming members of the top decision-making bodies and boards.

2. How many women are there in research in Europe?

When addressing this relatively simple issue, the reference manual for Research and Development is the Frascati Manual¹, which describes the four sectors of scientific research as being: the Higher Education Sector (HES) (§190), the Government Institutions Sector (GOV) (§168), the Business Enterprise Sector (BES) (§145) and the Private Non-profit Sector (§178-9). It also divides personnel involved in these sectors into three groups of “researchers” (§311), “technicians” (§316) and “other research personnel” (§319). For the moment, data collection and analysis is confined to the first of these three groups. Table I shows the number of countries that can provide data on female researchers in the first three of these four sectors.

Table I: Number of countries that can provide sex-disaggregated data on researchers by sector

	Total number of countries	EU	Associated States
All sectors together	15	5	10
HES	25	14	11
GOV	20	9	11
BES	16	6	10

Source: Eurostat (WiS database)

Only 15 of 30 countries can provide data on researchers by sex across all four sectors of research as mentioned above. It is worth pointing out that this situation may improve in the near future, as the revision of the Frascati Manual, which is currently taking place, should include the sex variable in its Research and Development survey.

As Table I illustrates, as many as 25 countries can currently provide data on the number of researchers by sex in the Higher Education sector. Figure 1 demonstrates the percentage breakdown of female researchers for these 25 countries.

Figure 1: Female researchers in the Higher Education Sector, 1999



Source: Eurostat (WiS database)

Exceptions to the reference year: 1997: DE, ES, PT – 1998: AT – 2000: HU, LV, LT, PL²

Exceptions to the Frascati Manual definition of researchers: BE, IT, NL, FI, UK, PL, SI

¹ The Frascati Manual – The measurement of Scientific and Technological Activities, Proposed Standard Practice for Surveys of Research and Experimental Development, OECD, Paris, 1993.

² See the Annex at the end of this contribution for the list of abbreviated codes used for the countries.

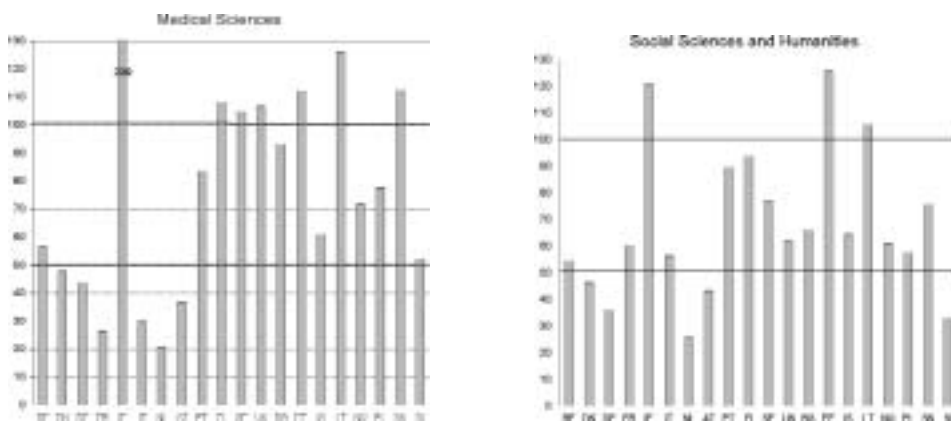
The percentage of female researchers in the Higher Education Sector is less than 30% in eight countries (namely Belgium, Denmark, France, Germany, Italy, the Netherlands, Austria and Cyprus). In nine countries, between 30 and 40% of researchers are women (Spain, Sweden, the United Kingdom, Bulgaria, Hungary, Iceland, Poland, Norway and Slovenia). And in another eight countries more than 40% of researchers in the Higher Education Sector are women (Greece, Ireland, Portugal, Finland, Estonia, Latvia, Lithuania and Slovakia). Latvia alone recorded a figure over 50%, at 51%. While it is in itself positive that such a figure can be calculated for these 25 countries, it should be mentioned that the reference year used is not always the same for all 25. Furthermore, the definition of “researcher” is not always directly comparable with that of the Frascati Manual. At the same time, with regard to the five countries for which data are not available, there are some good reasons such as the sector is not applicable to the country, or late inclusion in the project, or late arrival of the data.

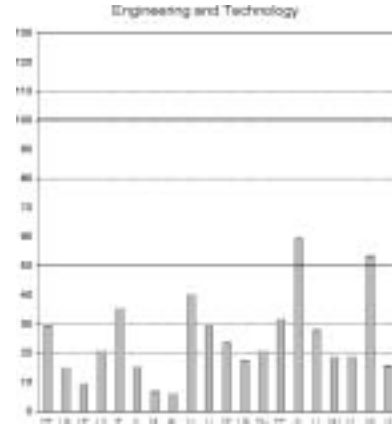
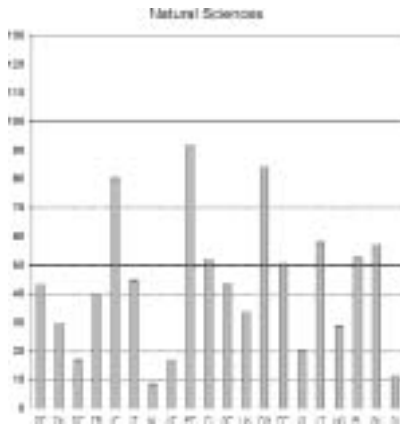
3. Horizontal segregation

This key policy issue relates to whether women tend to be clustered in the less scientific disciplines. Again, the terms of reference are those of the Frascati Manual, which lists six disciplines for scientific research: Medical Sciences, Social Sciences, Agricultural Sciences, Natural Sciences, Engineering and Technology and Humanities. Data can be obtained from 20 out of the 30 countries by field of science. In Figure, 2 the analysis is confined to Medical Sciences, Social Sciences and Humanities grouped together (data not always being available separately), Natural Sciences and Engineering and Technology. For each of the four graphs in Figure 2, the feminisation rate is being used. This means that the 100 line on the graph indicates there is parity between the sexes, that is to say, that for every man there is one woman. The 50 line shows where there is one woman for every two men.

Without going into too much detail and without wishing to make any comparisons across countries, it is clear that parity between the sexes is rarely achieved. Women are closest to parity in the Medical Sciences, Social Sciences and Humanities, and furthest from it in Engineering and Technology.

Figure 2: Feminisation rate of researchers in the Higher Education Sector (number of women for 100 men), 1999





Source: Eurostat (WiS database)

BE: Flemish part of Belgium

FR: Natural Sciences and Agricultural Sciences are grouped together

Exceptions to the reference year: 1993: AT – 1997: DE, PT – 2000: LT, PL

Exceptions to the Frascati Manual definition of researchers: BE, IT, NL, FI, UK, PL, SI

4. Vertical segregation

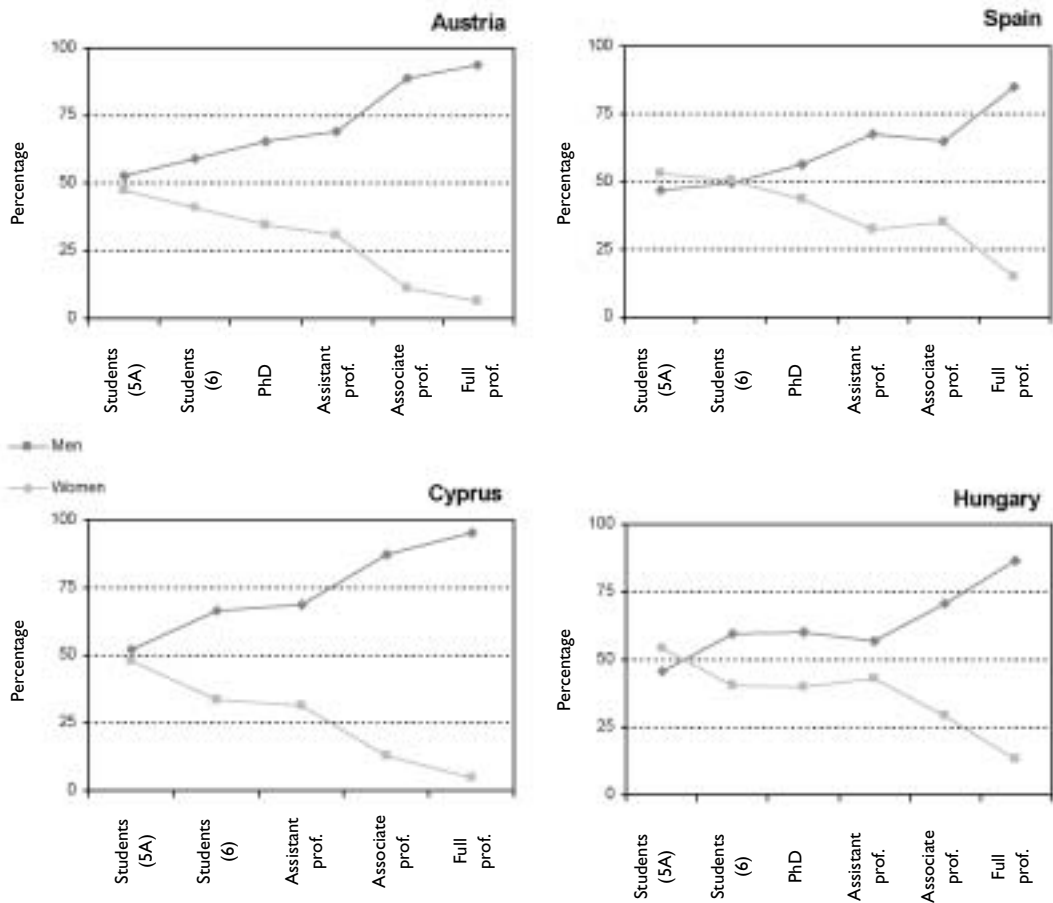
The third issue of vertical segregation relates to the differences between the sexes as they advance through their careers. The example used to illustrate this relates to the progress of academic careers starting from tertiary education as a student and going through a number of steps to finally obtaining full professorships. In this particular example, three steps have been chosen from tertiary education: studying for a first degree, studying for a Ph.D.³ and obtaining a Ph.D. The next three steps relate to positions held at three professorial levels in academia: assistant, associate and full professor. Each country's national classification has been harmonised as much as possible, using a classification proposed in the ETAN report⁴, which attributes these to C, B and A categories respectively. This classification is still under development, so care must be taken when analysing these data.

Figure 3 illustrates the phenomenon of vertical segregation. The effect is broadly similar for the four countries chosen in this example, namely Austria, Spain, Cyprus and Hungary. From an equal starting point as students, the end result at full professor level is a large gap between the advancement of women and of men. This type of graph could be produced for the majority of the countries involved in the project and, in most cases, a fairly similar picture is obtained.

³ These data are taken from the harmonised Eurostat education database, and refer to the ISCED Classification: International Standard Classification of Education, which defines the activities of students and graduates by level (bachelor's and master's degrees and master of philosophy (ISCED5A); doctoral degree, Ph.D. (ISCED6) and by field of study.

⁴ *Science policies in the European Union: Promoting excellence through mainstreaming gender equality*, ETAN Report, EN version, ISBN 92-828-8682-4.

Figure 3: Vertical segregation, 1998

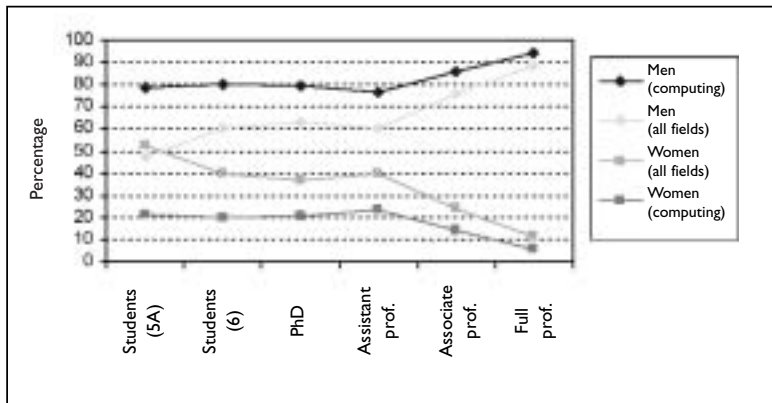


Source: Eurostat (WIS database)

In Figure 4, a combination of elements of both horizontal and vertical segregation is shown, using an example from United Kingdom data. Using the same six steps as described above and used in Figure 3 all fields have been plotted together in the middle of the graph. It can be noted again that parity is achieved at the start of tertiary education, but then the scissors open up. We have then compared this with computing, chosen deliberately as it is obviously one of the key industries in today's working world. The line at the top and the line at the bottom refer to computing on its own with, inevitably, men on the upper line and women on the lower line. Here the effect of horizontal segregation comes into play right at the start, still with the drop off through the professorial grades.

Unfortunately, such a graph can be produced for very few countries as the data by field for academic careers is rarely available, and yet this approach is very interesting.

Figure 4: Academic careers in computing compared to all fields together in the United Kingdom (1999)



5. Pay gap and success rate

The two remaining issues are pay gap and success rate, and here there are a number of problems relating to:

- data availability;
- incomplete coverage, especially for applications for research funding and the success rate of converting an application into a successful receipt of funding;
- lack of typologies for data on funds and on boards.

As a result of the above, it is difficult at this stage to present meaningful statistics on these issues. Nevertheless, in terms of the success rate, some recent work in this area has been carried out. DG Research, Eurostat and Eurogramme have worked together to produce a Statistics in Focus, entitled “Women in public research and higher education in Europe”⁵ which presents some initial results from the project, but only for the 15 EU Member States. Anecdotal evidence also exists on pay gap, suggesting around a 20% difference between the sexes. Some data are available from some of the Helsinki Group members, which would seem to back this up. However, much work remains to be done in these areas.

6. Conclusion

In conclusion, data on women and science in Europe do exist, but there are gaps in data availability and coverage. It is difficult to carry out time series analysis now, as data are hard to obtain over a number of years. However, to measure the effects of the kinds of policies, which others have referred to, such data are clearly needed. And finally, political developments are required to advance the systematic collection of data on women in science so that their progress in this area can be measured accurately. Such developments are necessary at all levels, from the OECD to Eurostat and the national statistical offices, to improve the provision of data on women in science.

⁵ “Women in public research and higher education in Europe”, *Statistics in Focus, Science and Technology*, No 7/2001, Eurostat, Catalogue no KS-NS-01-007-EN-C.

Annex

The following abbreviations are used in the graphs for the countries:

Belgium	BE	Bulgaria	BG
Denmark	DK	Cyprus	CY
Germany	DE	Czech Republic	CZ
Greece	EL	Estonia	EE
Spain	ES	Hungary	HU
France	FR	Iceland	IS
Ireland	IE	Israel	IL
Italy	IT	Latvia	LV
Luxembourg	LU	Lithuania	LT
The Netherlands	NL	Malta	MT
Austria	AT	Norway	NO
Portugal	PT	Poland	PL
Finland	FI	Romania	RO
Sweden	SE	Slovakia	SK
United Kingdom	UK	Slovenia	SI

Higher Education Sector	HES
Government Institutions Sector	GOV
Business Enterprise Sector	BES

CHAPTER 4

GENDER IMPACT ASSESSMENT STUDIES

The Gender Impact Assessment Studies were launched by the European Commission in June 2000 to evaluate the implementation procedures and the research agenda set in the programmes or sub-programmes of the 5th Framework Programme.

For ease of reference, the following abbreviations have been used:

Quality of life/QoL Study – Quality of life and management of living resources programme

IST Study – User-friendly information society programme

Energy Study – Energy sub-programme of the Energy, environment and sustainable development programme and the key action “Research and training in the field of energy” of the Euratom programme

Environment Study – Environment and sustainable development sub-programme of the Energy, environment and sustainable development programme

INCO Study – Confirming the international role of Community research programme

Innovation and SME Study – Promotion of innovation and encouragement of participation of small and medium-sized enterprises programme

Human potential/IHP Study – Improving human research potential and the socio-economic knowledge base programme.

The studies assessed whether and how gender issues were taken into account and provided recommendations for a better integration of the gender dimension in future Community research in that area. As expected, the exercise as a whole raised important points for consideration in the context of the new Framework Programme.

The Gender Impact Assessment exercise was a collective experience, to which each of the following people contributed:

- the contractors themselves: Mineke Bosch, Ineke Klinge, Adrian Healey, Galle Le Gars, Amanda Brandellero, Tina Weber, Neville Reeves, Joy Clancy, Jenniy Gregory, Deborah Cornland, Diana Hummel, Irmgard Schulz, Marguerite Appel, Charlotte Martin, Maria Aguirre and Mary Braithwaite;
- colleagues at the European Commission: Mary Kavanagh, Veronique Bernard, Nancy Pascall, Mario Frias, Elisabeth Lipiatou, Nicole Riveill, Irja Younakis, Maryse Grari, Jimmy Jamar, Angela Liberatore, Nicole Dewandre and Tanya Leigh.

SECTION I: QUALITY OF LIFE AND MANAGEMENT OF LIVING RESOURCES

Women, gender and the life sciences: women's participation in the Quality of life programme

MINEKE BOSCH

Centre for Gender and Diversity, University of Maastricht, The Netherlands

1. Short historical background

To give a short historical background to this Gender Impact Assessment Study, we have to go back no further than the 1960s and 1970s when a new wave of feminism swept over the world. At that moment in time, women tried to get more influence and power over the public and the private sectors and they defined women and health to be key issues in their endeavour. Male medical control over women's bodies and health was challenged in women's health collectives and handbooks such as *Our bodies, Ourselves*.

2. Women and gender studies

At the same time, women at universities started to criticise the curriculum as well as the research agendas within their disciplines. They discovered the existence of male bias in the choice of topics and in the concepts and theories which dominated academic fields. Not only did these academic feminists protest and criticise male bias and its neglect of women and gender difference; they also produced new research agendas and developed new concepts and theories, which were more capable of covering the experiences of women and men as well as studying gender difference. These research activities were labelled women and gender studies.

3. Feminist critique of science

Parallel to these developments, and overlapping them, a feminist critique of science has developed and consists of at least two lines of interest. Firstly, the study of women in science, which analyses the position of women in science from a sociological and socio-cultural perspective. Examples of central questions here are "Why are there so few women in science?" "Is science fair?" A second line of interest is the study of gender and science, which deals with the epistemological critique of science, questioning not just the male bias of concepts and theories and choice of study object, but also knowledge itself. This line of study challenges central oppositions such as objectivity versus subjectivity, mind versus body, culture versus nature. It regards these binary oppositions as power constructs which use gender to determine who is object and who is subject of research while at the same time hiding the fact that science is a social process.

An important result of both lines of interest, which are fully intertwined, is a redefinition of science and science production, not as a (dis)embodied and (a)social enterprise, but as a fully social undertaking, not segregated from society but as an intrinsic part of society.

4. Gender studies in the life sciences

Within the life sciences a field concerning gender studies developed, focusing on different aspects of the research process.

4.1. Gaps in knowledge

The study of women as women, not just as passive objects of research, but research from the perspective of women's needs and interests, brought to light many gaps in knowledge. Male bias in concepts and theories had left large areas unstudied: domestic and unpaid labour in economics, the study of daily life in history, or conditions of concern to women in medicine, such as menopause and menstruation, mastopathy, anorexia and incontinence.

4.2. Experimental design

Two other aspects that caught the attention of gender researchers, were the experimental design and the choice of population in (experimental) research. A famous example is the choice made by primate researchers for baboons as their major focus of interest instead of bonobos. Baboons are a rather aggressive male dominated primate species, whereas bonobos demonstrate a completely different and much more social behaviour. In the bonobo society, females play a much larger role than with the baboons, displaying emotions such as altruism. The biased choice to study only baboons influenced for a long time the knowledge about primates in general.

4.3. Interpretation

Another issue of concern became the interpretation of empirical observations, which were often guided by traditional ideas about men and women, male and female. This can be illustrated by the way a group of lions was perceived, namely in terms of a male lion with a harem. An alternative, but equally accurate and valid description of this observation, however, could be that the ethnologists had seen a group of females working together, tolerating one male lion in the margins of the group.

4.4. Mutual production of meanings of gender and science

A last issue in the study on gender and the life sciences, and most radical in its assumption of the fundamental permeability of science and society, is the observation that meanings of gender produce science, and concepts of science produce meanings of gender. An example of the first can be identified in the development of studies, which until recently focused more on the "active sperm" instead of on the "passive egg", and on "gene action" (and the nucleus) more than on the active role of the cytoplasm (and the egg). Examples of how science produces gender are abundant and are piled up in medical, biological, psychological, anthropological research on women from the Enlightenment until today.

5. The concepts of sex and gender

Central dual concepts, which were developed in women's and gender studies, are sex and gender. Although it would perhaps be better to say that gender researchers rather wanted to do away with sex and concentrate on gender. Indeed, when women started to study "the neglected sex" or the social relations between the sexes, they discovered that sex – or the biological distinction between male and female, men and women – did not explain the social differences between the sexes.

Rather, the sexual or biological difference was used to legitimate social sexual difference between men and women. In the words of Simone de Beauvoir, they discovered again that: “a woman is not born a woman, she is made into one” (“On ne naît pas femme, on le devient”).

From this developed an analytical distinction between sex and gender. “Sex” denotes the (unchanging) biological characteristics as chromosomes, physiology and anatomy that distinguish females and males, whereas “gender” refers to the array of socially constructive roles and relationships, personality traits, attitudes, behaviours and values, that society ascribes to the two sexes on a differential basis. Gender is a relational concept since gender roles and characteristics do not exist in isolation but are always defined in relation to one another. Gender is a system of signs and symbols which not only gives order to social relations in terms of gender, but also denotes power differences. Gender relations are embedded in and give shape to societal institutions such as the family, schools, workplaces and governments. They shape social systems and organisations, including science and the health system, in terms of gender and power.

Though the invention of gender as an analytical concept has had paradigmatic consequences for the study of the social and symbolic differences between men and women, the integration of the gender dimension into the life sciences or biomedical science always involves the integration of both sex and gender.

6. Diversity

A major understanding in women’s studies is that gender as a category always interacts with other basic categories of difference such as age, class, ethnicity and validity, to name a few. Though not central in this study, we did pay attention to the aspect of diversity.

7. Integration of the gender dimension

We have looked at the integration of the gender dimension in the specific programme Quality of life and management of living resources (QoL) of the Fifth Framework Programme (FP5) in terms of the 1999 Communication by the Commission “Women and science: mobilising women to enrich European research”. This Communication acknowledged the severe under-representation of women in science and announced an action plan to promote gender equality at three levels: science by, for and about women.

The level of “science by women” – how women participated in the development and implementation of the programme as members of committees and panels, as expert evaluators and as partners in projects. The level of “science for women” – whether and how the Work programme and the projects included, or allowed for, and produced the study of problems and research themes in the interest of or on behalf of women. “Science about women” – whether the Work programme or the (funded) projects allowed for research into sex and gender difference, not as a side issue but as an issue of major concern, or allowed for gender research in itself.

7.1. Science by women

7.1.1. Monitoring is a process

The participation of women in the programme has been assessed predominantly in quantitative terms. Regarding the use of figures, we would like to make a few preliminary remarks. If our

exercise can be perceived as a monitoring exercise, it should be stressed that we only give a picture of one particular moment. Good monitoring, however, is a process. Even if we have been able to compare women's participation in projects in four calls, we cannot say anything about tendencies. What is really needed is a time series analysis.

7.1.2. Representation of women in decision-making bodies

Without criticising the successful policies of the Directorate-General for Research (DG Research) in setting target figures for women's participation in all aspects of research, we would like to encourage a more differentiated and contextual approach to the setting of target figures. For decision-making bodies such as the Programme Committee (which is not mentioned in the Communication, but we think should be included), the External Advisory Groups and the High-Level Expert groups, we think a 40 to 50% representation of women is justified and realistic. This has also been argued in the ETAN report *Science policies in the European Union: Promoting excellence through mainstreaming gender equality*.

As regards the participation of women in the expert evaluation panels, as well as in the projects themselves, the target figures should be related to the recruitment potential of women in the fields. Although universal target figures such as the 40% rule may have a pulling effect, which we recognise as important, they may also have a discouraging effect when targets are not reached.

7.1.3. Recruitment potential

The recruitment potential of women in the different fields of research needs to be studied. We made an effort to get more figures about female scientists in Member States than were already assembled in the ETAN report, but failed, due to the lack of figures readily available.

7.1.4. The participation of women in the Quality of life programme

To assess the participation of women in the QoL programme, we have looked at all kinds of committees: Programme Committee, External Advisory Groups, High-Level Expert Groups and also A-grade Staff, Expert Evaluators and partners in projects. Only the main figures will be given here; the details are in the Final Report of our Gender Impact Assessment Study.

Delegate members of Programme Committees are most often science policy-makers and are recruited among staff members of Ministries of Science and Research, Agriculture or Economics. The total number of Programme Committee members from European Union (EU) Member States is 34 of which 26 are male and 8 female (24%); female observers from Associated States is 16%. On an aggregate basis, these figures seem to represent the level of women in the field of life sciences as a whole. However, nine Member States do not have any female Programme Committee members, whereas only two countries have no male Programme Committee members.

Table 1: Programme Committee members, EU countries (m/w)*

Country	Number			Percentage of women
	Total	Men	Women	
Austria	3	2	1	
Belgium	3	1	2	
Denmark	3	3	0	
Finland	2	1	1	
France	3	3	0	
Germany	2	1	1	
Greece	2	2	0	
Ireland	2	2	0	
Italy	2	2	0	
Luxembourg	1	0	1	
The Netherlands	3	3	0	
Portugal	2	2	0	
Spain	2	2	0	
Sweden	2	2	0	
United Kingdom	2	0	2	
TOTAL	34	26	8	24

* Sex-count based on informed guess guided by references to "Mr/Ms/Mrs" and names

Nominated or regular experts from the EU Member States assist the Programme Committee in its task. They are recruited among leading researchers, as well as from the regular staff of ministries. The percentage of female QoL nominated/regular experts from EU Member States is 37 which, given the recruitment figures for several EU countries we accessed, is not out of line. However, five countries are not represented by female nominated/regular experts, whereas only one country is not represented by male experts.

Table 2: QoL nominated/regular experts, EU countries (m/w)* (substitute experts included)

Country	Number			Percentage of women
	Total	Men	Women	
Austria	2	1	1	
Belgium	1	1	0	
Denmark	1	1	0	
Finland	5	3	2	
France	5	3	2	
Germany	8	5	3	
Greece	4	1	3	
Ireland	1	1	0	
Italy	9	7	2	
Luxembourg	0	0	0	
The Netherlands	2	2	0	
Portugal	4	2	2	
Spain	4	3	1	
Sweden	3	2	1	
United Kingdom	11	6	5	
TOTAL	60	38	22	37

* Sex-count based on informed guess guided by references to "Mr/Ms/Mrs" and names

Source: EC – DG Research, Unit F1 E-mail (08.12.2000), file PC list All members and experts

Five External Advisory Groups (EAGs) provide advice on QoL key actions to the Commission. The total number of advisers in the EAGs is 91, of which 58 are male and 33 are female. The achieved mean participation of women (37%) in the EAGs is noteworthy against the fact that the database from which EAG members must be selected is composed of only approximately 15% women. This figure in its turn seems rather low, taken into account that there are three sources of recruitment for that database: EU Member States or Associated States may propose researchers; Community services may add names; and there is an open call to which researchers may respond.

Also, it should be noted that despite the high aggregate percentage of women in EAGs, women are heavily under-represented, especially in key action 5.

Table 3: Members of QoL External Advisory Groups (EAG) (m/w)

Key action	Number			Percentage	
	Total	Men	Women	Men	Women
KA 1 & 4	20	11	9	55	45
KA 2	18	12	6	67	33
KA 3	17	8	9	47	53
KA 5	19	17	2	89	11
KA 6	17	10	7	59	41
TOTAL	91	58	33	63	37

Source: EC – DG Research, Unit F1: E-mail (21.06.00), file EAG Members

As regards the participation of women as *partners in QoL projects*, at the time of writing, the number of eligible proposals submitted for the two deadlines of the first call (June 1999 deadline, N=1 693, November 1999 deadline, N=1 541) and the two deadlines of the second call (March 2000 deadline, N=771, October 2000, N=1 473) are known. From these deadlines 307, 236, 146 and 250 projects were funded respectively (Table 4).

The figures on women in eligible proposals and in projects funded show us that, for all deadlines, the success rate of women is higher than that of men. In other words, in all the four deadlines, the participation of women in eligible proposals is relatively smaller than in projects. Through all the deadlines the proportion of female contact persons in eligible proposals rises. The proportion of female co-ordinators, however, which in deadline A reflects the number of female partners (18.9/18.5) and in deadline B even surpasses the participation of female partners (14.3/17), quite consistently goes down to 13% in deadline D.

There may be a relation between women's higher success rates and the systematic preference there seems to be in the evaluation process for larger projects. In all calls the mean number of partners per eligible proposal is lower than the mean participation in projects, while at the same time the proportion of female partners goes up. This relation is interesting to analyse further, especially since in the Sixth Framework Programme the mean size of projects will be larger.

Table 4: Women and men in eligible proposals and projects in QoL, 1st call, 1st deadline (DI A); 1st call, 2nd deadline (DI B); 2nd call, 1st deadline (DI C); 2nd call, 2nd deadline (DI D)

	DI A	DI B	DI C	DI D
Eligible proposals				
<i>(Missing sex in DI A to D respectively: 520 = 3.8%, 264 = 2%, 165 = 2.6%, 189 = 1.7%)</i>				
Eligible Proposals (EP)	1 693	1 541	771	1 473
Partners in EPs = N	13 399	12 680	6 148	10 951
Women in EPs = N	2 381	1 777	1 085	1 928
% of women in EPs	18	14	17.6	17.6
% of women contact persons	16	16.5	18.8	18.1
Mean number of partners per EP	7.9	8.2	7.9	7.6
Projects in QoL				
<i>(Missing sex in DI A to D respectively: 142 = 5.5%, 43 = 1.8%, 23 = 1.8%, 29 = 1.3%)</i>				
Projects in QoL	307	236	146	250
Partners in QoL projects = N	2 559	2 325	1 253	2 091
Women partners = N	485	334	243	413
% of women partners	18.9	14.3	19.3	19.7
Women co-ordinators = N	57	40	25	33
% of women co-ordinators	18.5	17	17.1	13
Mean number of partners per project	8.3	9.8	8.5	8.3
Success rates				
Success rate all	19	18.3	20.3	19.1
Success rate men	18.4	18.2	20.2	18.6
Success rate women	20.3	18.8	22.3	21.4

Source: EC – DG Research, Unit FI, E-mail (12.03.2001), file Gender of Co-ordinators/Participants

The assessment of the participation of women in the development and implementation of the QoL programme has also been highlighted in terms of an assessment of QoL policies regarding gender mainstreaming. One of our conclusions is that the gender policies within the units dealing with QoL issues are only dealt with in the Women and Science Working Group. This working group consists of dedicated and competent members who are directly in touch with the Women and Science Unit, but seem to have no regular status or function within the management of the QoL programme. Also we note that the awareness of women's participation in committees and panels seems to be very high, as we have seen before, but it contrasts with a low awareness of women's representation in A-grade staff and in projects. Also there is no structural and systematic monitoring of women's participation in all aspects of the QoL programme. Finally, the awareness of women's issues in research for and about women still seems underdeveloped though there is some progress. The same is true with respect to the gender dimension in all documents and publications related to the programme. It is very important that there is a clear gender awareness in all documentation, such as the calls for proposals, and guide for evaluators, and also in the public relations material.

8. Recommendations

Our recommendations are also ordered following the three levels of science by, for and about women. Some of our recommendations regarding science by women and the participation of women in all aspects of QoL are highlighted here.

8.1. Disaggregated statistics

There should be a structural monitoring of women's participation in all aspects of the calls. All numbers collected for reasons of monitoring the QoL programme should be disaggregated by sex and, in addition, statistical indicators for the measurement of gender equality should be developed and integrated into the regular collection of statistics.

8.2. Participation of women as a criterion for quality of proposals

We also made a few recommendations to get more women as partners in projects. Who is doing European research? How many women are really involved and doing research?

One way to increase the participation of women in projects would be to make the gender composition of projects part of the evaluation process. This could be done in the second threshold block of criteria by evaluating the participation of women as partners and co-ordinators. This would mean measuring the quality of the proposals by looking at resources, partnership and management.

8.3. Preferential selection

Another instrument would be to make use of a preferential selection method with full preservation, of course, of quality standards. This should be done after the regular evaluation has taken place. One could think here of two ways: after the standard evaluation, projects with a 25 or 30% or higher involvement of female partners and/or co-ordinators could be given some kind of preference when making the priority list. Another way to do this is to set apart 10 to 15% of the budget to ensure that proposals with a 25 to 30% or higher involvement of female partners and which qualified as eligible, but were not funded, would be funded after all.

8.4. Expert group

We very much recommend creating an expert group, which would bring female experts together in different countries to think about these issues.

8.5. Mainstreaming gender equality within the European Commission

8.5.1. More women in A-grade staff dealing with Quality of life

We think it is also important to look at the representation of women within DG Research. There seems to be a "glass-ceiling" already within the units dealing with QoL issues. To ensure a better representation of women in the higher echelons, special attention should be given to the recruitment, selection and promotion of service personnel. Target figures for positions and functions within the European Commission services might help to ameliorate the position of women in other areas of research.

8.5.2. Mainstreaming gender within DG Research

Another recommendation is that gender equality should be better mainstreamed within DG Research itself. The very competent Women and Science Working Group should have regular exchanges with the Director and Heads of Units about all aspects of gender mainstreaming and science by, for and about women. An annual report should be produced with figures collected

regularly about women's participation in all areas of QoL (or successor programmes), as well as with an overall assessment of the gender dimension of research. We thus recommend to use the tools we developed in our Gender Impact Assessment Study, that is (an updated version of) the GI-Resource and the GIA Protocol for assessing projects.

8.6. Mainstreaming gender in Member States

A last recommendation I would like to highlight is that the European Commission stimulates the implementation of gender mainstreaming and science policies at universities and in scientific and research institutions in the EU Member States. The implementation of gender mainstreaming in the EU Member States should be in alignment with the way in which the European Commission has shaped gender mainstreaming policies in European research.

Women, gender and the life sciences: research for and about women

INEKE KLINGE

Faculty of Health Sciences, University of Maastricht, The Netherlands

Dr Bosch described the state-of-the-art of the integration of the gender dimension in life sciences research based upon a number of recent reviews in the literature. We would like to highlight the following issues with a focus on health-related research.

First, to point to the under-representation of women in health research, and in particular in pharmacological research. Secondly, a connected point, males are still taken as norm in research. The best-documented example concerns the diagnosis of cardiovascular disease. Drug development, however, is another example. Cholesterol-reducing drugs have not been tested in women for long. Under-diagnosis of cardiovascular disease in women and inadequate medication are the results of this under-representation. Thirdly, research into sex differences is growing. Attention is being paid to sex differences in drug metabolism, risk factors, symptoms and course of disease. As a fourth issue, research into sex-specific diseases needs to be stimulated and this can be seen as a way to fill the gaps in knowledge.

The Quality of Life (QoL) programme has a broad scope, organised into 13 action lines: 6 key actions and 7 generic activities. In order to assess the integration of the gender dimension in the Work programme, we composed a literature resource against which the assessment could be made. This literature resource was based on searches in two international databases. One database specialised in gender literature (IIAV database), and the other one in health-related literature (MEDLINE). We focused on retrieving literature that addressed the gender aspects of a particular phenomenon. In doing so, we encountered a specific problem when searching the MEDLINE database: it appeared that “gender” was defined as “sex”. It meant, for example, that when using the key terms “gender” and “nutrition”, all literature addressing sex differences was also found. Several authors in the literature have pointed to the linguistic confusion in the use of the terms “sex” and “gender”. We solved this problem by creating a search tool that focused on the social and cultural gender aspects of a particular research. For searches in MEDLINE, we made a so-called gender caseload, a combination of the terms sex characteristics, sex factors, prejudice which was equated with gender bias, and additionally, terms like gender role and gender identity.

The literature resource that we composed was attuned to individual action lines, by combining the gender caseload with the key words of an action line. For example, for key action 2, we combined our gender caseload with the terms vaccine, infectious and disease. In both databases we were able to find a large amount of literature addressing gender aspects of all key actions and generic activities. The conclusion is that there exists a vast amount of literature addressing the gender aspects of this QoL Work programme. The literature resource is inserted in our final report and contains all the literature references.

When we assessed the 2000 edition of the Work programme against this background in the literature, we first thought it was broad enough to address the needs of women. However, it was obvious that the Work programme was not developed to take gender aspects into account. In the 2000 edition, gender was mentioned only once in reference to key action 6 on the ageing

population. In the 2001 edition, however, gender was already mentioned seven times and this is one of the examples of progress. Although we welcome these new formulations, we still consider them too general and not drawing enough attention to problem areas and themes, which are important from a gender perspective. Of course, there are developments over time, the call for proposals for key action 6 (January 2002 deadline) shows progress in formulations on integration of the gender dimension. However, the 2000 text in itself has undoubtedly influenced the integration of the gender dimension in projects.

In order to assess the integration of the gender dimension in projects, we had to develop a specific tool. The development of the tool was inspired by a number of existing ones, including the evaluation tool for policies from a gender perspective, which was developed in the Netherlands. Our tool, which we called the Gender Impact Assessment Protocol (GIA-Protocol), was attuned to specifically assess QoL research projects. Three steps are visible in the development of this protocol. The first step is about the identification of where sex and gender aspects are involved. A second step is the identification of how sex and gender differences are addressed; in health-related research both sex differences and differences resulting from the workings of gender should be addressed. And finally, we need criteria to evaluate how successfully sex and gender differences are taken into account. The criteria we used were derived from a guide developed by the Women's Bureau of Health of Canada, a department of the Canadian Federal Government. In short, the criteria concern identified problems of gender bias such as over-generalisation, gender-insensitivity and double standards which should be avoided. A further explication of these criteria can be found in our report. We have listed the places in research projects where sex and gender differences might be involved. The conclusion is that they can be involved in all elements of the research process, ranging from research questions, design and methods, to data gathering, analysis and interpretation, to language and concepts and also to outcome and expected effects.

Regarding the evaluation of the projects, we applied the GIA-Protocol resulting from the June 1999 call (pp. 22-23 in our executive summary). A first step in the Protocol is checking if a gender impact assessment is relevant to the proposed research (not every project has to be submitted to a gender impact assessment). The first screening question to that end is "are humans involved as objects of research?" followed by a second screening question about "expected gender effects and gender outcome of research?" Our analysis of the project portfolio in this particular study was limited to the first screening question. If humans are involved as objects of research, then the research projects should address sex and/or gender differences. The literature resource, and updates, can be used to check whether these differences have already been documented in the literature. As for the results, out of 240 key action projects, 66 (that is 28%) received what we have called a GIA indication. So, they should be submitted to our Protocol. Out of 63 generic activity projects, 17 (that is 27%) also received a GIA indication. We subsequently submitted projects with a GIA indication to the scrutiny of our Protocol. We had access to the full description of the projects. Our project researchers spent one week in the archives in Brussels going through these files. The first screening question was carried out at home, on summaries of the projects, but checked with the full description. The evaluation, according to Protocol, was done on complete projects and we focused on the section's objectives and methods and methodologies.

What did we find? For the key actions, only 14 out of 66 projects (that is 21%) with a GIA-indication did address sex and/or gender differences (four projects in key action 1, four in key action 4 and six in key action 6), but in a rather limited and partial way. For example, in key action 1, which is about food and nutrition, there was a study in which women were still excluded because of hormonal fluctuations, which we identified as an over-generalisation risk. In another example

from key action 4, which is about environment and health, a project on mobile phones and the relationship with cancer addressed sex and gender differences implicitly. This might have been because the project took account of “lifestyle”, a factor that is likely to be different for boys and girls. Key action 6, which is about ageing, is rather exemplary in being the most advanced one to take sex and gender differences into account. For example, sex differences were taken into account when collecting data concerning the diagnosis of Alzheimer and also in a study into genetic and behavioural risk factors related to ageing and cardiovascular disease. Of the generic activity projects, only 3 out of the 17 projects (that is 18%) with a GIA-indication addressed sex and gender differences in some way. A good example was found in generic activity 11, which is about disabilities. A study into the prevalence of mental disorders took account of social demographic factors like gender, age, education and rural or urban location.

We summarised and categorised the missed aspects in the projects we evaluated; and the conclusions of our analysis are the following:

1. Research does not address differentiated populations. There is a frequent use of generic terms like human volunteers, healthy volunteers, standard, normal adults, pregnant women, menopausal women, subjects with sub-acute stroke or renal carcinoma patients, farmers, consumers, fishermen, workers, family parents, environmental groups. Diversity issues, for example among post-menopausal women (age, ethnicity, class, etc.), were not addressed.
2. Secondly, the composition of study populations and consulted groups was not argued for, which can result in the under-representation of women and in taking males as a norm.
3. As regards methods, the sex of the interviewer was not explicitly mentioned. The composition of focus groups was not mentioned and a validation of surveys for both sexes was not given.
4. As regards level of analysis, this was often too aggregate, resulting in lack of attention to the gender dimension. For instance, different effects of fishery policies on members of a family or of agricultural policies on the members of a farm were not taken into account.
5. Finally, there was little attention to the gendered effects or outcome of research. It resulted for instance in the development of a technology for forestry, which was only suited to men.

Our recommendations, which had to be attuned to the Sixth Framework Programme (FP6), are directed at two priority thematic areas, namely genomics and biotechnology for health (1.1.1) and to food safety and health risks (1.1.5). We want to highlight the different structure and organisation of FP6: the 13 action lines have disappeared, which has complicated the framing of recommendations.

Concerning the priority area genomics and biotechnology for health, our first recommendation is about sex differences in basic research. Several influential reports, for example, the US Institute of Medicine (IOM) and research agendas of the National Institutes of Health (USA), the Canadian Institute of Health Research and also INSERM in France, have pointed to taking potential sex differences into account at the basic cellular and molecular level. Basic and applied research should take sex differences into account. The sex of biological research materials like tissues should be disclosed, and results should be given in sex-disaggregated data. The area where this applies in particular is genomics. Sex differences in genetic polymorphisms are relevant for therapy, drug development and eventually prevention. The challenge ahead lies in addressing sex differences from basic research onwards. Fortunately, the draft programme contains a footnote requiring this. Secondly, we recommend that research on the brain and on ageing processes should take aspects of gender into account. Thirdly, we recommend that gender aspects of poverty-linked infectious diseases like aids, HIV, malaria and tuberculosis should be addressed; they are documented in the

literature. One should bear in mind that men and women are affected differently by poverty. We have also pointed to the so-called *surveillance medicine*. Surveillance medicine has come along with the shift from a complaint-related medicine to a risk-oriented medicine. Surveillance medicine will require new ways of relating to, dealing with and communicating on risks. Gender aspects are very much involved there. A last recommendation emphasises that future applications of the human genome project should stay aware of the role of gender in issues of genetic screening and infertility.

The second priority thematic area where our recommendations apply is *food safety and health risks*. We have pointed to the role of socially constructed masculinity and femininity in eating disorders. Examples are anorexia and the Adonis complex in men. Of course, the role of the media is very important in these disorders too. An interesting publication in the literature, aptly called *Doing gender, doing health*, is about teenagers managing their asthma and diabetes, in which the influence of the male and female gender role was prominent.

As regards environmental risks, we raised attention to cumulative effects of endogenous and exogenous hormones. Exogenous hormones are not only found in the environment, publications in the literature found they are also present in textiles. So, your sweatshirt could be loaded with hormones!

Another area in the draft text of the new programme was called “anticipating needs of the European Union” (1.2 now called priority 8). Under that heading, we formulated a number of priorities from a gender perspective. First of all, as regards the field of public health, we called for attention to populations with particular health needs such as refugees. We also called for the integration of the gender dimension in systems of quality assessment in health care and we raised attention to the pressure on informal care, which is particularly important in view of the ageing population. We also proposed research to pay attention to diseases without diagnosis. The role of gender in epidemics, pathogenesis and diagnosis of, for instance, chronic fatigue, chronic pain, burn out and fibro-myalgia, is prominent. Finally, useful research agendas have been developed, such as the Office of Women’s Health Research (Agenda for research on women’s health for the 21st century). This and other agendas should be consulted and could help to shape future EU priorities.

In conclusion, to mainstream gender in research, we recommend integrating the gender dimension as an evaluation criterion. A full implementation of our Gender Impact Assessment Protocol is called for and could be incorporated in the evaluation procedure; marks could be given for the assessment comparable to marks given in the current evaluation procedure. We also advocate training in gender expertise for evaluators and the development of a training document.

The guide for proposers and evaluators should outline clearly what proposers need to address in their proposals. Researchers will have to consult the literature, if sex and gender aspects have been addressed already, they will have to motivate their choice of study population, for example, they will have to give data about the validity of their research method. Some education with good examples will be needed.

We argued for a European discussion on guidelines for clinical research. We do not have to copy or to have guidelines identical to those in the USA, but we would like to stimulate a European discussion on the issue. In the meantime, we recommend analysis of existing databases by sex. What is needed in the future is the development of models for the design of clinical studies (pharmacokinetic and pharmaco-dynamic) that yield valid statistics.

To conclude, we outlined some new ways ahead. First of all, we call for studies about gender but emphasise that gender is not a women's issue. It should be made explicit in the call for proposals and programme text that gender is a process of relevance to the health of women and men. As said before, "doing gender is doing health". Research into the process of gender itself should not disappear from the Sixth Framework Programme. Next, researchers should keep in mind that gender is conceptually connected to other categories of difference such as ethnicity, age, class, sexuality, geographical location and level of ability. Research projects using one sex group or one age group should address diversity if possible. We also pointed to fruitful insights from gender studies and from science and technology studies for future life sciences research. Of major interest here are insights into the co-construction of technologies and users. Fortunately, the latest text on key action 6 already aims to involve users of technologies developed for the ageing population. Of equal interest are insights into interactive ways of technology assessments, especially for research into science and society. Both the process of public understanding of science and communication on recent science developments, including controversial ones, will benefit from interactive ways of technology assessment such as consensus development and public debate.

Gender equity and health

PEGGY MAGUIRE

European Institute of Women's Health, Ireland

1. Introduction: gender equity and health in a global context

The last decade has seen a growing debate about the links between gender and health. On the one hand, women have been campaigning under a human rights banner for their needs to be taken more seriously in health planning. These arguments were reinforced in the Platforms for Action developed at the UN conferences in Cairo (1994) and Beijing (1995). On the other hand, there has been a growing consensus on the broader economic and social gains to be made from promoting the health of women. The World Bank in particular has argued for investment in women's health as a rational use of resources, especially in the poorest communities (World Bank, 1993 and 1995). In response to these pressures, international organisations and national governments have prepared gender action plans, which include health-related objectives. These have focused mainly on reproductive issues but there is a growing acceptance of the need to integrate gender concerns into all aspects of health care.

2. The case for a gender sensitive health strategy

The first question that needs to be addressed is the meaning of "gender equity" in a health context. The most obvious definition would be the achievement of the same life expectancy and health status for women and for men. However, this would clearly be unachievable since individuals differ enormously in their genetic inheritance. Moreover, we know that women have the biological potential to live longer than men. Hence realistic strategies for gender equity cannot be focused on equalising longevity or health outcomes. They must instead ensure that women and men have equal access to the resources they need to realise their potential for health – whatever that potential may be (Doyal, 2000). These resources will include high-quality and appropriate medical care. They will also include the range of social, economic and cultural goods that individuals need to promote their own wellbeing. Many of these resources will be common to both women and men. However, there are also significant differences between the two groups in their health needs and in their access to the relevant resources. These differences will need to be identified and acted upon if health policies are to be equitable.

3. Sex differences in health needs: the biological dimension

The most obvious differences in the health needs of women and men are those related to their reproductive characteristics. Women's capacity to conceive and give birth can have major effects on their wellbeing. If they cannot control their own fertility or lack the resources to move safely through pregnancy and childbirth, women will be unable to fulfil their potential for health.

Beyond the reproductive arena, men and women also have different health care needs as a result of their susceptibility to sex-specific diseases such as cancer of the prostate or cancer of the cervix. There is also a differential risk of developing some diseases that affect both sexes. All things being equal, men are more likely to die prematurely from heart disease for example, while women appear to have a greater susceptibility to a number of diseases including rheumatoid arthritis, systemic lupus and osteoporosis. Differences in male and female biology must therefore be a central concern

in any strategy for promoting more equitable health policies. Most importantly, reproductive health care must be given a high priority. But the whole range of sex differences in mortality and morbidity needs to be taken into account in the planning of both research and service delivery.

4. Gender inequality and health: the social dimension

Although biological differences between the sexes are clearly important they can tell only part of the story. Socially constructed inequalities or gender differences between males and females also play a central role in determining whether individuals are able to achieve their potential for a long and healthy life. This is because gender divisions have a direct impact on the health needs of women and men as well as affecting their access to care.

All societies are divided in two along a male/female axis. Those who are defined as female are given primary responsibility for household and domestic labour. Conversely, males have been more closely identified with the public world, with waged work and the rights and duties of citizenship. In most societies there are not just differences but inequalities inherent in the social definitions of femaleness and maleness. Those things defined as male are usually valued more highly than those defined as female, and men and women are rewarded accordingly. These patterns of discrimination are more extreme in some communities than in others. However, there are no societies in which women and men are treated equally, or where women are treated better than men (UNDP, 1995). Not surprisingly, these inequalities often prevent women from fulfilling their potential for health (Doyal, 1995). Gender inequalities are most obvious in the distribution of income and wealth, which reflects women's unequal position in the labour market, their less favourable treatment in most social security systems and their lower status within the household. Discrimination against women is also evident in the political sphere: their access to power is not commensurate with their numbers, their needs or their contributions as citizens. All these dimensions of gender inequality are very evident in the European Union (EU) Member States just as they are in other parts of the world (Commission, 2000).

In recent years women and their advocates have built up a large body of work demonstrating the intimate inter-relationship between these gender inequalities and patterns of health and health care (Doyal, 1995; Kitts & Roberts, 1996; Stein, 1997; Tinker et al., 1994). Studies have looked not just at life expectancy but also at more qualitative dimensions of wellbeing. They have shown that many of the health problems women face are not related in any direct way to their specific biological characteristics. Depression for instance, is more commonly reported by women than by men, yet there is no evidence that women are constitutionally more susceptible to these problems (Busfield, 1996). Within the household women often have little support and the nature of their labours may affect their health. Household work and childcare can be debilitating, especially for those living in poverty or in unfamiliar surroundings. The time consumed in caring for others can lead some women to neglect their own health. For too many this may be exacerbated by domestic violence. Work outside the home can also be hazardous to both physical and psychological health. While some of these risks are the same as those borne by men, others are very different, reflecting the gender divisions in the labour force and at the workplace. As well as affecting women's physical and mental health, gender inequalities also affect their use of health care and the quality of the services they receive. In most EU Member States women are offered equal access to basic health care. However, their use of those services may be hindered by a number of gender related factors which are likely to affect poor women in particular. These include lack of culturally appropriate care, lack of transport and lack of substitute care for dependants (WHO, 1998; Gijbbers van Wijk et al., 1996). When they do get access to care there is evidence that women may receive treatment which

is technically inferior to that received by men, and may also be delivered in less respectful ways (WHO, 1998; Petticrew, McKee & Jones, 1993). Though they have a longer average life expectancy than men, most women do not lead healthier lives. Moreover, a considerable amount of the illness they experience can be traced back to the gender discrimination that shapes many aspects of their existence (Annandale and Hunt, 2000). If health strategies are to promote gender equity, they will need to reduce the discrimination women face not just in the health sector but also in the wider society.

5. Differences in patterns of health and illness

5.1. Demographic trends

The overall health of the EU population is among the best in the world. Life expectancy has increased for both women and men over the post-war period with the male average now standing at 75 years compared with a female average of 81 years (Eurostat, 1998). Women live an average of 6 years longer than their male compatriots of the same status do and this gap is continuing to widen. This raises important questions about the biological and social influences on longevity and about the different policies needed to maximise life expectancy in the two groups.

One consequence of these demographic trends has been an increase in the number of older people. Across the EU, around a quarter of women are now over the age of 60 compared with only about 18% of men, and this predominance is especially marked among those in the over 80 group. This greater longevity raises important questions about the quality of life of those who survive. Since many women appear to be especially disadvantaged in old age this will need to be reflected in planning health and social care for the future (Arber & Ginn, 1995; Ginn & Arber, 1994). At the same time that the population is ageing, there has also been a decline in fertility. The infant mortality rate has improved significantly and maternal mortality has dropped too. This makes the EU one of the safest places in the world for mothers and children. However, there are significant ethnic and social class differences in both maternal and infant/child mortality rates, and households headed by women are often at greatest risk.

5.2. Causes of death

Data on causes of death provide important indicators of sex and gender differences in health. 47% of all deaths in women across Europe are the result of cardiovascular diseases and 22% are the result of cancer while the comparable figures for men are 39% and 28%. Thus male and female causes of death are broadly similar. However, closer examination reveals significant differences between the sexes and these have important implications for the development of health strategies.

Diseases of the circulatory system (ischæmic heart disease and cerebro-vascular diseases or stroke) are the most common cause of death for citizens of EU Member States. Mortality rates from coronary heart disease have decreased in all countries since 1970 but it remains a major cause of death and disability for both males and females. Men are more likely to die prematurely from the disease than women are, and this reflects in part their greater biological susceptibility. However, it is also a result of gender differences in daily life, especially smoking patterns. This raises important questions about the different strategies needed to control coronary heart disease in men and in women.

Cancer is also a major cause of death in both men and women but again, there are significant differences in the patterns found in the two groups. Some of these are of biological origin. Breast

cancer for instance, is a predominantly female disease. It causes more than 20% of all female (cancer) deaths, and a woman living in the EU has a 2-3% chance of developing the disease during her lifetime (Commission, 1997). The cervix is the second most common site accounting for 2% of all cancer deaths. Men too are at risk of sex-specific disease with cancers of the prostate and testes causing around 17% of (cancer) deaths per year. The allocation of resources for research and treatment of these different cancers poses considerable challenges but it is important that gender equity is one of the criteria used in making these decisions. Lung cancer shows a very different pattern since the same disease affects both males and females but not to the same extent. Standardised mortality ratios for cancer of the lung; bronchus and trachea now stand at 73 for men and 15 for women (Eurostat, 1998). Hence it is a disease that predominantly affects men. However, the rate is currently rising among women. Around 9% of all cancer deaths in women are now attributable to lung cancer and the female mortality rate for the disease has risen by 45% since 1970. This narrowing of the gap between men and women is in large part a reflection of social trends especially changes in the smoking habits of both groups. Hence prevention strategies will also need to be gender specific in response.

5.3. Patterns of morbidity

Information on morbidity is sparse at the EU level and the available data are rarely sex-disaggregated. One of the few exceptions is self-reported illness and disability and this does show marked gender differences (Eurostat, 1998). At all ages, women are more likely than men to perceive their health as bad or very bad and this pattern can be observed across almost all the Member States. The overall average for women reporting a (very) bad health is 25% compared with 20% for men. This confirms the pattern found in many smaller scale studies of women experiencing less good health and raises important questions about how this phenomenon should be addressed (Macintyre, Hunt).

6. Some recommendations

Despite the limitations of the data, this overview highlights the relevance of both sex and gender issues in shaping patterns of health and illness. Nevertheless, there have been relatively few efforts to incorporate these insights into policy-making. The remainder of this paper will identify policies for mainstreaming gender issues, in particular women's issues, in the collection of official statistics, in health research and in the delivery of services. The final section will highlight the importance of multi-sectoral approaches to the promotion of health for women.

6.1. Including sex and gender as key variables in routine data collection

Compilations of EU-wide statistics currently offer little in terms of sex and gender disaggregated information. This is especially problematic in the context of morbidity data. While men are more likely to die prematurely, it is women who experience more chronic ill health, distress and disability, especially in old age (WHO, 1998). If these differences are to be properly understood, systems will need to be developed for monitoring gender differences in patterns of health and illness across the lifecycle. Lack of disaggregated morbidity data is especially problematic in the context of mental health. There is also a marked absence of information on sexual and reproductive health, including more information on contraceptive use, which again, is especially significant for women. There is as well an urgent need for better monitoring of gender violence. A recent World Bank estimate suggested that domestic violence, rape and sexual abuse together account for 19% of the disease burden among women aged 15-44 in the developed countries (World Bank, 1993). Yet data on the scale of the problem are still not available.

6.2. Recognising diversity in the measurement of gender and health issues

Health information systems require revision if they are to reflect the differences between women and men, but effective planning also requires recognition of the differences between groups of women and groups of men. The disaggregated data currently available offers little help since it usually presents men and women as homogeneous entities. If policies are to reflect the reality of the lives of individuals and communities, the new information systems will need to reflect the various dimensions of diversity as well as being gender sensitive.

One important differentiating factor between individuals is age. Health requirements of both men and women will vary across the life cycle and these need to be reflected in information systems. Across Europe, women and men need to be divided not just by age but also by a range of social and economic characteristics including class, nationality and ethnicity. There appear to be close links between poverty, gender and health for example, but more work is needed to disentangle them. Migrant women are more likely than others to have reproductive and mental health problems and may also be more likely to experience domestic violence (Carballo, Divino and Zeric, 1998). The factors behind this include not only poverty but also geographical and cultural mobility, linguistic and other problems limiting access to services as well as the reality of racism. However, these problems cannot be fully understood without the regular monitoring of the health of particular groups of disadvantaged women.

6.3. Need to measure health in a broader social context

It is important that essential new data towards the formulation of women-specific policy make clear links between gendered patterns of individual behaviour and the social and economic variables that shape them. The impact of "lifestyle" receives some attention in current statistical compilations. Poor nutrition, smoking, lack of exercise and excessive alcohol consumption have all been identified as causes of disease (Eurostat, 1998). However, there is very little sex-disaggregated data available at EU level. This gap will need to be filled if the different pressures on women and men to make unhealthy choices are to be properly understood.

Moving beyond individual behaviour there is also a lack of routine data on some of the more structural links between health and daily life. We know for example, that work can have an impact on health and that both sex and gender influence these effects. However, there is little information on this in routine statistics. Even less information is available on the hazards associated with informal, unpaid and domestic labour, despite their obvious impact on the health of women across all the Member States (Doyal, 1999).

6.4. Tackling gender bias in medical research

Alongside the development of gender-sensitive methods of routine data collection, gender bias in health research will also need to be addressed. Health research is currently based on the non-stated assumption that women and men are physiologically similar in all respects apart from their reproductive systems. Other biological differences are ignored, as are the social/gender differences that have such a major impact on health. The implications of this bias for prevention and treatment strategies are just beginning to emerge and particular concern has been expressed in relation to heart disease and also to HIV/AIDS (Narrigan et. al, 1997; WHO, 1998).

In the context of coronary heart disease for example, there is a growing volume of evidence to indicate that researchers often behave as though it were just a male disease (Freedman and Maine,

1995; Sharp, 1998). As we have seen, it is also the most important cause of death among women. However, too many epidemiological studies and clinical trials continue to be done on all-male samples. As a result, there are still major knowledge gaps about the differences between disease processes in males and females and both preventive and curative strategies are too often applied on women when they have only been tested on men (DeBruin, 1994; Hamilton, 1996; Rosser, 1994).

6.5. Bringing women into biomedical research

Few women are currently involved in the male-dominated arena of medical research, either as investigators or as subjects. In the US this issue has been widely debated and a number of strategies have been developed to promote gender equity (Auerbach & Figert, 1995; La Rosa, 1994). The European Commission can play an important role in developing similar initiatives in Europe. Criteria for EU funding should include the requirement that all applicants take sex/gender concerns seriously in their research design. This would be one of the conditions for the awarding of grants. The European Institute of Women's Health (EIWH) worked with the Directorate-General for Research to prepare a statement on gender to be included in the 6th Framework Programme.

6.6. Broadening the scope of health research

The reform of biomedical research can only be a partial strategy for developing the knowledge base of a gendered health policy. It is also important that new methodologies are developed to broaden the scope of health-related research. Around the world, studies in the area of sexual and reproductive health, but also in mental health, are already showing the value of interdisciplinary approaches. Research that brings together quantitative and qualitative methods is proving especially valuable as the basis for policy development. The European Commission can encourage and support those who try to cross the biological/social science boundaries through both training and funding.

7. Putting gender into the planning process

One of the most important principles of gender-sensitive planning is that women as well as men should be actively involved in the design, implementation and evaluation of all government programmes. Clearly, women have traditionally had much less impact than men have on all stages of the policy process in Ireland and across the EU as elsewhere in the world. If their needs are to receive as much priority as those of men, more appropriate forms of consultation will have to be developed. This may involve working more with representative organisations, community groups or individuals directly involved in specific projects. It is also important that this involvement is carried through to the evaluation stage. Health-related programmes and projects need to be conducted so that the results can be assessed from the perspective of both women and men.

7.1. Capacity building

Apart from tackling inequities in research, an assessment of gender-sensitive needs must also be encouraged in the delivery of health services. This will involve a comparison of the numbers of males and females in the target population and an assessment of the gender patterns in current service use. In order to do this the following questions should be asked:

- How can we explain the different use of services by men and women?
- Can any difference be seen in the quality of care women and men currently receive?
- In what ways are health services themselves gendered?

- Who currently controls access to health-related resources and do the allocation criteria take into account the different needs of women and men?
- In order to plan for effective service delivery, women themselves, NGOs and health advocates need to be more involved in the design, implementation and evaluation of services.
- Training materials should be developed to assist in conducting gender analysis in policies and programmes.

Health sector reform should be completed in a gender-sensitive way, resulting in a positive impact on staff composition. If policies and programmes are to be gender sensitive, the importance of educating health workers and policy makers in relevant areas cannot be overstated. Attitudes of many doctors and nurses often constitute particular obstacles to women and men seeking informed decisions concerning their own health. Medical and nursing curricula also need to be reshaped to ensure that gender issues will be properly integrated into the planning and delivery of services in the future.

A report funded by the European Commission and published in 1997 identified major gender inequalities in access to positions of influence and power in public health and health care institutions across the EU (Vinay, 1997). Women make up a large majority of both consumers and workers in health care but still hold a disproportionately small number of senior positions as clinicians, managers and policy makers and are under-represented on the various committees that run health services. The EU and particularly national governments will need to develop strategies for enhancing women's opportunities within the health sector. These may include the promotion of an equal opportunities culture, setting of targets and monitoring progress, providing more childcare and creating mentoring networks.

7.2. Inter-sectoral collaboration

Most areas of the government's work have some relevance to health and all need to be gender sensitive. Sectors as diverse as education, agriculture, consumer affairs, industry, transport and social protection all need to be monitored to assess their implications for the health of both women and men. In many cases policies will need to be developed across what have traditionally been seen as separate areas. Strategies for the prevention of gender violence, for example, will require integrated action in criminal justice, law enforcement, health, housing and employment sectors. Within the economic sphere, attention needs to be paid not just to the "official" economy but also to the informal sector and to patterns of unpaid labour.

7.3. How will we measure health status in the future?

As the EU enters a new phase of enlargement, there will be new risks to health not least as a result of increased mobility of citizens. There is a need to encourage the development of appropriate indicators for measuring the health status of men and women and to encourage gender sensitive and comparable information systems between Member States. It is essential to establish a sound knowledge base to inform policy and programme decision-makers on the health status of EU citizens, resulting in priority setting and targeted health promotion and disease prevention policies. It is essential therefore that the gender perspective is taken into account and that data is disaggregated by sex so that results can be presented for easy use.

Following the launch of the discussion document *Promoting Gender Equity in EU Public Health*, September 2000, the EIVH lobbied the European Commission and prepared amendments to be

tabled in the European Parliament, to ensure that gender would be included in the New Public Health Strategy, and the 6th Framework Programme for Research. With the support of many MEPs and organisations the amendments on gender were included in the Trakatellis Report and voted through the European Parliament in April 2001.

The EU has an important role to play in the promotion of gender equity in health in Europe. The Health Promotion and Disease Prevention programmes, including the gender perspective, can lead to more targeted and specific programmes, encouraging healthier lifestyles and informing specific groups of risks to health. The Gender Impact Assessment Study has outlined the commitment of the Commission to gender mainstreaming in research. However, the study by Ineke Klinge and Mineke Bosch outlines the major gaps in the 5th Framework Programme, and areas that must be addressed in the 6th Framework Programme, if we are to achieve gender-sensitive research. There is quite a lot of awareness-raising yet to be done. Policy makers, politicians, researchers, NGOs, all stakeholders interested in the improvement of the quality of life for both men and women, must work together to ensure that the gender dimension is included in research at all levels, guaranteeing effective and efficient health care policy in the future.

Report on the User-friendly information society Gender Impact Assessment Study

ADRIAN HEALY

ECOTEC Researching and Consulting Group, Belgium

This paper will focus on the aims and objectives of the Gender Impact Assessment Study on the Promoting the user-friendly information society programme (IST programme), the methodology and the findings and some broad conclusions.

1. Aims and objectives

We first had to set the background of gender relevant analysis through a bibliographical study. We essentially tried to identify what gender issues come forward within the Information Society Technology (IST) area. Secondly, we had to carry out an in-depth analysis of the implementation of the IST programme from a gender perspective. Thirdly, we had to analyse the impact of the programme itself, focusing on an analysis of the Work programme, on what the programme was trying to achieve, and on what had actually been achieved through the projects funded to date. Two distinct elements came out very quickly: the situation of gender within the IST sector at the moment and how gender-awareness had progressed through the IST programme specifically. The final objective was to identify some of the challenges and formulate some recommendations for the future.

2. Methodology

The methodology adopted was related to each of those four objectives. The first part of the study, a comprehensive literature review, had two purposes. It allowed us to identify and to analyse, to a certain extent, what the potential gender impacts might be. It also allowed us to look at what research under the IST programme might be able to achieve in terms of having a gender facet to it. For instance, would it be in terms of raising awareness on gender issues, or in terms of undertaking research that was positively overcoming gender disparities which existed? To do that we had to identify what the disparities might be. We wanted to look at this in some depth, not only identifying the headline disparities but also some of the underlying factors beneath. We used a whole range of literature, much of which was not European based, but mostly from Canada and the US. A number of studies come from the UK or from other individual countries within the European Union (EU), but what seems to be missing is any wide-ranging comprehensive study of gender disparities across the EU. The statistical base is simply not comparable at the moment. We found this to be a big difficulty and something which potentially could be looked at further in the future. The literature review was intended to guide the project, to identify the assessment framework within which the study would be processed. What sort of questions should we be asking? What are the issues that we're really interested in tackling here?

The second part of the methodology examined the gender impact of the IST programme and to what extent it contributed to raising gender awareness more widely. This was largely through an

analysis of the implementation process and the structure of the programme, as well as an analysis of the impact of the programme's outputs. Which were the supported projects? What were those projects trying to do? What were the projects actually achieving in the field (even at an early stage)?

There are two elements to this essentially: the nature of the technology which is being supported or being researched and then, what that research is trying to address.

There are four types of research which may potentially be taken forward through the IST programme. Research into technology for individual users; technology for collective users; broader scale research around core technologies (the infrastructure and so forth around the information society); and a series of research which isn't technologically based, but may have a social or economic or any other aspect.

First we need to look at some of the objectives that can be identified. Perhaps research is looking to improve the affordability of the technology. Perhaps it is trying to address gender differences between users. Perhaps research is looking to compensate for existing bias within the information society or to address bias in other sectors, using the information society as a means or a tool to overcome those biases. What we call the "sensitivity guide" was constructed using this matrix. So, for example, we could suggest that technology which is aimed at the individual and identified user could aim to improve affordability of technology. However, that is unlikely to have a positive impact on gender disparities as it's targeting unidentified individuals in this sector, when it could address gender differences between users.

In contrast, research which is aimed at supporting infrastructure or core technologies may be able to improve affordability of the technology and therefore have a positive impact upon gender disparities, but it's unlikely to be able to address gender differences between users because of their collective nature. It is also unlikely to be able to compensate for existing bias in the information society or to tackle bias in other sectors, because it's seen as being gender neutral in this respect. It's actually just dealing with core infrastructure and technological elements.

A number of positive gender impacts were identified from the literature review. Firstly, the IST programme could have a positive impact in a very direct manner: it could provide gendered solutions to gender inequalities in the Information and Communication Technology (ICT) sector. It could also have a positive impact by actively targeting and tackling gender biases in the development of ICT solutions. Furthermore, it could have an indirect positive impact through making ICT networks and ICT applications more affordable.

Sadly, there are also some potential negative impacts of the IST programme. I say potential because this is part of the research method more than anything else. The potential negative impacts could be direct or indirect simply because a greater part of the resources of the IST programme are being allocated to the so-called "gender neutral" ICT developments. About 40% of the programme has been applied to core technologies, things which are seen as being neutral. The problem with this is that this clearly maintains existing gender imbalances. Equally, the programme might have an indirect negative impact simply through failing to exploit positive or possible opportunities for a more positive impact, that is, the opportunities are there, but they are not being taken and therefore the impact is more likely to be negative.

3. Findings and broad conclusions

We assessed the findings at two levels. Firstly, the findings of the literature review, which examined the gender impact on different aspects of society, looking at impacts through a gender perspective on people as citizens, as workers and as consumers. We then examined what would happen in terms of the gender aspect of the programme itself, examining how the IST projects and the IST programme relate to the issues identified from the literature review. We looked at programme management issues, programme content issues and project activity as well.

Concerning the gender impacts on people as citizens the findings will come as no surprise. Firstly, women are less likely to have access to ICT, either at home or at work. This came through very clearly in all the available statistical analysis. However, even when women did have access to that technology, participation in the information society tends to be gender defined. Women tend, on the current figures, to use the information society less than men do. There are many, many reasons for that. Some are sociological, some are financial, and some are related to the whole field of social exclusion as well.

However, what is interesting is that the current gender imbalance present in the EU has, it appears, been reversed in the United States. It appears that this may be an issue of familiarity, it may be an issue of content. In a large part, the information society is further developed in the US. It has been around for longer; thus there are now more users: there seems to be an increased familiarity and thereby an increased willingness use it. One of the reasons for this may be that, at least in the US, the content of the information society as a whole is becoming less biased towards male interests. Certainly, at the outset of the information society, content was largely male dominated. This may still be true in parts of the EU, in the way that people use it, in terms of what sites are available in which languages, for example, in terms of wider applications of the information society as well. As the information society develops, applications seem to become more women-friendly, shall we say, at which point the balance seems to be shifting; a positive sign. In fact, what seems to be coming forward is that class rather than gender will be the defining characteristic of the future, social exclusion will determine whether you have access to the information society or not. This remains a gender issue whilst women make up the majority of those who are socially excluded, but it is too simplistic to simply say that the defining line is one of gender rather than anything else.

Unfortunately, when we looked at how the information society impacts on workers we came up with a similar, almost depressing, conclusion. Women are under-represented in the ICT industry, especially at high levels. This mirrors other industrial sectors. This may not come as a surprise but is unfortunate as in the early years of information society many people hoped that this would not be the case. This was a new industry and people hoped it meant that traditionally defined roles would not be repeated. Unfortunately, it seems to be so: there is wage segregation, there is occupational segregation and women are in general under-represented at the higher levels. They're also under-represented in ICT education and training. Again, this causes problems later on because of issues of familiarity, of willingness to use new technologies and there is a self-reinforcing circle being created. One of the reasons that has been put forward for this under-representation of women is the hard science aspect, the engineering, the technology element to the information society that has been developed so far. However, as the information society matures we will move towards a greater focus on the content industries, marketing, advertising, publishing and so forth. It is suggested that as women are more traditionally represented within these industries, we may see a greater balance coming forward in terms of gender distribution in within IST.

One of the other hopes that has been put forward was that the information society would offer opportunities for new working methods and that these might, in turn, overcome gender issues within the labour market. Teleworking for example, would enable women to undertake childcare tasks as well as taking on a full-time career. Sadly, this is a simplistic assumption, partly because of the different ways of teleworking. Evidence suggest that women are most likely to be based full-time at home when they're teleworking, perhaps cut off from the social interaction of the work place, whereas men are more likely to be mobile workers moving between offices and home and having a much more diverse existence. So it's too simplistic to look at teleworking as a single characteristic, there are all sorts of social aspects and economic aspects associated with it as well.

Equally, we're all aware of the new employment opportunities which are being opened up by ICT technologies such as the rise of call centres. These have fairly poor employment conditions and women dominate the jobs. So what we're beginning to see is that disparities are opening up in terms of the nature of the labour market opportunities which are available and which are potentially accessible.

Finally, as consumers, we find that at the moment, e-commerce is being used more by men than by women in the EU. In the US the situation is reversed: women are more likely to be shopping online than men are. This is good because it helps people become familiar with the information society, helps them become willing to try other activities which are associated with it. Unfortunately, the retail tendencies really reflect existing profiles. In the limited research we were able to carry out using secondary sources, the research themes suggest that men tend to go to the sport sites and women to the cosmetics and the clothing sites. So social stereotypes are being carried through in terms of the information society as well. But this is largely due to content issues (is there a suitable content on the Internet to start with?) and to access issues (physical, behavioural and commercial access).

So, the analysis of the literature provided us with a somewhat gloomy perspective. IST has some serious disparities within it, although it is moving forward slowly in certain directions.

We then looked at the IST programme as part of the 5th Framework Programme. The first thing we looked at was programme management. Unfortunately, there is limited female representation within the management hierarchy. Remarkable consistency, but fairly low consistency. In the information society advisory group, there are four women, only 15% of the members and 14% of members of the monitoring panels are women. None of the figures achieved the 40% target that has been set for membership of such committees. However, there is no evidence of exclusion of any deliberate nature. There is indeed good evidence of strong efforts being made to involve more women within these programmes management committees and strong evidence of looking at a higher proportion of applications from women than from men. However, the barriers to participation are unfortunately very strong. One of the problems is conflict of interest. Because there is a limited pool of specialists from which to draw, those specialists have far more calls upon their time. As a result they're far more likely to be involved in activities which might be constituted as a conflict of interests and therefore barred from participation. Equally, attendance requirements can be quite onerous, particularly for mothers having to come to Brussels for a week at a time to assess a series of projects. This can be difficult for those with a family life which they do not wish to leave behind in another country. Also, the requirement for individuals to have a high degree of industrial and technological experience means that the barriers we saw for women in the industry itself, where few women are involved at senior levels, start to come through within the programme management committees as well. So this is a reflection of the wider circumstances in that respect.

What is the management impact on the programme content? How does the programme content try to address issues of gender balance? I am very pleased to say that there is very strong support in the Work programmes for equal opportunities. It is stated very explicitly, it is a key theme. The Work programmes bring together technology developments and EU policies within these areas. However, our concern is to the actual impact of these good words. For instance, when examples are being developed as to typical users of technology, typical participants in the information society, the stress has been on what are called “lean forward” types. These lean forward types are sometimes given female names but they tend to be professionals, Information Technology (IT) literate, positive about the information society. The alternative are called “laid back” users, people who are less IT literate, who are not in the same professional classes. Unfortunately, the characteristics of the laid back group are more likely to apply to a majority of women at this stage than they are to men; the male dominant characteristics are represented by the lean forward types. So it is possible that there is a lack of underlying awareness of what gender issues are and that, despite the good intentions, the Work programme is not fully taking into account some of the gender issues which exist within the information society. Equally, the balance of funding within the programme is directed towards technological key actions, towards those that are seen as gender neutral. However, because they are maintaining existing gender conditions and disparities, one might see them as male dominant as well. The programme content is well meaning but it may not fully understand all of the issues.

What about the projects? This is the area where there is the greatest opportunity to make a difference regarding gender issues. Unfortunately, there doesn't seem to be any clear consideration of gender at the proposal stage. Projects do not necessarily consider gender issues and the assessment process itself does not take gender issues into any significant account. This is unfortunate, and some good opportunities might be missed. Of all the projects within the IST programme, only one considers gender issues explicitly, makes explicit reference and talks about the differences. A few other projects do deal with gender issues, but not in an explicit manner. They deal with these through compensating for existing biases within the information society, or they address gender bias in other sectors. There is a general lack of awareness of gender issues. We did a small survey on project leaders and none of them came back with any idea of what the gender issues were within their project, this included the female project leaders that we surveyed; there is no gender difference within that aspect of it. Science is blind at that stage. However, among the projects that we did identify, when looking at them in more depth, there were some very interesting ones where there was potential for gender impact. I'll give you one or two examples, just to show you how this might develop.

One project was trying to increase interest in space research amongst young people. This is just that sort of project we need if we're to get young people and young women interested in science and moving into science in the future, but the project made no reference to the different learning needs or interests of men or women, of boys or girls. The danger is that if the project follows the traditional research and learning experience of science, then it's not going to appeal to women and won't attract more women or girls into a career in science in the future. Another project dealt with voting issues: the increasing importance of e-government. The Community and Parliament hope to use the Internet as a way of empowering people, who can't otherwise take part. Again, a good potential for gender impact in terms of overcoming biases. Again, no reference to any gender issues, despite this being an important issue. Another project aimed at call-centre working, an area where the employees are mostly women, but with no reference to gender issues at all. A final project was about archaeology. Another good area where gender could be taken forward in terms of different issues of interests to different groups. This could encourage people to identify with

certain aspects or activities, encourage them to use the project being created, so they become more familiar perhaps with the information society and its potential. However, when we asked if they would like to be included in a publication they told us “but we don’t have anything to do with gender”. They were obviously not interested in that aspect.

So where does this leave us? Three conclusions can be made at this stage:

1. There is no evidence that gender is seen as an issue by programme makers or project leaders to any significant degree, although there are welcome signs of change beginning to happen. I have to stress that this was an assessment of what has happened in the past rather than what we are moving towards over the last few months and into the future.
2. Equally, there is very limited monitoring of gender content, even where there are questions requesting gender information: the number of female scientists involved in the project for example. There is no consistency in completing that information, no consistency in asking for the information to be completed, but again, that is improving.
3. The projects which have been supported sustain, and I think potentially deepen, existing gender divides through inattention rather than any active aspect. The good intentions are there, but too many of the projects see their activities as gender neutral, whereas in reality they are sustaining or deepening existing biases.

So, what is the balance sheet for the IST programme? I would say that the programme is having a potential positive impact on gender issues, through assisting and improving the affordability of technology. By making technology cheaper and more available, more women are able to access it and thereby use it. Mobile telephones are a prime example of this over the last five to ten years.

However, there is a potential negative impact, partly because the majority of the funds are allocated to so-called “gender neutral” developments. Secondly, because the programme is not providing or seeking to provide explicitly gendered solutions at this stage.

To sum up, I would say that these results are slightly unfortunate because there is a substantial opportunity at the moment to improve the effectiveness of what is doing within the IST programme, and it doesn’t require dramatic change either. I think some small steps in terms of raising awareness, raising consideration will have significant impact and allow very significant results to be achieved over time. A lot of the projects are there, a lot of the interest is there. It’s just a question of making it work out.

GABRIELE MOHSLER

Ericsson, Germany

This is the first time I have spoken in front of so many women because I'm a woman in a man's world. I studied electronic engineering and, to make it even worse, it was in Germany. Some of you are probably thinking "how did she come to this, I could never study this electronic engineering stuff. I hardly understand how this microphone works or a mobile phone works. I just want to use it." Good for you. You should study what you're interested in; you should do what you're good at. Others might be thinking "oh that's very interesting, I'd like to know more... How come she did this? Did something go wrong in her education or what was wrong with her?" I always have to explain to a lot of people why I am doing what I am doing and why I am a woman in a man's world. Let me relate some of my experiences from my education and my career to date.

During my studies I had to do three months training. I was the first woman to work in a small company of about 200 people. I heard the saying: "if you're a woman and you really want to survive this, you have to be better than the men." I would add that you have to do all the things men are doing as well. You can't say "no, I'm not doing that because I'm a woman". There is a big difference when a job requires physical power, but in my job, the heaviest thing I have to lift is my pen and therefore I don't need many muscles. One of the important things I found out is that if you're a woman in a man's world, you don't necessarily have to be better, you just have to do everything that is requested.

When I started to study there were about 900 men and one woman to 30 men. This sounds super, but again, I had to explain why I was studying this subject. I was asked questions such as "haven't you played with dolls?", I said "of course", then "did you repair your father's shaver?" and "he doesn't use an electronic shaver, sorry". I found it very frustrating, but you have to survive this and go on. I also heard remarks like "as a woman, it is easier because men are giving you marks". Some people, mostly men, expect women who are studying engineering to either look ugly or be totally frustrated. I don't think I am either of these. If you look "normal", they think that you will try to get by, by being nice to the professor to get a better mark. That's not true, but you have to work against these prejudices. You cannot avoid all these questions. I couldn't tell anybody that I was just interested in technology. It was not enough of a reason. I'm not just blaming men, there are of course many women who ask the same types of question, mainly the girlfriends of my colleagues.

When I started training as a patent engineer people said "patent engineer, this doesn't mean that you're really an engineer", although I was obviously working with technology.

In the first company I worked in I was the first woman in my department of about 40 men. My boss, a man, said "now we can afford to hire a woman – we have 39 others who will stay when you're gone". My tutor came with me to my first meeting in the job. When I entered the room one of the waiting men said: "A coffee, black for me, please". I went out, got the coffee, went in again, put it in front of him and said: "OK, but now let's start business, please." They were totally shocked but I never blamed them. I could have been a secretary. It's a good job, why not? But why do they think that just because I am a woman, I am a secretary. Now, one reason why I chose this company was because it was also an international acting company. It would have been much more difficult to be a woman, as an engineer, in a small or medium sized company. So I chose the smoother way. However, I finally realised that this was not really the company where I would have equal opportunities to make a career. After some time, you have to decide whether you want to make

a career or you want to have an ordinary job. And then the competition starts, but I found that competing against men was not an equal competition. I was 30 years old, so everybody expected me to leave at some stage to stay at home. In Germany, many women take a career break but then find it very difficult to get back into a job. Nobody asked me if I intended to do this, they just expected I would.

So I decided to go to a company where the situation was better. I chose to work with Ericsson, which, as a Nordic company, has more positions open for women. I soon became Head of the Patent Department. My manager, a woman, is a Research Director. I have to admit that it was much easier for me to start here as a woman hired me. But even in Ericsson, where there are quite a number of women in management positions, there is only one woman in the core executive team and, typically, she is the Human Resources Manager. In technological companies today, even in Sweden, it is unusual for a woman to hold very high management positions.

Still today I feel that I have equal possibilities to build my career in Ericsson. This is mostly because in Sweden there are a lot of women studying electronic engineering. For example, I am working in a group of managers in the patent area where there are 50% women and women have 50% of the management positions. Perhaps that is by chance, but it really shows the difference.

Against this background I want to make one very important point. Several times, target setting has been mentioned, that we should have 40% women in certain positions. That's fine as long as there are 40% of women who are equally as good as men. I am against targets that just state that there should be 30 or 40% women. It actually makes life much more difficult for women like me. All the time I was told "yes, it's easy for you to get the job because they have to take one woman in a management position". I believe that there should be equal rights for women only if they are equally good.

Recently, I had to make a short presentation to our top management and I decided to give them a presentation about considering more women in management positions. I want to share some of the points with you. I outlined some advantages of having women in management positions. Women are very tough in getting things done. They are chasing the goals. If women want to achieve something, they work on it, they do as much as they can to get it, and they get it, mostly. The second point, which is mainly positive, is that women are much more emotional. This can of course be a drawback if you are too emotional, but in general, I would regard this as being positive. I can be very tough on somebody, but I can also be very nice to another.

So use your advantages, go for it and make your way. But never request to be treated in a better way, just because you're a woman. Also remember that in a company you do your job because you have to earn money for the company. So do your job as a man does, but don't try to be a man, don't behave differently. Be a woman.

Women in Growth – Perspectives on gender equality in industrial research

LUISA PRISTA

Materials Unit, Growth Programme, Research Directorate-General, European Commission

1. Gender Impact Assessment Study... the approach taken by Growth

The Competitive and sustainable growth (Growth) programme took a conscious decision not to complete the Gender Impact Assessment Study. The decision was taken during the first phase of the study, as we felt that such a study in this area would produce banal results with little, if any, positive impact on future strategy. Growth is an industrial research programme and as such, it has been traditionally male-dominated. The low participation of women in this sphere has been well-documented for some time. From our statistical data we can see that the participation of women in research projects is increasing. Nevertheless, in the 5th Framework Programme, the participation of female co-ordinators of research projects remains at only 8%. Despite the nominal increase in the participation of women in this area (it was only 1% in the 4th Framework Programme), the current level is still not acceptable and needs to be addressed.

The very small numbers in question could not allow a realistic statistical extrapolation. Therefore, we used a different approach. Rather than concentrating on analysing already known and non-representative data, we decided that it would be better to come to terms with understanding the real issues relevant to industrial research and to use this information in setting up some guidelines for the future. This would help to facilitate and encourage the effective participation of women in future research projects.

2. Uniqueness of Growth as an industrial research programme

As a starting point, we considered it important to look at characteristics specific to our programme. The Growth programme has a very clear objective. It aims to improve the competitiveness of European industry, whilst at the same time ensuring sustainable development. As an industrial programme, Growth spans practically all sectors. It covers transport to aeronautics, mobility to production, manufacturing to materials and measurements to testing. It is a programme that, by its very nature, addresses industrial needs that will contribute to defeat European socio-economic challenges. It therefore reflects the evolution of our society towards a sustainable knowledge-based society.

3. Understanding women's participation in research by analysing the evolution of industry, society and the European Union research Framework Programmes

Our changing society demands modern industry to follow its evolution, encouraging industry to play an active and responsible societal role. While in the last decades we have witnessed a shift from mass-production to customer-oriented production, we are now moving towards society-oriented production. Industry has not only to supply products and services, but also to offer solutions to society as a whole. The participation of women across industrial research programmes was

analysed by taking into account the issues mentioned above as well as the evolution of our research programmes. This implied looking at the shift from a labour-intensive industry towards a knowledge-based one, whilst at the same time looking “in-house” at the research projects funded by our programme and at the content of the programme itself. At the level of European Union (EU) research, the Framework Programmes showed a very significant shift in the research approach: from a technological push, market-oriented approach, to a customer-oriented, problem-solving approach and, in the future, towards a much wider solution-finding approach.

The impact of the future results of industrial research was also taken into account (in terms of gender impact) since these results will become more and more significant, not only at technological and economic levels, but also at the societal level, tackling issues such as culture, education and ethics. The research responsibility lies not only in dealing with these issues already present in our programmes, but also in launching a public debate and stimulating awareness of these issues.

4. A study based on consultation of different research actors

It was important to collect input from the players directly involved in the Growth programme (such as male and female researchers, industrials, committee members, national contact points, evaluators and European Commission staff). This was done by means of a series of interviews. The aim of these interviews was to have a clear picture of women’s vocation and interest in industrial research and to define future opportunities for women in order to improve their participation in research projects.

The results obtained revealed that in the 6th Framework Programme (FP6), the ground will indeed be very favourable for more active participation of women in industrial research. In fact, FP6 embraces multi-disciplinary approaches, inter-disciplinary themes and skills and more knowledge-based technologies. It addresses softer hybrid technologies such as nanotechnologies and biotechnology, with greater attention given to the use of the results of research. This approach includes ethical issues, training, environment and societal concerns in general. The interviews carried out confirmed our starting hypothesis that these are areas of particular interest to female researchers for which the involvement of women as users, educators and citizens, is crucial.

The future then appears to be very favourable and will lead towards an increase in the participation of women in research. We must however not become complacent. There is much to be done to accelerate this process.

5. Future work

As a positive continuation of the work that has already started in this area, and to coincide with the conference, we have launched a working group entitled “Women in Growth”. One of the aims of this group is to stimulate and expand the discussion amongst all concerned players, to propose practical actions and objectives, with the ultimate aim of having a more gender-balanced structure in FP6.

The Growth website¹, that already hosts the complete set of interviews, will hopefully become an open forum for discussion with all interested parties. We invite you all to visit it and to give your feedback. Open dialogue and continuous discussion are paramount to ensuring that the good work that has already started will be maintained and indeed gain momentum.

¹ <http://europa.eu.int/comm/research/growth/gcc/projects/women-science-conference.html>

Of course, efforts in this area will continue, in strict co-ordination with the Women and Science Unit. We expect to make both the content and the instruments for the implementation of FP6 as favourable as possible, in order to reach an effective and correct gender-balanced participation in industrial research. The input of women in industrial research activities is a win/win situation. It is an essential, enriching factor, not only for women, not only for Europe, not only for industry, but for society as a whole.

Engendering energy

JOY CLANCY²

Technology and Development Group, University of Twente, The Netherlands

1. Introduction

There were two basic objectives to the Gender Impact Assessment Study for the Energy sub-programme (Lot 4): to examine to which extent women's and men's concerns are addressed to ensure that men and women benefit equally; and to ensure that any existing inequalities between women and men are not perpetuated. The output of this research is three Working papers. This paper mainly relates to the first Working paper since it is more general and probably of interest for a wider range of people.

The second Working paper addresses the way in which the "Preserving the ecosystem: research actions for energy Directorate" (Energy Directorate) deals with the Energy sub-programme in relation to gender, gender issues within the content of the Work programme, and also within the staffing levels. This Working paper is really quite critical of the gender sensitivity, or rather the lack of it, in this Directorate, and publishing this Working paper is a wonderful and brave exercise of transparency by the Commission.

Working paper 3 looks at the Energy sub-programme itself, and particularly at the problems that female researchers faced within that programme. The final outcome is a set of recommendations to enable the Commission to reach its objectives of gender mainstreaming in the Directorate-General for Research (DG Research).

2. Working paper 1

The objectives here were to look at women's specific concerns in energy and to look at how gender concerns could be incorporated into energy research.

There were two approaches to data collection. Data from secondary sources, both from the European Union (EU) and from other industrialised countries, were analysed. In addition, a number of surveys were carried out. In this respect there is a considerable overlap between some of the data needed for Working paper 3 and Working paper 1. There was quite some frustration when trying to obtain data. The Commission does not have sex-disaggregated data of the type required to answer the questions set out in this research. The importance of sex-disaggregated data can be gathered from this phrase: "*No data, no visibility – no visibility, no interest*". In other words, if there are no sex-disaggregated data, you cannot possibly generate people's interest in the subject. It was also disappointing that some members of the Helsinki Group, the Commission's Gender and Science Committee and similar committees at national level, who were approached, did not respond. Trying to interview women who work in the nuclear industry was, in summary, impossible, which is detrimental to their perspective on gender and energy.

² On behalf of Jenny Gregory (IT Power Ltd, United Kingdom) and Deborah Cornland (Cornland International, Sweden).

The analytical framework used was the one that has been used already within the Women and Science Unit of DG Research: research by, for and on³ women. In the research reported here this means: What are women doing in energy? What are women's priorities? Are they the same as men's? And do women experience different career problems than men do?

2.1. Research by women

It is quite difficult to find information specifically about the energy sector, because it is so broad in terms of academic subjects. You can be an energy economist, a combustion chemist, a radiation physicist. Degrees in these subjects do not confine you to the energy sector, so a high degree of career mobility is possible. This makes tracking careers methodologically difficult. However, one can say, with a reasonable degree of confidence, that the number of women in higher education who are studying the subjects enabling a career in the energy sector is not reflected in the number of women at the higher levels of hierarchy in the energy sector. There are indications that more women are entering the energy sector. The ENEQO project, supported under the 4th Framework Programme, to encourage more female scientists and engineers to join the electricity sector is to be welcomed. However, something happens to these women, as they do not stay in the industry. This is the well-known phenomenon of the leaky pipeline.

One of the aspects that emerged from the interviews is that both women and men consider that the energy sector has a particularly masculine image. It is an image of white men over 50. Does this matter, if these men do a good quality job? Not if they fulfil companies' wishes. However, if the objective is to encourage young women to enter the energy sector so that they can contribute to one of the most challenging problems facing us today, sustainable energy, then something has to change. Such a masculine environment can actually seem quite threatening. Unfortunately, the old-fashioned masculine behaviour of patronisation still exists, certainly in universities. Here is a not uncommon anecdote from a female student studying engineering in the Netherlands, a country which prides itself on its image as a liberal society: "my lecturer said to me: oh, I had a girl as clever as you five years ago!" But he never said this to his male students – I had a boy as clever as you ten years ago. It is dispiriting that this sort of thing, which was common for female students in the 1960s, still exists today.

To enter the energy sector, women have to be particularly brave and of a particular type of character. Several women had similar reactions during the interviews when challenged about tolerating chauvinistic behaviour: well, it's much easier to behave to the accepted (masculine) norm and ignore gender issues than it is to put your head above the parapets. You threaten your career if you're not seen as one of the boys. Changing attitudes is a slow process.

So what are the consequences of this male behaviour? Women leave companies and they are setting up their own businesses. "Why waste your energy", one woman said, "fighting prejudice when you could be investing it in doing much more exciting things in science?" So, women set up their own co-operatives and networks. They feel that it is a much easier and more comfortable environment to work in.

³ "On" has now been changed to "about".

2.2. Women's research agenda

The aim here is to assess whether or not DG Research is involved in the sort of research that interests women. If the answer to this is that the Commission is not funding areas of interest to women, it might offer an explanation as to why so few women apply for research funding.

A group of female researchers working in energy within the EU were asked a number of questions. Should renewable energy get priority? Should social gender implications for energy get priority? Are women hindered from reaching senior positions within the energy sector? Is this due to the socialisation process of masculine culture in work? Why do women not get into more senior positions in the energy sector? If women did get into more senior positions, would we see a change in the energy research agenda? This last question always produces an interesting discussion about what is the influence in a particular situation, in this case energy research agendas, of having a larger percentage of women. Is it just more of the same or does it really produce a shift in the agenda?

There was quite a considerable consensus that renewable energy research should get more money and that technological research should be combined with the social implications of technology. There was lower consensus in the opinions on social issues. Women were certainly regarded as being hindered from reaching senior positions. Most respondents did not feel this was the result of conscious action. None felt that anybody had been deliberately obstructive towards her, purely because she was a woman. However, there were certainly things in women's working environment that did not help them gain promotion, for example, working hours and childcare provision. Many of the examples quoted are solvable barriers; some being practical and others requiring attitudinal change, which are much more difficult to address.

Research "for women" has another dimension. Women are researchers, therefore, they have a particular professional view about the specific sort of energy research that should be undertaken. However, women are also members of society who are very concerned about the impact and influence of energy on their lives. There is very little statistical data on what women as citizens in Europe or in industrialised countries think about energy issues. Do they have different perspectives than men do? Actually, the answer to these sorts of questions is relatively easy to find out, at least within the EU. Eurobarometer carries out a biannual survey of European citizens asking them a range of questions, including their views on energy. These data are not sex-disaggregated when presented. Gender is probably not taken into account at all as an issue. Household energy surveys in industrialised countries do not seem to look at the gender makeup of the household. This can be quite significant even in the EU because, due to demographics, relative pay levels and social issues, it is women-headed households that tend to be living more in poverty than male-headed households. So, if you are living in poverty, particularly in the UK, you generally live in poor quality housing that contributes to higher energy bills. We tend to think of gender and energy as something we only need to take into account in relation to developing countries. However, it appears that there is a distinct gender component to energy even in the EU. Despite this, it appears to be a totally unexplored issue within the Union. Part of the problem is that economists, even those dealing with development issues, do not see gender as an impact factor when making planning models. The general impression that comes out of the available data is that women favour renewable energy and energy conservation and are opposed to nuclear energy.

2.3. Women working in the energy sector

Once again, more general information on science and engineering had to be drawn on due to the lack of specific data on the energy sector. However, it is not unreasonable to assume that, if you are a woman in science, it doesn't really make any difference whether you are in energy, in transport or any other sector, as whole ranges of gender issues related to the working environment remain the same.

An important issue to emerge in the research was that the male way of doing things is taken as the norm. What does this mean and why is it important? Take as an example the aim of the Commission to have more women as evaluators. To be an evaluator, you need to spend five days in Brussels with no provision for childcare, nor is there an allowance that can be claimed. For many mothers, due to gender divisions of labour within the household, this immediately becomes problematic while many fathers can rely on their wives to look after the children. This approach to evaluation is based on the way that men are able to order their lives and women are not. Hence, holding five-day evaluations in Brussels is not the way to encourage women to become evaluators. The Commission – and other organisations – have to be more creative. If you really want women to be involved, then you have to change your ways of working. This is what mainstreaming gender is about: it is not just having more women sitting in the room, but doing things differently. Now, gender mainstreaming also benefits men. By changing the culture of working from 8 am until 8 pm, men can spend more time with their family or do other things they value such as watching football on TV!

For many women, children constitute a barrier to their career. The problem has shifted from that of getting a good job in the first place, when one had to face discrimination of the sort “oh, I suppose you'll be pregnant within two years”. Nobody dares saying that to you now at an interview, even though they may think it! The problem is rather the childcare issue and, later in life, once the children are out of the way, it becomes elderly parents who have to be cared for. Again, that burden generally falls on women. However, there is a sociological change taking place within the EU and other industrialised societies which may lead to solutions to these barriers, namely the increase in male single parent-headed households. It will be interesting to see whether, if these numbers increase significantly, there will be a change in the rules to allow costs for care provision to enable men to attend meetings!

As for old boy networks, apparently not a wholly British phenomenon, they have been problematic in preventing women from having access to open and fair job recruitment. Sweden has tried to address this problem with the use of external peer review of candidate lists.

Now, where do we go from here? Is there a best practice? Regarding gender issues, you have to look at the United States and Canada to learn from their experiences. The US has done most work in relation to engendering science and engineering, and found that a legal requirement to publish data has been very effective. There is indeed a legal requirement for public bodies, including universities and scientific research bodies, to publish sex-disaggregated data on employment and research grants. The Canadian approach has been to use indicators as a powerful tool in ensuring that anti-discriminatory legislation is enforced. The Women and Science Unit within DG Research, which is currently working on the development of indicators, should look at the experiences in Canada. The Canadians found that quantitative data was not enough, you need qualitative data to measure cultural change within the organisation. It is not enough to say “wow, we've got 40% women on our committee” and then go home feeling very satisfied. Quantitative data by itself hides

a lot of gender issues. For instance, what personal cost women have had to pay to get there; the attitudes about changes at work from male colleagues; and whether the “8 am until 8 pm equals quality scientist” culture still pervades an organisation. Working paper 3 has proposed some indicators for use in the energy sector.

3. Working paper 2

Working paper 2 conducted an institutional analysis of the energy programmes to provide a benchmark for the incorporation of gender to date. The research also aimed at providing recommendations as to what can be done to further promote research by, for and about women through the energy programmes, in particular the capacity of the Energy Directorate to incorporate gender in their work.

The structure of the organisation, the progress in meeting policy goals on gender, and the culture of the organisation, were analysed. Documentary analysis and interviews with a number of Commission staff at different levels were also undertaken, and a written survey for staff was distributed. The working environment and gender sensitivity within the Energy Directorate was also analysed.

In general, it was found that there is lack of awareness of what gender issues and gender-oriented research are about. As a result, there is a lack of capacity to incorporate these questions into the energy programme. No evidence could be found – but the researchers for this study are happy to be corrected – that the gender dimension has been considered in formulating the energy Work programmes. Gender is not mentioned in any of the energy related Work programme documents for 1999 and 2000, or in FP6 documents. There is little or no awareness in the Energy Directorate of the fact that gender-relevant research topics exist in the energy fields and could be promoted. The situation within the Energy Directorate has to be put in context. It is a heavily male-dominated department and in this type of working environment, the issue of gender is often misinterpreted and misunderstood. Therefore you cannot possibly expect people who are not really sure about what they are supposed to be doing or why they are supposed to be doing it, to take up gender (or any other contentious issue) with great enthusiasm and implement it.

The Women and Science Unit should think about the way of approaching gender mainstreaming within the Commission if they want success. There are two particular areas that need to be considered: providing information and providing training. This recommendation is based on the experience of some multilateral development agencies. When gender mainstreaming was introduced into these organisations at a time when there was no information about why gender mainstreaming was necessary, or any awareness raising and training, there was understandable resistance. Many men felt their jobs were under threat and some women were not happy, considering gender mainstreaming either as not necessary or making their life difficult due to increased male hostility.

Gender mainstreaming is a two-pronged attack: it is looking at the way you do things internally and it is also the way you do things externally.

4. Recommendations

4.1. Women in the energy sector

- Implementation of the recommendations of the ETAN Report.
- Collection of sex-disaggregated statistics.
- Evaluation of the impact of the National Science and Engineering Research Council on Canada's gender policy.
- Encouragement of affirmative action programmes, science funding bodies and use of annual progress reports as a monitoring tool. Development of qualitative indicators. Extension of the ENEQO project throughout the energy industry. DG Research should implement a programme of gender-differentiated awareness-raising that promotes the positive benefits for all gender mainstreaming. Establishment of a European research network of women in renewable energy.

4.2. Women and Energy

Eurobarometer should present sex-disaggregated statistics. Key actions and generic activities (socio-economic aspects of energy) should have a more social dimension. Engaging a dialogue in appropriate forums on energy research by women, for women and about women.

Summary of points raised during the “Energy” session discussion

ANNETTE B. CUTLER

Technology Initiatives Ltd, Energy and Global Environment Consultants, United Kingdom

Background: A study entitled “A Gender Assessment of the non-nuclear energy and nuclear energy sub-programmes” had been commissioned and completed. The author of this summary (discussant) was asked to review the study in order to highlight key issues and to lead a structured discussion on the findings in the energy sector. The following summary covers points raised from the review and resulting discussion.

Overall, it was considered that the Gender Impact Assessment Study on the Energy sub-programme of the Energy, Environment and Sustainable Development programme presented a pessimistic point of view. Much has already been achieved towards gender balance, although it was agreed that there was still a long way to go before gender balance is achieved and sustained. The study authors argued that this attitude was adopted largely in response to the way in which the text of the tender call was worded.

It was considered very unfortunate that the hydrocarbon sector had been deliberately omitted from the study, particularly as this is a field in which some progress has been made towards gender balance. Hydrocarbons are a major energy sector and Europe has 25% of the global market share. The study results, without this sector, are therefore not representative of the Energy programme as a whole. The study authors advised that they had made this decision following discussions with the Commission.

A statement in the study says that if Europe is not to fall behind in energy research then it needs to attract women. There is considered to be no logic behind this statement. In general, women are not being attracted to the energy sector, but neither are men. The sector has an ageing population. There is a lack of newly qualified people entering the sector and this is being recognised as a major recruitment problem. There is a huge opportunity for women to seize this sector as their own. Working paper 3 starts with the assumption that there is inequality, when maybe this is not the case. There is certainly no inequality in the capabilities of women and men but there is a lack of numbers of women. This is a matter of quantity not quality.

It was considered unfair of the study to criticise the Directorate-General for Research (DG Research). The discussant has first hand experience of how DG Research positively tries to find female expert evaluators, but women are not presenting themselves for selection. Women need to have the confidence that they are good enough to be classed as experts. Mentors are needed to help women build this confidence. There was much discussion on how this system could be improved. The discussion audience agreed that the Commission needs to change its ways of working with regards to the evaluation process. Expecting women (and men) to be absent from their families for five or six days at a time needs to be reconsidered. Childcare allowances could also be provided. For many, men and women alike, the expert evaluator application mechanism was considered too onerous, although the system has now improved. With a lack of women on the Expert database in the energy sector, the Commission has created its own gender balance problem through the restriction of only using experts three times.

The study authors had difficulty achieving the questionnaire responses required using the routes that they chose. They did not have the support from CORDIS that perhaps they should have had.

It is recommended that for future studies of this type requiring responses from the Research Community, CORDIS should be included as a prime dissemination mechanism.

It was disappointing that the study failed to find useable data and it was considered that breaking energy into its various components would have been more successful. It was felt that the authors had not understood the sciences within the energy sector. The sample achieved was not considered representative and was too small for the authors to gain a grasp of the real facts. If the hydrocarbon sector had been included, the authors would have been able to access the gender statistics gathered by the major oil companies. The audience agreed that the Commission needs to collect gender-differentiated data to gain a clearer insight into gender balance. Gender mainstreaming is wider than equal opportunities and needs to address and change the structure of traditional working practices including issues such as hours of working, ways of working and arrangement of school holidays.

In the study, assumptions made do not match the facts and some assumptions have been made from no data. Statistics and pie diagrams were developed but without the data to support them and the conclusions reached were not well argued in the reports. This is particularly the case in Working Paper 3. For example: nil response should not be taken to be a negative response; the questionnaire simply did not reach the right audience. Working paper 3 starts from a negative standpoint (why proposals fail), when it should have been a positive one, promoting why proposals succeed. The assumption regarding rejected proposals is unfounded. Some of the more recent data show that women proposers actually have fewer rejections than men do but the authors do not appear to consider this an important observation. In fact, women tend to pay attention to detail, which is needed in proposal preparation. The results in Working paper 3.7 give important pointers but it was considered that the authors had not grasped the positive aspects or the areas of concern in detail. More positive work could be undertaken in this area.

The authors of the study appear to have misunderstood the concept of the European Research Area. This should include small as well as large centres of excellence including innovative companies as well as research establishments, so should not prejudice women who are in small organisations, as suggested by the study authors. A large proportion of innovation originates in the smaller centres and SMEs.

The conclusions reached do not summarise and refer to the results (such as they are) and appear to be the opinions of the authors. The conclusions should be an assessment of the facts, but facts are sadly lacking. It was agreed that the Commission needs to rectify this with structured data gathering. Despite this, from the study authors' own experience and knowledge, they have still been able to suggest some important recommendations from the study such as the "Development of qualitative indicators to detect changes in cultural practices within the work place, which discriminate against women".

It was suggested in the study that women networks should be established. Many men and women consider these to be analogous to the old fashioned gentleman-only clubs and of little value to a balanced society, today. Such networks would be more successful if open to men as well as women. Women need to show that they are more open-minded, as there are many men who are sympathetic and want to gain a gender balance.

Many companies are attempting to achieve a gender balance, but lose a large proportion of women after about five years when they leave to start families. It was suggested that some of the problems

may be of women's own making, particularly if the companies encourage mothers to return to work. However, technology is moving too fast to allow for career breaks and there is little available to keep people informed. It is recognised that, in particular, the larger organisations could assist in making career breaks much easier to achieve with Continuous Professional Development (CPD) during the career break and the provision of better working facilities. As examples, for CPD, organisations could provide technology and company updates via access to their Intranets. "Career break" employees could then keep up to date so that they are re-employable. On return to work, crèche facilities, for example, could be provided. It was noted by the study author, that in the same way, the Commission had failed to provide crèche facilities at this conference and workshop on gender issues, an event where a crèche should have been a standard facility.

The study addresses paternity leave and gender quotas, but neither of these is necessarily the answer. No consideration was given to SMEs and the staffing problems that paternity leave would cause. In the US, artificial gender quotas are causing staffing problems and having a negative effect with both male and female resentment. The study authors and the audience agreed that gender quotas are detrimental.

Above all the quality of the research must take priority. Appointment must be on merit but women should be made aware of these job and research opportunities so that they can apply and they should be *encouraged* to apply. Over-promotion of women will have a negative impact on men. The right balance must be achieved. The prime focus of energy research, which should not be forgotten, is to develop the technology to give Europe a safe, secure, climate-neutral sustainable energy supply and that this needs to be done using the most qualified people possible, male or female.

SECTION 5: ENVIRONMENT AND SUSTAINABLE DEVELOPMENT

Gender Impact Assessment Study on the Environment and sustainable development sub-programme

IRMGARD SCHULTZ & DIANA HUMMEL

Institute for Socio-Ecological Research (ISOE), Germany

This is an overview of the most important findings of the Gender Impact Assessment Study on the Environment and Sustainable Development sub-programme (ESD) of the Fifth Framework Programme (FP5). It consists of three parts. Firstly, the evaluation concept of the study is described briefly. Then, quantitative data on the participation of women in the elaboration, management and implementation of the ESD sub-programme is analysed. Finally, the analysis of the content of the sub-programme and proposals is made, that is, the qualitative assessment of the ESD sub-programme with respect to gender aspects.

1. Evaluation concept

1.1. Gender Impact Assessment

“The assumption of gender-neutrality of policy has unintended, unforeseen but significant and mostly negative effects on the gender relations in a society” (Verloo/Roggeband). Because of this recognition, a Gender Impact Assessment was developed as a new instrument for policy-assessment. It was designed to analyse potential effects of new governmental policies on gender relations. It was applied in the Netherlands for the first time in 1992. However, in research, and especially in the field of environmental research, no Gender Impact Assessment had taken place so far. So the instrument had to be adapted to this specific field. Concisely defined, the new instrument had to identify the main gender-relevant factors of a research field and to analyse how they influence gender relations.

1.2. What is the meaning of “gender”?

“Gender” means characteristics of and relations between women and men. The meaning of men and women is neither fixed nor biologically or naturally given, but a social construction. “Gender” opens the perspective for diversity. It is not a construction of a universal man in his relation to nature that is needed, but instead a perspective on gender and diversity. In the field of environmental research this means studies of, for example, environmental problems and strategies with respect to elderly or handicapped women, young girls, migrant boys, etc. WISE (Women’s International Studies Europe) count gender, “race”/ethnicity, class/income, sexuality, age, ability and geographical location as major axes of social distinction. Ignoring these categories has, on the one hand, negative effects on gender relations in a society and, on the other hand, negative effects on the results of research and on environmental strategies.

1.3. What are gender impacts?

A basic problem in gender relations is the structurally unequal power relations between women and men. It becomes apparent in societal symptoms such as: unequal access to and ownership of resources (land, money, goods, etc.); unequal participation of men and women in the public and the private sphere; sexual violence; and the non-value of unpaid subsistence work, housework, etc. This basic understanding is needed for awareness and comprehension of gendered problems found internationally. It is a key to the political strategy of an empowerment of women, a strategy basic to the United Nations' women policies. According to this understanding of unequal power relations between men and women, a main perspective of international women's policies and thus, a first goal of a Gender Impact Assessment is *equity/equality between men and women*. This is important for the analysis of the gender composition of the ESD sub-programme.

Our second evaluation goal is *sustainable science*. This is important for our analysis on the level of content. Sustainable science refers in general to sustainable development and to an orientation on the ethical principles of inter- and intra-generative justice and responsibility for the future. As gender studies emphasise, sustainable science has to include responsibility for gender equity and thus gender analysis as an integral part of science. Viewing the standards, methods, instruments and tools of environmental research, a sustainable science demands, above all, interdisciplinary and transdisciplinary methods.

Gender research in environmental research is confronted with a strong orientation on natural scientific and technical research as well as a lack of data and analysis of the situation of women and their part in research. Thus, the general question of our Gender Impact Assessment Study of the ESD sub-programme is "do sustainability and environmental research offer better conditions for the participation of women and the inclusion of gender issues?"

The ESD sub-programme consists of different key actions (KA) and generic activities. Key actions are: sustainable management and quality of water; global change, climate and biodiversity; sustainable marine ecosystems; and city of tomorrow and cultural heritage. Generic activities are: fight against major natural and technological hazards; development of generic Earth observation technologies; and socio-economic aspects of environmental change in the perspective of sustainable development.

1.4. Analysis at two levels

The evaluation concept consists of two basic elements:

- An analysis at the organisational level with respect to the gender composition and participation of women in the ESD sub-programme. This includes an analysis of the institutions and bodies involved in the elaboration and implementation of the ESD sub-programme and an analysis of the proposals submitted and projects funded (section 2).
- An analysis at the content level, assessing the integration of the gender dimension, including the contents introduced by the objectives of the Work programme, as well as the contents of the proposals and projects (section 3).

2. Analysis of gender composition at the organisational level

2.1. Bodies and institutions

The analysis of the gender composition in the ESD sub-programme refers to two main objectives of the EC policy on equal opportunities:

- Equity and equality: the preamble of FP5 states that “the Community equal opportunities policy must be taken into account in implementing the 5th Framework Programme and therefore participation of women in the field of research and technological development should be encouraged”.
- 40% objective: the European Commission’s aim is to achieve at least a 40% representation of women as evaluators in Marie Curie fellowships, advisory groups, assessment and monitoring panels.

2.2. Commission staff

Within the Research DG, the Directorate “Preserving the ecosystem: research for the environment” is responsible for the ESD sub-programme. Its scientific staff, at the time of the study, consisted of 37 men and 10 women, that is 21% women. The total absence of women at the top level and in leading decision-making positions such as Head of Unit or Director is striking. Within the thematic units, there were substantial differences in the gender composition: Unit “Management and quality of water” had 20% women; in unit “Global change, climate and biodiversity” only 9% of the scientific staff were women. In Unit “Sustainable marine ecosystems” 33% were female scientists, whereas Unit “City of tomorrow” had the highest percentage, 43% women.

2.3. Evaluators

Considerable efforts have been made to increase the level of women employed as evaluators, particularly in the first call where the average number of female evaluators was 27%. However, in the second call, a considerable decrease in the percentage of female evaluators was observed: on average only 19% of women were employed. This decrease may be due to the fact the Commission replaces at least a third of its evaluators in every call. This means that if many female experts from the pool have been employed in the first call, there would be fewer women available as evaluators for the second call if they remain at a constant level in the expert pool. Again, the percentage of women differed considerably between the different key actions (Table 1).

Table 1: Programme Committee members, EU countries (men/women)

Key action	1 st call	2 nd call
Quality of water	17%	11%
Global change	32%	19%
Marine ecosystems	30%	17%
City of tomorrow	36%	33%

2.4. External Advisory Groups (EAG)

The Commission was quite successful in its efforts to achieve the 40% objective of women's participation in the EAGs for the ESD sub-programme. Women represent on average around 44% of all members in the three EAGs "Quality of water/Marine ecosystems", "Global change" and "City of tomorrow". The highest rate can be found in the EAG of "City of tomorrow", which has more than 50% women.

2.5. Recommendations concerning the participation of women in relevant bodies

The attractiveness of the jobs in the Directorate should be improved for women, for example, by facilitating the compatibility of profession and child/elderly relative care duties, such as flexible working hours and part-time work. Gender should be considered in recruitment practices. Positive discrimination measures could be established, for example, the preference of women in the case of equal qualification and merit (in particular in the case of the decision-making positions at the top level). Concerning the participation of women as evaluators, women should explicitly be encouraged to apply to the expert pool. The evaluation period could be shortened or organised in a more flexible manner. Women's networks should be informed about the employment of evaluators.

2.6. Gender composition of proposals (1st and 2nd calls of 1999)

The most important findings of our analysis of the gender composition of proposals are:

- The overall participation of women in the proposals (including co-ordinators, principal and assistant contractors) is extremely low: around 14%.
- More than one third of all proposals have no female participants at all.
- Only 15% of all proposals have more than one quarter of female participants.
- Differences between key actions could be detected, but they are not as significant as the differences in female representation in the relevant bodies.
- Even the generic activity "Socio-economic aspects of environmental change" and key action "City of tomorrow" which have a high number of women in the relevant bodies, have less than 20% female participation in the proposals submitted.

2.7. Recommendations with respect to the participation of women in proposals

Obviously, stronger efforts are required to increase the percentage of women in proposals. Gender should be established as one of the evaluation criteria, at three levels: the participation of women in science, the scientific content, and at the level of methodology. Positive discrimination is necessary. For instance, a bonus should be introduced in the evaluation step "Quality of management", when the co-ordinator is a woman, providing that excellence and the quality of science is guaranteed. For large projects, a steering committee with balanced gender composition should be obligatory. More detailed analysis is necessary to examine the underlying causes and barriers for application.

3. Content analysis of the ESD sub-programme and proposals

Analysing the gender dimension in content consisted firstly, of analysing the proposals with respect to nine indicators of sustainable science, and secondly, of analysing the objectives of the ESD Work programme,

with respect to the consideration of three main gender dimensions of environmental research. The evaluation of the gender relevance of the ESD sub-programme is based on the Work programme (1999 version) and the RTD priorities formulated in the key actions and the generic activities; and on summarised descriptions (“abstract” and “objectives”) of the 2 125 proposals of the first and second calls.

3.1. Analysis of the 2 125 proposals

We derived nine indicators that characterise sustainable science and give the opportunity to introduce gender issues. We began with “women/gender” as the central indicator and gradually widened the perspective towards other indicators. For example, with respect to the approach of gender and diversity “target groups/social diversity”, “participation and ethical questions”, as well as “impact assessment” (comprising many kinds of environmental and technology impact assessment, as well as health or risk assessment) were considered. These nine indicators were then applied to the proposals.

Table 2: Coverage of general indicators in the proposals

Indicators of “sustainable science”	Coverage in proposals
Women/gender	0.0%
Target groups/social diversity	19.8%
Social issues	17.8%
Policy issues	34.5%
Socio-economic issues	14.0%
Participation	5.5%
Ethical questions	0.5%
Impact assessments	21.6%
Interdisciplinarity	15.1%

It is most significant that “women/gender” is entirely absent as a thematic issue. In only one of 2 125 proposals is the term “women” explicitly mentioned. Gender was not mentioned at all. However, a considerable number of proposals address issues that have potential importance for gender-relevant research, for example concerning “social issues” or “policy issues”. Table 2 shows that the response to the other indicators was very different. The share of “participation” is remarkably small, which is surprising because a considerable number of proposals are related to “target groups/social diversity”. Obviously, target group orientation does not necessarily imply a concern with participation. Another striking result with respect to a programme intending to address sustainability issues is that a few proposals, ten in total, are concerned with “ethical questions”.

As a result of the content analysis, the proposals submitted in the various thematic fields can be assigned to *two different profiles*: one characterised by a relatively high value of the “impact assessment” indicator (KA 2 “Global change” and KA 3 “Marine ecosystems”); and the other one with stronger emphasis to social and socio-economic issues (KA 1 “Sustainable management and quality of water” and KA 4 “City of tomorrow”).

Our recommendations would be:

- Women and gender issues should be formulated explicitly in the ESD Work programme, in the key actions and in the respective action lines, as well as in the calls for proposals.
- Standards for sustainable science must be formulated. An innovative sustainability approach, including gender aspects, should be included in the Work programme and in the calls for proposals.

- The sustainability approach should also contain a focus on social/socio-economic issues if it has a focus on “assessments” (environmental, technology or risk impact assessment).
- The Work programme and action lines should reflect the normative dimensions of sustainability, including equity/equality between women and men. Objectives concerning the ethical dimensions of sustainable development must be formulated.

In conclusion, gender research could function as a bridging concept for a sustainability approach in that it provides the possibility for linking social-scientific and natural-scientific research with environmental and sustainability issues. However, as our analysis shows, the reverse is not the case: interdisciplinary research and sustainability issues are no guarantee for the inclusion of gender analysis. In fact, gender mainstreaming must be formulated explicitly as a factor of quality of research and, in particular, of sustainable research.

3.2. Analysis of the ESD sub-programme

Three main gender dimensions must be seen and recognised in environmental research. The two first dimensions are directly taken from the Gender Impact Assessment developed by Verloof and Roggeband (1996) and the third dimension derives from the evaluation goal of sustainable science.

1. *Gendered division of labour/women’s work.* Work implies not only market-mediated labour but also domestic work, subsistence and care work as well as work in the formal and informal sectors of the labour market and their inter-linkages.
2. *Organisation of intimacy.* This means the organisation of personal relationships, of sexuality, procreation, motherhood, concerns around the body and psyche of a person with respect to norms and institutions. It aims at a life in self-determination and acceptance of women’s rights and human rights.
3. *Shaping power of women in science, technology and politics.* This means an empowerment of women in these fields (the German term is “Gestaltungsmacht”). It aims at the power to create and shape knowledge, new technologies and political (environmental) strategies by reflecting the power of women and men to create and shape everyday life.

There is much information covering the debate on the subject “gender and environment”. As a background for the gender impact assessment of the contents of the ESD sub-programme we identified priority issues at the level of themes and contents (Schultz et al. forthcoming). Four different discourses, some of them overlapping, pick out gender aspects in the environment and sustainable development research as a central theme:

1. the debate on women, environment and development (WED-debate);
2. feminist critique of natural sciences and technology;
3. focus on everyday life and the environment and health issues in environmental research;
4. the debate on globalisation and sustainable development from a woman’s perspective.

Against the background of these different discourses, the three main gender dimensions could be specified.

Example 1: Gendered division of labour/women’s work

- Gendered division of labour/women’s work (in different professional fields, in environmental professions and in the household).
- Gendered access to and ownership of resources (money, goods, education, information).
- Gendered patterns of the use of natural resources (for example household water use).

- Reproduction work and daily life experiences of women and men in its relevance for environmental strategies.
- Time use patterns of women/men and their relevance for environmental strategies.

Example 2: Organisation of intimacy

- Women's, human and reproductive rights, and their relevance for environmental issues.
- Protection of intimacy in environmental strategies (e.g. against data abuse).
- Women's/children's/different target groups' needs in environmental strategies.
- Women/men and environmental health.
- Gendered risk perception (for example of technology).

Example 3: Shaping power of women in science, technology and politics

- Women's/men's positions in science, technology and politics (planning positions, decision-making, etc.).
- Participation of women/lay persons/NGOs in environmental research and strategies.
- Women's/indigenous knowledge in environmental research and strategies.
- Standards and instruments of integrated gender and environment impact assessments, of gender-sensitive eco-measurements.
- Gender-sensitive indicators of sustainable development.

3.3. *Numbers are not enough!*

Why do we need indicators? Standards for sustainable science are indispensable for the implementation of gender perspectives in research. However, numbers are not enough! (This was also one of the main results of a discussion at the Massachusetts Institute of Technology about women and science). A quantitative increase of women in research is important, but not sufficient. Qualitative standards are needed too. Thus, our initial question, whether sustainability and environmental research offer better conditions for the participation of women and the inclusion of gender issues, cannot be answered yet.

3.4. *Outlook*

Continuity in innovative sustainability approaches must be built up over a longer time than the period of one research programme. As research projects funded by the Commission need a long phase for preparation and consolidation, the gender research community has to adapt to the new contents and themes of a research programme. Networks on gender research in environmental and sustainability research need time to be established. The strong break between the lines of FP5 and FP6 must be seen critically from this point. Thus, a continuity of the themes and subjects is a prerequisite for new approaches and especially for gender research to be successful.

Literature

- Verloo, M. and Roggeband, C., "Gender Impact Assessment: The Development of a New Instrument in the Netherlands", *Impact Assessment*, vol. 14, No 1, 1996, pp. 3-21.
- Schultz, I. et al. (forthcoming), *Gender, Environment and Sustainable Development: State of the Art*, European Commission, Brussels.

SILVANA VALLERGA

International Marine Centre, Italy

I would like to make a few comments on gender and research in the Energy, Environment and Sustainable Development programme from the point of view of the national delegates.

The European Parliament and the Council recommended taking into account the Community equal opportunity policy for the implementation of the 5th Framework Programme (FP5). However, the effects of the recommendation were not visible in the composition of the delegations. On the contrary, the Italian delegation had two women in the 4th Framework Programme (FP4), whilst two men were appointed as delegates in FP5. Luckily the “Women and science” national committee was later taken into account. Now we have a woman and a man as delegates, but still only one woman out of four experts. Women account for 16% of the Italian delegates in programme committees of FP5 and only 7.5% of the experts are women. In FP4, female experts accounted for 15%. Although our Ministers were encouraging equal opportunity in the Council, back at home they appointed men. From what I see in the EESD committee, this happened in the vast majority of countries. A lesson to learn is that we need to monitor to ensure that words become facts.

It is quite enlightening to analyse the performance of Italian women in the Marine Science and Technology Programme, FP4. The proposals co-ordinated by women accounted for 12% of the Italian proposals submitted, and they represented 30% of the Italian projects approved. The rate of success for proposals co-ordinated by women was 80%, the rate of success for proposals presented by men was 25%. These figures indicate that there are not mediocre women applying, while there are a lot of mediocre men applying. We need to have promising women in the arena. They will be the excellent women of the future. If not, we will continue to find the same women running from one committee to another, preparing one proposal after the other. We might even achieve gender equity, but with the same woman replicated. The high percentage of successful proposals co-ordinated by women might indicate non-discrimination in the evaluation process. On the other hand, the first phase of the evaluation is carried out on anonymous proposals. So it might be that anonymity is the main player, not equity.

There's another interesting point to analyse. Female co-ordinators perform better in EC projects, but have lower qualifications than male co-ordinators. This means that women at lower career levels are actually better than men at higher levels. It is just another way to measure the glass ceiling.

The Wennerås-Wold paper (Nature 347, pp. 341-343) shows that the criteria for job selection are: scientific excellence, link with evaluators and masculine gender. Women can achieve scientific excellence, even links with evaluators, but are hopeless at becoming males. Thus the criteria for selection in competitions are biased towards males.

New criteria, biased towards women, should be used if we are to balance the present gender bias. Bice Tubini and Flavia Zucco produced an interesting study where they identified “women features in research”: interdisciplinarity, spirit of service, training of the next generation, focus on the promotion of research not of their own career and capability of co-operation. Some of these criteria should be taken into account to help getting gender equity in job selections and promotions. Some private companies are now exploiting the capability of women to “mend management”, to get people together, to work for the benefit of all, not only their own career.

Environment and sustainable development have actually embedded some of the new criteria such as multidisciplinary and the interest of the community. We have to understand the human dimension of global science. It often seems more important to preserve the environment, than to improve the quality of life of the different human beings, children, women, men and old people. This is an issue at which women are very good.

We have to work together on the 6th Framework Programme to introduce issues that women address more easily, in order to facilitate the participation of women and to benefit society. At the same time, we must support the participation of women at the first level of their careers. There are many promising researchers, and not enough well established female scientists.

It was recognised that the participation of small and medium-sized enterprises (SMEs) to the Framework Programmes was limited by the funding available to prepare proposals. The EC provides SMEs with Exploratory Awards to support the preparation of proposals. Post-doctorate fellows have problems coming back home after the period of training in another country. The EC gives grants for post-doctoral fellows to establish their own research in their home country. Financial resources are allocated to overcome the limiting factors. Women are encouraged to participate. Encouragement is not what we're looking for. Real opportunities and real funds are what we need. We now have more women in committees. Women in high-level positions can work harder, women are used to that. We need more funds to manage and to support more intermediate-level women to move up.

In the study, a bonus for women participating in EC programmes is mentioned. This might end up in reproducing the old-time search for Portuguese, Greek and Spanish partners for projects, to improve, it was thought, the chance of success, without providing the "southern" accessory participants with the full benefit of real partnership. Gender equity in a proposal has to be perceived as good management, thus providing extra marks for the proposal. We will have to ensure that the participation is real, not cosmetic. We definitely need more female participants, but they should get the full benefit of the partnership.

We should strengthen our own networks and establish "nice ladies' networks" to support promising women getting to top-level positions. We have to counteract the "old boys' networks" supporting mediocre men in top positions.

SECTION 6: CONFIRMING THE INTERNATIONAL ROLE OF COMMUNITY RESEARCH

THOMAS ARNOLD & NICOLE RIVEILL-BOUNAGA

International scientific co-operation projects Unit, Research Directorate-General, European Commission

THOMAS ARNOLD

The objective here is to present the main results and key conclusions of the Gender Impact Assessment Study on the programme Confirming the international role of Community research (INCO programme). We will also look into gender issues in international research and technology development (RTD) co-operation in the future.

1. Why assess gender impact in INCO?

The objective of the gender impact assessment of the specific INCO programme was to formulate recommendations for a better integration of the gender dimension in future research activities and programmes. So there is a focus on the present, but already with a view of defining the future.

2. Presentation of the INCO programme

INCO is a horizontal programme concerning the second activity of the Treaty. It is an important programme with many diversified activities, but represents only 3.2% of the total budget of the 5th Framework Programme (FP5). For such a small budget, many different research needs are addressed.

The general objectives of the INCO programme are:

- to promote scientific co-operation between the European Union (EU) and non-EU countries for mutual and balanced benefit, and
- to facilitate European access to skills and know-how outside the EU, strengthen competitiveness and presence in new markets and provide information on research possibilities, activities and priorities outside the EU.

International co-operation under FP5 is pursued through two complementary routes:

1. A dedicated programme Confirming the international role of Community research (INCO) on specific RTD activities which are relevant to certain third countries or regions. This includes the pre-accession States, the newly independent States (NIS) and other Central and Eastern European countries (CEECs), the Mediterranean partner countries, the developing countries, the emerging economy countries and industrialised countries.
2. An international co-operation dimension in the other specific thematic programmes of FP5.

In the INCO programme, there are specific objectives for each group of target countries:

- for Candidate Countries, FP5 corresponds to the period in which they will prepare their full integration into the European science and technology community;
- for the CEECs which are not candidates for accession, as well as the NIS and Mongolia, co-operation is directed at specific problems of this region in transition;
- co-operation with the Mediterranean partner countries aims to enhance the scientific and technological base of the Euro-Mediterranean partnership;
- co-operation with developing countries (INCO-DEV) – including the Mediterranean partner countries and Balkans for some programme areas – is directed at the specific problems these countries have in facing regional or global challenges (which are defined through different mechanisms of regional dialogues). More than 40% of the INCO budget is dedicated to INCO-DEV;
- co-operation with emerging economies and Newly Industrialised countries (NICs) aims at giving appropriate reciprocal access to expertise and knowledge in these countries and the EU.

As for the breakdown of the INCO budget, the biggest part, 44%, is for INCO-DEV; 24% is for the NIS and the CEECs which are not in the pre-accession phase; 12% is for the Mediterranean partner countries; 11% for co-ordination; and 5% for the States in the pre-accession phase.

There are two fellowship-schemes in INCO. One is for European researchers going to Japan and the other is for young researchers from developing countries and emerging economies going to European or Associated countries as part of RTD projects of FP5. This represents 3% of the budget and 1% for the emerging economies and industrialised countries.

3. Presentation of the 6th Framework Programme 2002-2006

Looking at the international dimension in the Commission proposal for the 6th Framework Programme (FP6), the indicative budget is €600 million for international co-operation, of which €300 million is within the opening of seven priority areas and €300 million is within “Specific measures in support of international co-operation”.

The seven priority areas are:

1. Life sciences, genomics and biotechnology for health
2. Information society technologies
3. Nano-technologies and nano-sciences
4. Aeronautics and space
5. Food quality and safety
6. Sustainable development, global change and ecosystems
7. Citizens and governance in the knowledge-based society.

Some actions are directly relevant for third countries and will probably also be of interest to developing countries, for instance, the action “Poverty related diseases” within the first priority area.

The second half of the budget is part of “Specific activities covering a wider field of research” and includes specific actions for three groups of third countries: Mediterranean partner countries, Russia and the NIS, and developing countries. In addition to this, substantial funds are being foreseen for International Fellowships within the “Human resources and mobility” part of “Structuring the European Research Area”. If you add all of this together and compare it with the

€475 million of the current INCO programme under FP5, one can say that the Commission proposal is ambitious with regard to international co-operation.

There should be a lot of scope under FP6 for gender relevant issues in the area of international scientific co-operation. The activities will probably be more spread over the whole Framework Programme compared with the current concentration within the INCO programme. As a result, future assessments of this type will probably have to look much more widely at international co-operation across the whole of FP6.

NICOLE RIVEILL-BOUNAGA

The INCO programme is extremely complex given the diversity of international co-operation that we are trying to put in place. It is not easy to bring about real international co-operation with countries that don't have the same immediate development objectives or priorities.

In INCO one has to listen, the programme cannot impose anything. It must rather try out, then integrate, the different approaches adopted in different regions, which is not always easy to do. It is true that the budget is small, but it has put money into research for around 10 to 15 years, creating more capacity in so-called developing countries on a number of continents.

Furthermore, the programme has to take into account European interests and skills that are extremely varied in relation to research and inter-development and indeed inter-regional differences. The programmes that have been set up are intended to have a multidisciplinary dimension which is extremely difficult in existing research systems. This is because the rules that govern scientific excellence push you into narrow areas rather than encouraging you to relate your area to others. Developing countries have rather different priorities, both in the short and the medium term, and they don't have the same priorities as Europe. Taking that into account is not easy.

The Gender Impact Assessment Study takes all of these things systematically into account. The recommendations include a number of points common to all research areas and programmes. The question is "if you have a specific activity for developing countries as part of FP6, are there any specific aspects to consider?" The generic aspects are the same everywhere, but the specific characteristics of different continents, regions or sub-regions may be such that they will need to be taken into account in a different way. Can specific aspects be identified and made more apparent in the new programme? This wasn't easy in FP5 and caused problems for a large number of project proposers who had difficulties grasping the more generic policy aspects. In FP6 we should improve the specific things relating to international co-operation. Europe is very important, there are 15 Member States and the Candidate Countries, but international co-operation addresses the rest of the world.

Finally, I would like to express here my agreement with Stella Leigh-Williams about the importance of a generic approach to education. Obviously, that is where a concept begins, where men and women, or indeed boys and girls, start thinking about themselves as being equals or not. Research here should have a high priority. If education isn't carried out properly, things will go badly and we can't foresee how badly under the existing circumstances.

The Gender Impact Assessment Study on the INCO programme

CHARLOTTE MARTIN

Royal Tropical Institute (KIT), The Netherlands

1. Introduction

One of the features distinguishing the Confirming the international role of Community research programme (INCO programme) from other research programmes in the Fifth Framework Programme (FP5) is precisely its international dimension. This means encouraging scientific co-operation with partners in countries outside the European Union (EU). The INCO programme recognises five groups of countries with diverse needs and various possibilities for partnerships within and outside Europe. Our focus was on the areas that received the bulk of the funding in the programme (DEV/MED/NIS-CEEC). The programme offers the potential for problem-solving research in many contexts, thereby contributing to the implementation of several EU policies.

This contribution will be selective and will concentrate on our findings about gender mainstreaming and also the way in which partnerships work. It is based on our executive summary of the study and the synthesis that we wrote for Chapter 3 in the final synthesis report of the studies.

2. Conceptual approach

While the bibliographic part of the study sought to reflect the important international dimension to research and the diversity of the countries that are funded, the study itself sought to learn from both theory and practice in relation to gender issues in science and technology research.

The findings also pointed to the conclusion that effective gender mainstreaming, that is, research by, for and about women, was most likely to take place within a “transformative” gender approach. Such an approach can be defined as one where we seek to go beyond integrating gender issues into the existing policy agenda and rather aim to transform the agenda itself and broaden its goals to enable it to address issues of social justice. The elements that were relevant to research in gender and science included factors such as: inter-disciplinarity; located analysis; reflexivity; equal opportunities; interactive research; mutually beneficial partnerships.

The study constructed an analytical framework for the analysis of the INCO programme. This was adapted from the institutional framework which forms part of the OECD/DAC publication *Source book on concepts and approaches linked to gender equality*.

3. Approaches to gender mainstreaming in the INCO programme

Gender mainstreaming is at its initial stage within the programme, both in terms of its content and the implementation process. The prevailing perspective taken towards gender issues is the equal opportunities approach. Mainstreaming gender into the programme implementation and its content tends to be limited to promoting equal opportunities for researchers and external experts and within panels and committees. The limitations of this approach are that:

- the gender dimensions that are not well embedded into the procedures can easily be lost given the procedural culture of the programme;
- the presence of women within panels and procedures is taken to lead automatically to knowledge of gender perspectives and competence in gender.

In our study on INCO we argued that incorporating the gender dimension into research is a qualitative issue, reaching far beyond the quantitative approach of “sex-counting” that is currently applied within the programme. However, a qualitative approach requires gender competence among the Commission personnel responsible for programme management and among the groups of external experts contracted. While such competence exists among staff working on INCO (particularly in INCO-DEV), it has not been supported as yet, by training and other input in FP5.

4. The socio-economic dimension in research

A problem-solving approach requires action to improve the socio-economic knowledge base for research. This knowledge base is clearly enhanced through integration of the gender dimension leading to “good science”.

With regard to the Work programme, most of the activity areas of the programme have a clear socio-economic and socio-cultural element to them. In addition, the Work programme clearly supports a “sustainable” approach to development issues. Despite this, the study found that gender is only made explicit in the INCO-DEV part of the Work programme. Opportunities to incorporate gender explicitly in relation to priorities – such as the preservation and use of cultural heritage, or the promotion of healthy societies (INCO-MED), or the environment and health priorities in relation to the NIS and CEECs – have largely been missed at programme level. Importantly, we found that where there is a socio-economic dimension in the Work programme, then it is more likely to be such a dimension in the subsequent proposals. This provides entry points for recognition of end-users and, by extension, gender. This led us to conclude that one of the keys to the integration of the gender dimension into scientific research was a socio-economic dimension to research. In addition, we found that it is essential to take concerted action to make gender explicit as a crosscutting issue within the INCO programme.

5. Equal opportunities in programme implementation

The first steps towards the integration of women into programme implementation have been taken, and considerable efforts are made by staff to try to obtain the required 40% of women on all panels and procedures. Despite these efforts, there are fewer women than men at all levels of the programme implementation structure.

An aspect which is unique to the INCO programme, and reflects on attempts to build partnerships, is the two-stage evaluation process found in the INCO-MED and INCO-DEV area, that is, scientific and regional evaluation panels. In common with other programmes, scientific panels can draw on the entire database, while for regional panels evaluators are drawn only from the region concerned. The low numbers of women in the database from the countries involved in the regional panels, that is, from developing countries, is in general a real problem. For example, only 19.6% of the total number of experts from countries in the regions of concern to INCO-DEV are women. In addition to the low numbers of qualified women registered, the profile for regional panels requires evaluators to have government advisory experience as well as being highly qualified scientists, thus providing further barriers to the inclusion of women experts in the panels. In the most recently

composed regional panels in INCO-DEV an average of only 15% women was achieved. However, while only 16% of experts in the overall database are women, for scientific panels (in agriculture, health, natural resources and policy) the INCO-DEV area achieved an average of 32% women on these panels. This shows the difficulties that officials face in meeting their quota on regional panels and indicates the implications for the integration of gender into partnership issues.

With regard to the gender composition of research teams carrying out projects, the study was not able to detect any gender bias from the information currently available. Evidently, considerable efforts are made within the programme to support equal participation of women and men in proposals submitted. However, the study stressed the need to compile sex-disaggregated statistics in the near future in order to monitor the gender composition of proposals.

6. Calls and proposals: some issues from a gender perspective

The study analysed the calls for proposals and the extent to which the proposals incorporated a gender perspective. There are some examples of research proposals in INCO-DEV that integrate gender fully into their methodology, reflecting a multidisciplinary approach and presenting research teams with a mix of competence, including gender competence. There are also several examples of useful gender work supported as a result of calls under Accompanying Measures.

Where gender issues are reflected in proposals, evaluators appear to react favourably as evidenced in the consensus forms, and frequently, more information or emphasis is called for by evaluators on the socio-economic impact or on the needs of the users in the proposal during the evaluation process. However, this does not mean that the proposers are able to integrate such perspectives within their work as many teams are not multi-disciplinary and lack social science perspectives.

7. Strengthening regional partnerships

EU policy is aimed at fostering regional partnerships and this is reflected at all levels in the INCO programme. The scope of “partnerships” is fairly narrowly defined however and, although governments and institutions from partner countries are consulted during the formulation of the Work programme, partners are not involved in agenda setting or defining priorities for calls at programme level.

What is more, as regional links are weak in several INCO activity areas, the potential for mutual learning, supporting and informing country representatives and fostering local initiatives in research is limited. International links are central to the INCO programme and are essential if institutions and individuals are to learn from each other about good practice in science – the need to strengthen them is recognised by INCO staff.

8. Conclusions

The study concluded that gender equality in terms of equal opportunity for women and men is reflected and clearly understood in terms of the promotion of women on various structures/bodies, panels of evaluators, etc. and that equal opportunities policies are reflected in many of the procedures. However, attempts to mainstream gender in INCO are relatively recent, and while the relevance of gender is mentioned in some policy documents, it is not yet systematically reflected in all related procedures and processes of the institution.

The study found that the idea that gender mainstreaming is a strategy to reach gender equality goals, rather than a goal in itself, is not widely understood within INCO. This is to be expected given that training programmes to build gender competence among INCO staff through staff development for women and men have yet to take place.

The importance of the INCO programme to the research efforts of many poor and marginalised countries needs to be recognised and resources devoted to strengthening regional partnerships and to integrating gender within them.

9. Recommendations

The recommendations are divided into short, medium and long-term activities. Short to medium-term recommendations relate largely to the development and implementation of a gender mainstreaming strategy that could be initiated during the current time frame. Long-term recommendations deal with redefining research priorities and methodologies in line with gender debates and the growing recognition of the relevance of gender to research and good science.

9.1. Short to medium-term actions in the remaining INCO time frame

- *Compile and disseminate sex-disaggregated statistics*, that is, define gender indicators for monitoring progress towards gender equity and representation in international networks.
- *Expand the gender resource base to organisations and individuals*, that is, include partner gender skills and competence in database registration of organisations, and compile a database of potential gender resources represented in regional networks and organisations.
- *Install institutional procedures for monitoring*, that is, develop a monitoring system that requires the identification of specific gender competence and develop gender indicators.
- *Initiate action to build gender competence of INCO staff in the organisational development process*. This includes training, technical advice and support to programme development as well as management commitment and organisational structures and procedures for technical accountability.
- *Mainstream gender into existing procedures and develop support for programme development*.
- *Compilation and dissemination of existing good-practice examples in INCO/FP5*.
- *Preparation for the Sixth Framework Programme (FP6)* by developing a coherent strategy to ensure that the WISE report and Gender Impact Assessment Study recommendations are integrated from the start of the consultation and formulation process of FP6.

9.2. A longer term perspective: transforming the research agenda and practice

- *On-going development of gender competence*: coherent strategy for the on-going process of building gender competence, and collaboration and strategic links with other DG Research and DG Development programmes and staff.
- *Capitalise on existing experience*: build on research experience related to gender integration from Member States and multilateral institutions; identify and collaborate with regional gender networks. Moreover, Beijing's critical areas of concern should be recognised as explicit priorities for the EU's future research agenda.
- *Conduct gender analysis of all research data as well as on-going systematic compilation of sex-disaggregated statistics*: examine statistics to provide the basis for the development and implementation of a coherent monitoring system.

- *Implementation of Gender Impact Assessment protocols in all supported research activities:* implementation of protocols through all stages of development, that is, initiation, design, execution and presentation of results (WISE report).
- *Equitable and transformative resource allocation for research and partnership development.* This implies: creation of “gender budgets” (resource allocation to support activities advancing the understanding of gender and science); review of existing budgets to ensure gender equitable allocation; strengthening the capacity of partners (dissemination and redistribution of information resources); and enhancing potential for responding to local research initiatives.
- *Reinforcing of local capacity to reflect and express priorities in the development of research agendas and debates:* strengthening local capacity; recognising and valuing local knowledge and its potential contribution to shaping global concepts and policy-related research.

Comments on the INCO Gender Impact Assessment Study

STELLA LEIGH-WILLIAMS

Third World Organization for Women in Science (TWOWS), Obafemi Awolowo University, Nigeria

The work carried out in the Gender Impact Assessment Study was very complex and difficult and it has been done very well, but I fear that there is still a lot more that could be done. I will deal here with the concepts of science as an educational activity and the links between international educational programmes, gender and science education, gender and research. Then, I'll put it all together as gender science research and the international role.

The family preference for boys' education has a complex impact on what happens to girls and thus, to women. There is a lack of women in various aspects of the sciences, even if there is an increment in some of the life sciences. I still feel that in many of the developing countries science education has a long way to go. If the international role of this programme should be a contributing factor, as the title of this report suggests, then, I'm afraid that we are far away from achieving the INCO-DEV, INCO-MED and NIS objectives.

Although the educational aspect of this concept is reinforced where people can begin to think in theoretical terms, in practical terms, quantitatively, we're going to regress. This is because if we look at science in the past, especially the various revolutionary aspects of science from Galileo until today, we will find that these were not people who did what we have to do in academia. These were people who were outside of the networking, who constantly believed what they felt and experimented with it. Only long after they are dead do we recognise what they have contributed. What we want in the 21st century is for that base to be reinforced so that the researchers who are submitting proposals to the European Commission are actually building the blocks for future generations.

Science has international resources, whether it's in the developing countries or in the Western countries: the people. The people are the same, but because the culture is different, the academic background is different. The environment is also different and the environment defines the outlook, which affects participation.

Mentoring. This occurred for many of us because our curricula were not developed based on who or where we were. The curricula were imported and therefore most of us did not have that cognitive theory of science. Most of us have had to memorise it and the older we get, the better we get at unravelling the basis of these theories. That's why you find that a lot of us begin to contribute in our old age rather than in our young age. What we hope will come from the Sixth Framework Programme 2002-2006 is what is presently happening in Europe: the mentoring system whereby young scientists are better informed and can communicate their own views. But, because the environment differs depending on the continent, we need mentoring together with networking and evaluation.

Information and Communication Technology is bridging that gap for us as much as possible. When I was doing my Ph.D. we used to punch cards that we put into FORTRAN Computers to read and analyse our data. Now computers are better programmed, using SPSS and other good programmes for analysis. No one punches cards anymore. You can even scan your data on to the computer and ask the computer to do the rest of the work. I remember I had to throw away a number of cards

because they were bent and therefore the machine rejected them. Now I don't have to worry about that. So you find too that gender in science and its international role is like a puzzle: you have the time, you have the numbers and you have the books. But the European Union needs to prioritise so that national and international partnerships and collaborative sharing of information and technology can take place.

We also have to have institutional partnership and collaborative research, but there are still some of us who, for political reasons, are not in partnership with Europe. A lot of national research findings are published in international scientific journals because scientists are told that it is the way to go. So, you have to start with what you know in order to be able to infer what you don't know. This should be part of future plans. INCO proposals covering the 2002-2006 period would be enhanced by more work in this area.

In Africa, the gender gap is still deep and very wide. Other countries are always talking about 9 or 10%; where I come from, female professors are still below 5%. In physical sciences, I am sure we only have about 0.5%. We also want to have a breakthrough and to be innovative. How do we get into this collaborative activity? This is what should be demonstrated in this report.

Gender and research: international role (abstract)

Men and women have proved to be efficient in adopting the concept of "Episteme", known today as "epistemology". It is based on scientific knowledge, which is universal, invariable and independent of context. Additionally, it is based on analytic rationale. In 1991, the World Conference on "Education for All" held in Jomtien, Thailand, pointed out the issue of a "gender gap" in educational opportunity and its impact on human development. This gender gap in education has an impact on the "science education gap" as it relates to gender inequality and on the "technological gap" as it relates to information and communication technology. This gap in human capital investment is more prominent in the low-income regions of the world. As pointed out by Beneria and Bisnath (1996) there is a family preference for boy's education and this, coupled with the need for children's labour contributions within and outside the household, is the primary cause of the lack of investment in the education of girls especially in rural communities. Okojie (2001) discussed this limitation in the education of girls in rural communities based on the findings of the research carried out by the African Academy of Sciences Research Programme entitled *Research Priorities for Education of Girls and Women in Africa*.

1. Introduction

Approximately two-third of the world's illiterates are women. In Africa, more women can read and write now compared to the era before Independence, but with the current status of modernisation of the African societies in general, traditional forms of transferring knowledge from generation to generation are becoming lost to the societies. Women and children are still at a disadvantage globally where education is concerned. Worse still, women and children in the developing economies are at a greater disadvantage in the field of Science and Technology. In the Third World in particular, it is very difficult for the "girl" children to complete their schooling because they are expected to assist their parents with various domestic tasks in the home as well as in the agricultural sectors. Parents often consider that their daughters' education is poor investment compared with that of the boys. Hence, within the realms of the educational and research fields in

the Third World, women must be seen as being a neglected group from the level of basic education upwards. However, in Asia and parts of Eastern Europe, which for economic reasons are classified as developing economies, the situation is somewhat different compared with the situation in North, East and West Africa. In Botswana and Lesotho for example, at the primary and lower levels of secondary education, the girls are in the majority. However, at the university level, there are twice as many men as women (SIDA, 1985).

Dating back to the post-Independence era of many sub-Saharan African nations, there was remarkable advancement in education as a whole. The introduction of the original concept of science as an educational activity was widely accepted in the general curricula of the educational plan of action. As pointed out by Okojie (2001), evidence from many African countries showed that increased investment in education yielded several benefits, thereby accelerating the nations' growth process in the 1960s. One major benefit is that "educated women" are more likely to be in wage employment and earn higher incomes. They also have fewer children compared with the less educated women and utilise modern health facilities and therefore experience lower child mortality.

2. International educational programme

In the pre-Independence years, most sub-Saharan African countries inherited the educational programme of the political system in place. Thus, in the post-Independence period, these countries continued with the inherited international educational programmes. The continued investment in the educational programme led to great expansion in the provision of educational facilities regionally. Primary school enrolment consequently reached 6.5% between 1960 and 1970 (ADB, 1998). However, in the 1990s, in line with the economic crisis in the African region, enrolment gains slowed down to the point of stagnation. The current decline in the rate of economic growth in most African countries is linked to the financial problems experienced in the region. This has an adverse effect on the quality of education as well as the quality of science education, research and gender disparity, which is the emphasis of this contribution to the on-going discussion at the European Community level.

The gender impact assessment is indirectly linked to the educational programme. This issue is characterised by regional, inter- and intra-country as well as gender disparities. In the 21st century, Africa is the only region in the world where gross enrolment rates for primary education have remained lower than 100% (ADB, 1998). Since the UN declaration of the Women's Decade in 1975, many African countries have made efforts to close the gender gap but the region still lags behind the rest of the developing world in reducing it. The focus of this paper is on the measures taken to reduce the gender disparities in science and research.

The general pattern is that the higher up in the educational system, the fewer the women, and particularly in the field of science. The reason is that, when women do get educated in the western sense, they are counselled to take professional qualifications such as primary school teachers, home economics teachers, secretaries, nurses and midwives and so on, rather than in fields that have been classified as men's fields such as aviation, mechanical and chemical engineering.

Table 1: Gender inequality in education in Africa

Female Gross Enrolment Ratio (GER) as % of male	Middle-East and North Africa	Southern Africa	Sub-Saharan Africa
Primary school level			
1980	74	67	76
1990	86	75	82
1994-1996	86	82	84
Primary & secondary school levels			
1990	82	75	82
1996	86	94	87
Adult literacy – female as % of male			
1980	50	48	57
1990	61	58	67
1998	70	63	75

Source: Okojie (2001) from DFID 2000, *Poverty Elimination and the Empowerment of Women*, p. 32

Table 1, as reported by Okojie (2001), shows that at primary school level the trends in female Gross Enrolment Ratio (GER) and female adult literacy as a percentage of males' GER is narrowing over time for the three regional areas. For example, in 1980 at primary school level, female GER as a percentage of male was 74% for the Middle-East and North Africa, 67% for Southern Africa and 76% for sub-Saharan Africa. In 1990, there was an increase to 86%, 75% and 82% respectively. Between 1994 and 1996, the ratio remained at the same level for the Middle East and North Africa, while for Southern Africa and sub-Saharan Africa the trend continued to increase from 75% and 82% to 82% and 84% respectively. The same trends are observed for the primary and secondary GERs combined, as well as for adult literacy rates.

Table 2: Male/Female Enrolment Ratios in Africa

	1980		1990		1994-1996	
	Male	Female	Male	Female	Male	Female
Combined primary/secondary GER						
North Africa	80	58	82	67	86	76
South Africa	66	77	87	94	95	99
Sub-Saharan Africa	53	36	53	40	59	47
Third level enrolment per 1 000 persons						
North Africa	11	5	15	9	16	12
South Africa	3	2	5	4	8	7
Sub-Saharan Africa	2	1	3	1	3	1

Source: Okojie (2001) from United Nations 2000, *The World's Women: Trends and Statistics*

Table 2 shows that sub-Saharan Africa has performed very poorly compared with other areas in the African region in terms of GER at primary and secondary levels combined. The same is observed at third level. The statistics indicated a gender gap in enrolment at all levels of education in all three African regional areas. Table 3 below, shows the data at individual country level for those nations where data are available. Although there are great disparities in access to education by boys and girls as well as men and women, boys/men have greater access to education, science education in particular, than girls/women. In general, the gender disparity is due to the limited access to education by girls and women. Nevertheless, there are other factors that limit girls and women's access to science and education. These factors are described in the findings from the African Academy of Science (AAS) Research Programme.

Table 3: Gender disparities in education for selected African countries

Countries	Combined primary/secondary GER, 1994-1996		Illiteracy rate 15-24 years 1990 census		Third-level enrolment per 1 000 persons 1994-1996	
	Male	Female	Male	Female	Male	Female
Algeria	-	-	14	38	14.7	10.0
Benin Republic	63	35	45	73	4.2	0.9
Burkina Faso	26	16	-	-	1.3	0.4
Burundi	-	-	40	52	1.1	0.4
Cameroon	-	-	15	29	-	-
Central African Republic	43	26	37	65	2.1	0.3
Chad	47	23	-	-	1.0	0.1
Ivory Coast	58	38	40	62	6.0	2.1
Democratic Republic of Congo	52	41	-	-	-	-
Djibouti	31	22	38	62	-	-
Egypt	-	-	29	49	23.2	14.7
Eritrea	-	=	-	-	1.7	0.2
Ethiopia	33	20	-	-	1.0	0.2
Gambia	62	46	-	-	1.9	1.1
Ghana	64	50	-	-	-	-
Guinea	64	50	-	-	1.9	0.2
Guinea Bissau	50	27	-	-	-	-
Malawi	-	-	30	51	-	-
Mali	33	20	62	81	-	-
Mauritania	54	42	43	62	6.2	1.3
Morocco	-	-	29	54	13.3	9.3
Mozambique	38	27	-	-	-	-
Niger	23	14	75	90	-	-
Nigeria	77	61	-	-	-	-
Senegal	-	-	51	72	-	-
Sierra Leone	-	-	-	-	-	-
Somalia	-	-	-	-	-	-
Sudan	-	-	22	41	-	-
Swaziland	-	-	-	-	7.5	5.4
Togo	-	-	-	-	5.3	1.1
Tunisia	-	-	7	28	-	-
Uganda	-	-	20	28	-	-
Zambia	-	-	20	28	-	-
Zimbabwe	-	-	-	-	9.1	3.7

Source: UN 2000, *The World's Women: Trends and Statistics*

3. The African Academy of Science (AAS) research programme

In order to improve the knowledge of “why” and “what” gets girls/women in education and keeps them there, AAS collaborated with the Task Force of Donors to African Education (DAE) and the Working Group on Female Participation in Education in Africa. Together they initiated the first African-wide research grants programme in 1992. This was to encourage researchers to investigate the various factors responsible for the limitations in gender disparities in education. The programme was labelled “Research Programme for Education of Girls and Women in Africa”. The objectives were to promote research on how gender plays a major role in determining who gets to school, how well they do and how far they progress; and to encourage and support the creation of a viable research community enabling a substantial and direct contribution to the long-term improvement of female education in Africa.

The research was supported financially by private foundations, bilateral aid agencies and international organisations, thereby, confirming the international role of community research links to the educational programme in particular. This research programme initially focused on the causes of gender disparity and policies that have been effective in closing the gender gap. In the 1994 and 1995 programmes, the theme researched was “Collection of relevant information for preliminary assessment and evaluation of female participation in education in sub-Saharan Africa”. This enabled the researchers to explore as well as simulate predictive statistical models whose results could assist policy-makers to prevent the recurrence of several barriers to female education in Africa. Issues researched included:

- factors that account for differences in schooling between boys and girls. Factors within the school system such as: implemented curriculum; classroom interactions; quality of instruction; funding; teachers’ expectations and roles;
- factors within the household such as: income; demand for girls’ labour; socio-cultural beliefs and prescribed roles for girls and women at home; labour market and career opportunities;
- policies that have been effective in closing the gap in school enrolment, retention, repetition and achievement between girls and boys.

The countries involved in the research were: Botswana, Cameroon, the Democratic Republic of Congo, Kenya, Mali, Nigeria, South Africa, Tanzania and Uganda.

All the studies, as reported by Okojie (2000), confirmed the gender gap in the access to education by girls in Africa, especially at the secondary and tertiary levels, where science education is of immense priority in terms of sustainability and developing process. The factors inhibiting girls’ access to education in Africa are:

- household and family factors;
- individual and personal factors;
- community factors;
- school factors and
- cultural factors.

The policy recommendations include:

- policies to remove constraints at community level, that is, sensitivity raising programmes;
- co-operation and partnership between all the stakeholders;

- measures to enhance income-earning opportunities;
- measures to reduce opportunity costs of girls' education;
- recruitment of female teachers;
- improvement in the quality of education;
- career counselling;
- incentives that will encourage more girls to offer to enrol in science courses;
- measures and actions that will increase girls' motivation and self-esteem.

4. Conclusion

The paper has raised issues that will enhance the international role of “gender and research” contributions to science. Collaboration and partnership between education and science research will empower the numerous stakeholders and confirm the international role of the European Community Research Action Plans for the future.

Bibliography

- United Nations, *The World's Women: Trends and Statistics*, United Nations, New York, 2000.
- World Bank, Hopkins John, *Social Indicators of Development*, Baltimore MD, 1990.
- University Press.

Gender Impact Assessment Study on “Innovation and SMEs”

MARIA AGUIRRE
SOCINTEC S.A., Spain

The first part of the Gender Impact Assessment Study on the Promotion of innovation and encouragement of participation of SMEs (Innovation and SMEs) programme consisted of a literature review that attempted to gather relevant information on women’s participation and contribution to business and economic life. It is important to bear in mind that we were not looking at the female population as a whole, but specifically at women entrepreneurs and managers.

The first main finding was the significant lack of sex-disaggregated data in the statistics and, particularly, a notable lack of raw data linking women with innovation processes, such as technology transfer, finance of innovative actions or companies and protection of intellectual property rights, etc. This means that, in practice, we have very little data providing an insight into the real contribution of women to economic life. The second main finding was the confirmation of the gender segregation in the labour market – so much more evident as the career ladder is climbed – referred to as the glass ceiling effect. Some studies mention the sticky floor as well! Another major point was that women are excluded from formal and sometimes also informal networks, so they have more difficulties to access positions with decision-making power.

The literature review looked at gender in terms of numbers, but also highlighted other gender issues or gender-related differences. For example, gender differences were observed in the rate of self-employment and in the motivation for setting up their own business. Although most of the latter is shared by women and men, women mention more often a stronger need for self-fulfilment, a means to escape employment or even (although this is not a very general opinion) a good way of conciliating family life and work. Apart from different gender patterns in relation to age, marital status and education level, other studies looking at the socio-cultural characteristics revealed certain differences in management style, degree of flexibility and composition of the task force that women entrepreneurs or managers employ.

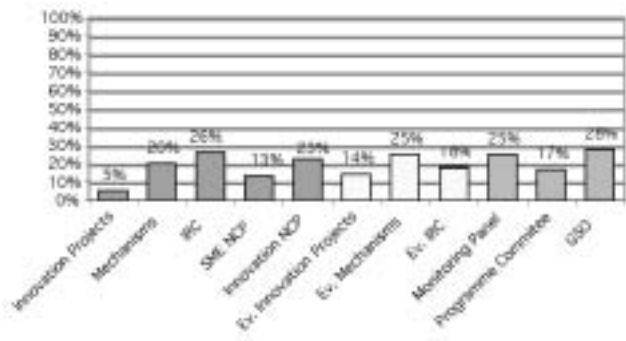
Differences were also observed in the type of companies led by women. Women are mostly found running companies in the service sector; that tend to be smaller in size (even for the same sector) and that, at least at the very beginning of their creation, are less interested in expansion than male-led companies. In addition, they start with a smaller amount of capital. Women normally had fewer personal assets as well. Some studies have observed a lower stability rate for female-led companies within Europe, linked to the sector of activity.

When examining the barriers to active participation in business life, there were certainly a number with a gender component, ranging from the private sphere or personal attitude of women to more general and external barriers such as societal attitudes, mostly related to traditional assumptions of sex roles. Additionally, the structures, both social and at work, still seem to follow a predominantly “male culture” of making business. Many studies also identified barriers linked to

education and training, not in the formal academic education, but in the type of specific education that an entrepreneur or manager would need. Much of this is obtained by working in the companies and through the gradual acquisition of responsibilities. Additionally, women entrepreneurs seem to face specific difficulties and, consistently, the number one difficulty is the access to finance for starting up a company. We can already mention a number of reasons that have been put forward to explain this finding. Among them, women tend to ask for smaller loans (less interesting for banks), may find the bank vocabulary more foreign or lack financial know-how (one of the specific skills mentioned before). Women entrepreneurs also manifest a lack of role models and do not seem to profit to the same degree from information and advice schemes available, apparently preferring a tailor-made type of advice. Finally, the constraints of access to networks, and the access to foreign markets, are particularly important for women entrepreneurs. Related to the barriers or difficulties highlighted by the literature review, we also looked at the various mechanisms that different institutions and countries are implementing to try to overcome them, including several initiatives and studies undertaken by the European Commission.

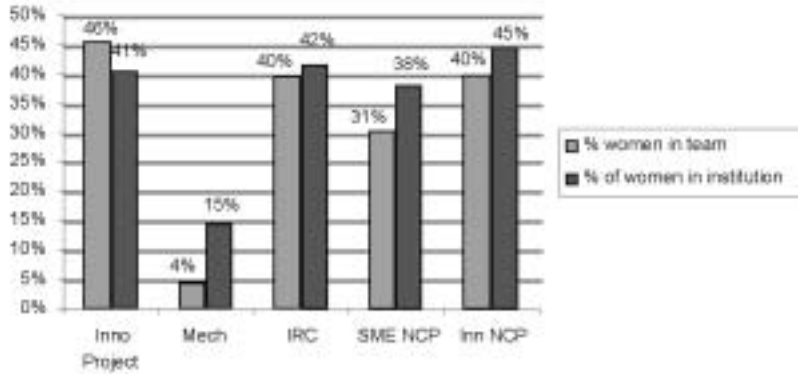
The second and main part of the study was the assessment of the Innovation and SMEs programme from a gender perspective, which involved various aspects. One of them was obviously the participation of women, in terms of numbers, and the profile of these women participating as contractors, evaluators and policy makers.

Graph 1: Gender composition (% women) in groups involved in the Innovation and SMEs programme



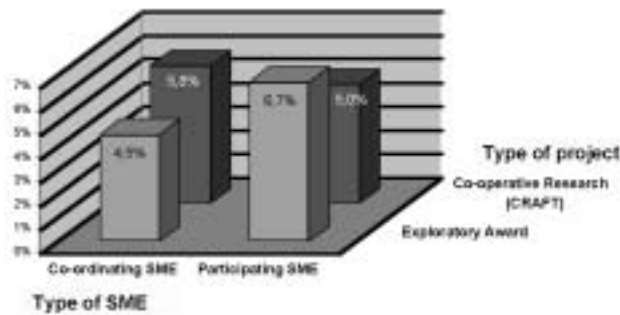
In this graph, the percentage of women is given for each of the groups mentioned. The first five bars refer specifically to the female co-ordinators or contact persons for the contractors group. These are either organisations funded by the European Commission to carry out “innovation projects”, “mechanisms to facilitate the setting up of innovative companies” or networks, concretely, the Innovation Relay Centres (IRC) and the two National Contact Points (NCP) (for both the innovation and SME parts). The next three bars represent the evaluators of the innovation projects, the mechanisms and the IRCs. The last three refer to the policy-makers, which include the monitoring panel, the programme committee and the group of senior officers (GSO). As shown, the average female participation is around 20% and, although some groups are close, none of them reaches 30%, and the evaluators are far from the suggested target of 40% participation. Looking more closely at the contractors, the percentage of women acting as co-ordinators varies from 5% to 26%, but if the total participation of women in the teams and in the institutions where they work is examined, the results are closer to near parity, reaching between 40 and 45%. Anecdotally, the “mechanisms to facilitate the setting up of innovative companies”, which shows the biggest number of women acting as co-ordinators is also the group with less global participation.

Graph 2: Global participation of women in the contractors group



Regarding the participation of SMEs led by women in the first call (1999), based on data provided by the Innovation and SMEs programme officers, the average is just below 6%, which seems to follow the percentage of women entrepreneurs in high-tech firms.

Graph 3: Participation of women-led SMEs involved in selected projects



We also looked at the profile of the women participating in these different groups, by sending a questionnaire. We obtained a good answer rate and consequently could detect some trends. Most women were slightly younger than the male counterparts and very few, about 9%, were older than 55. Twice as many women as men were unmarried and had fewer children, particularly among evaluators and policy-makers. In terms of education, it was similar for women and men, but as the level rose, there were fewer women, and at Ph.D. level, there was one woman for every three men. In terms of professional category, a similar trend was observed and, for example, whilst no men were technicians, there was an average of three times more male managers than female. When asked about the power of decision they thought they had, generally speaking, women thought they had less power of decision than men did at all levels. In fact, the only people who answered they felt they had no power of decision were women. As regards the sector of activity they operated in, no major differences were found, although reflecting some of the literature review findings, only men worked in the finance, insurance and real estate sectors.

Another aspect of this part of the study was assessing the actual contents of the programme and the treatment of gender in it. We found that the programme tackles some of the most relevant issues, as highlighted in the literature review, for example, in terms of access to networks, access to financing,

promotion and training, practices to help develop the innovation culture and the preparation for the setting up of new enterprises. In theory, this was good news. However, when examined in detail, the contents appear to be gender-blind, since there is no explicit recognition of gender differences. In fact, there is only one specific mention of women entrepreneurs and their networks in Economic and Technological Intelligence, an activity aimed at identifying the needs of SMEs.

Concerning the evaluation procedure, it was found that no attention is really paid to gender during the briefing, in the documents or in the guide for evaluation. So unless there is a particular interest of the individuals responsible for managing the evaluation procedure, there will be no mention of gender issues or mainstreaming. Taken together with the absence within the contents of the Work programme, it is not surprising to find that practically none of the projects financed by the programme (in the first calls, year 1999) considers gender issues – at least explicitly. Only one of 21 “innovation projects” is sex-specific (it dealt with foetal surveillance during labour). In the activity “mechanisms to facilitate the setting up and development of innovative enterprise”, none of them acknowledges gender in an explicit manner. Having said that, we also have to remark that many of the projects funded dealt with barriers and/or possible solutions to those barriers. Given that we only had limited access to the information of the proposals and also because the projects were just beginning, we should wait until the end of the projects to assess in depth how gender issues may have been tackled.

Concerning the networks, it was not in the scope of this study to evaluate the functioning of the networks. However, when we sent the questionnaire to find out how many women were participating in the programme, we took the opportunity to collect some relevant information, and we could confirm two findings pinpointed in the literature. Firstly, women tend to make less use of the type of information and advice provided by these networks, and secondly, the vast majority of these networks, or the institutions that participate in the networks, do not provide specific services aimed at women entrepreneurs. As in the Work programme itself, it is understood that the services are provided for entrepreneurs and that they are equally suited for women and men.

The last part of the study dealt with recommendations, which we differentiated in two main types. One important recommendation in all of the studies, is to collect sex-disaggregated statistics. Without the numbers and the basic information, we cannot set objectives, monitor the situation and, eventually, see the improvement or assess the usefulness and adequacy of different actions that could be taken. It has therefore been proposed that the IRCs and NCP networks should be optimised to become both sources and channels of data and information regarding women’s participation and gender issues. This should also apply to other instruments that are already in place like the Intellectual Property Rights (IPR), LIFT helpdesks and the SME line already mentioned. It has also been recommended that the gender variable be introduced in current tools used to evaluate the socio-economic impact of innovation, following the example of some groups and statistics already looking at this.

Regarding the other type of recommendations, and given that gender mainstreaming is still not properly understood by everybody, one of the first tasks should be to improve the information and training on gender mainstreaming within the Commission, which could be done by means of seminars and practical examples. To improve the participation of women, a stronger encouragement should be achieved. Although in all the relevant documents (evaluation guidelines, Work programme, etc.) there is a line that states that women are encouraged to participate, this should be stated in a clearer manner in all the texts. On the other hand, an effort should be made to employ the most effective channels that are, in practice, used by women entrepreneurs, managers

and individuals that might be interested. Additionally, and linked to the lack of role models, it could be a good idea to present these role models and successful case studies both in the Communications and in presentation instruments that the Commission has already designed, or in new ones.

Regarding the contents of the programme activities for future design, all the different groups, from contractors to evaluators and policy-makers, agreed that most of the relevant issues were there and that it was a matter of making explicit the barriers that were bigger for women than for men. In other words, it was more a point of making explicit these gender issues and that women would be a target for such activities rather than modifying notably the content of the programme. But there were also suggestions to emphasise the need for activities that help in the identification of gender issues and elimination of inequalities.

In relation to gender balance and quotas, since there is already one for evaluators, the recommendation was not only to maintain this policy but also to extend it, having at least a suggested quota for other groups. Given that the selection of participants in several groups is not made by the European Commission itself but by the Member States directly, it was thought that some type of good practice guidelines could be designed to promote and facilitate this selection procedure, with the aim of increasing female participation.

A final set of recommendations concern the evaluation procedure, a very important aspect of the whole study for several reasons – not least because the suggested 30-40% quota was not reached. Women are scarcely present (10-20%) in the databases from where the evaluators are drawn. So, first of all, it should be made known to women that the Commission wants female evaluators. Secondly, the procedure for selection of these evaluators should be assessed – and corrected if necessary. Thirdly, alternative procedures could be considered, because the current one, staying a whole week away, certainly poses problems for women with younger children. Regarding the actual procedure of evaluation, and given that currently there is no actual briefing, the issue of integrating women in science, innovation and economic life fully should be considered as a social objective. One of the five eligibility criteria is a social objective, but there is no mention of gender mainstreaming equal opportunities in this context. In addition, we thought that it would be helpful to introduce a bonus to improve the participation of women or institutions with a good gender balance. The system could work in the following manner: Once the proposals have passed the basic eligibility criteria and fulfil the standard of quality, a bonus could be given if they have a better gender balance in the team or if they belong to organisations that provide proof of equal opportunity policy, gender mainstreaming or policy actions. And finally, it was recommended to ensure that the gender dimension is present in both oral and written briefings provided to the evaluators.

Women in SMEs: gender issues from WEEN and WomenCraft projects

HILARY FARNWORTH

Association for Women in Science and Engineering (AWiSE), University of North London, United Kingdom

1. Introduction to the projects

Women's Enterprises Electronic Networks (WEEN) worked with over 150 SMEs run by women, and trained and supported them in their use of the Internet for business. It was based in the University of North London, with partners in Italy, Germany and Greece, and ran for three years, from 1998 to March 2001. At the time of writing⁴, the WEEN project web site was available at www.unl.ac.uk/head/ween, where resources such as Case Studies and Training Materials, suitable for use by organisations that train SMEs, were available as downloadable files.

WomenCraft was a one-year ETI project in 2001. It had the aim of supporting SMEs led/managed by women to apply for research and development funding under the Fifth Framework Programme (FP5), and to find out why so few women compared with men had applied for FP5 funding. At the time of writing, information on the WomenCraft project site was available at www.betatechnology.co.uk.

2. Women in SMEs: some statistics for UK and Sweden

- UK: 35% of SMEs are women-run and 77% of women-run SMEs are one-person.
- Sweden: 30% of start-ups are run by women.

These figures are taken from *Women as Entrepreneurs in Sweden and UK* (February 2001) available from www.womens-unit.gov.uk.

A general point about typical women-run SMEs is that the majority of them are one-person businesses or less than five employees. At any rate they are usually micro-businesses in size and as such, they have specific needs which are somewhat different to bigger SMEs. This point came out of both WEEN and WomenCraft, and the situation in the UK is borne out by the available statistics.

3. The Internet: opportunities for women-run SMEs – WEEN

Running a business based on or heavily using the Internet, either for e-business or e-commerce (both terms are used in their broadest sense here) gives opportunities for:

- working from home;
- flexible hours;
- virtual businesses: a business using work from freelance associates (also known as e-lancers) rather than formal employees;
- reaching global markets.

⁴ 05.01.2002.

Flexible hours and working from home are two often excellent conditions for women. Working from home and using freelance associates as workers keep the business overheads down, and there is some evidence that women prefer to keep the capital expenditure of setting up a business low: they either do not seek large loans or they do not wish to worry of servicing large loans. Micro-businesses based at home can usually be set up for under €10 000.

4. Internet opportunities: WEEN case study

Lucia Clarke runs a lingerie business, specialising in garments for larger ladies. Using e-commerce, and Lucia's measurement system, customers can order the garments over the web and pay on-line⁵. Silk lingerie is very easy to post, as it is not bulky, neither is it perishable; this type of product is ideally suited for e-commerce globally. Lucia works from home, designing garments, managing the making of the garments by five to ten employees who all work from their own homes. An associate manages the business website. Rather than paying up-front for the website creation and maintenance, Lucia has a negotiated percentage deal with the website designer, who receives a percentage of all on-line sales income. The company has sold their goods in several European Union countries, both directly to on-line customers and to shops that have taken bulk orders. Lucia has school-age children and is a good example of a woman running an SME that is successful in its use of the web and e-commerce. WEEN included her as an excellent role model in its Case Studies, which were produced by the project as an extra deliverable to help women see the potential of working with the Internet⁶.

5. The Internet: issues for women-run SMEs – WEEN

5.1. Identifying skill gaps and accessing training

Women on the project often needed to self-assess their Internet and computer skills so that they could make best use of their time for training. In the first session, women often said "I am a complete idiot with computers" or similar words. We would gently question them, finding that they could already word-process, use simple e-mail and had other skills. I have been involved in various computer-training projects for over ten years, and I have never heard a man use this form of words. We realised we had women putting themselves and their knowledge down. This is a gender factor. We strongly encouraged the women on the project to re-phrase their assessment of their position, into statements like "I am already using computers and the Internet, and I will identify my skill gaps and get some more training".

Accessing training can sometimes be tricky for women running SMEs: existing business support agencies such as Small Business Service (UK) do not always tailor their course to the specific needs of the micro-business.

Business planning and obtaining finance

A person running a micro-business usually has high-level skills in the area of the business, the product or service, varying degrees of management skills, and very little time to take on extra work. When we started the WEEN project it was visualised that we would train the women to create their own websites. However, by 2000, the industry standard for effective business web sites

⁵ www.innervision.com

⁶ WEEN Case Studies are available at www.unl.ac.uk/head/ween.

was already quite high in terms of design, appearance, and the sheer amount of skilled web design to produce a successful site. We therefore trained women in the basics and covered the main concepts so that they would be better able to delegate the web site design and maintenance.

In the first session we identified if the women had proper business plans, and were already aware of services to support SMEs with their general planning and management. We worked closely with the local Business Link, who joined the project as partner, and we were able to introduce many of the London-based women through WEEN to a helpful woman Business Link Adviser locally. We found that business planning was crucial, as without planning the women were much less likely to get access to funds to pay web designers. WEEN therefore covered business skills and ICT skills – not just the ICT skills on their own.

5.2. Dealing with web designers: negotiating, delegating

Similarly, we found it was very important to encourage the women to negotiate business relationships with their web designers. We had some evidence that using students, or relatives, in unpaid loose arrangements, would often result in having to bring in a paid web designer anyway to re-design and completely overhaul sites at a later stage.

6. WomenCraft

This project had partners in Italy, Austria, UK and Estonia. It has been set out to encourage women to apply for FP5 Research & Development (R&D) funding, and to research why women, particularly in the science, engineering and technology (SET) sectors, were under-represented in the applications for FP5 R&D funding. The following are some main findings and issues from the WomenCraft project:

- Identifying women-run SMEs in the SET sector was very time-consuming as in most countries statistics are not held by gender, but was nevertheless achieved.
- Over 2 000 women-run SMEs were contacted.
- Women-run SMEs with 1-10 employees often have needs for other types of funding than R&D. One of the major findings was that many women wanted comparatively small funds (from €10 000 to €40 000) and often for marketing. Major R&D projects were not the top priority, and many businesses did not have a need for major scientific research projects at all.
- Language can be a barrier to applying for European funds as not all micro-businesses can easily find and work closely with National Contact Points or other experts who can write applications.
- Time is at a premium for SMEs.

However, the WomenCraft Project did work with a number of women-run businesses and support them in their applications for funding under FP5. At the time of writing the exact numbers are not yet collated. The Final Report is in preparation by BetaTechnology, the project co-ordinators⁷.

⁷ www.betatechnology.co.uk, WomenCraft co-ordinator – Antony Davies.

7. Some questions based on WEEN and WomenCraft

Some trends for business practices in women-run SMEs, and particularly micro-business, have emerged from the WEEN and WomenCraft projects.

7.1. The virtual SME: flexible employment model

Businesses can appear very tiny because they are listed as a one-person business. This has tended to mean that micro-businesses have been dismissed as too small to be worth helping in major initiatives. This is not only a factor affecting the success of women in small businesses, but often the tiny appearance is misleading as the turnover can be sizeable.

Women-run businesses often have associates rather than employees. They use the flexible employment model (FEM). For instance, one SME on the WEEN project had a sole trader running her business (thus appearing tiny in size) but a team of 20 freelance associates who could be called upon to work with clients. By this strategy the turnover was quite large. Associates worked from home, there was no office space rented, and the team kept in touch via e-mail and the web. So you could say this was a virtual business model. I would like to put the question: is this model a general European trend?

7.2. Women-run SMEs and finance

What is the best practice in overcoming barriers to access finance for business? I would like to see studies on best practice in overcoming this real or perceived barrier to business growth and success, and some innovative ways of disseminating this best practice so that it reaches women across the EU who are setting up or trying to grow businesses.

7.3. Women's networking groups

What research is being done into the key role of women's business networking groups? Both WEEN and WomenCraft relied on key networking groups that support businesswomen in the various partner States. AWiSE does a lot of work with networks of women who are in SET and their contacts were fed into the WomenCraft project. A two-way process is going on between the women-run SMEs that are looking for support they can relate to and really use, and the networking groups, all of which have slightly different aims, mission statements and strategies. Some, such as the British Association for Women Entrepreneurs and les Femmes Chefs d'Entreprises Mondiales, have pan-European roles already and are ambitious for more. Some, such as Everywoman and Women.de, base work mainly through innovative web sites⁸. On both projects we had many discussions about the potential of a truly EU-wide women's business network, which would bring together personal contacts, web-based communications and an informed strategy for supporting women and their specific needs as SME managers. I would like to see more effort put into examining the special value that such networking groups have in supporting women who run SMEs, how their work can be mainstreamed, how they can best work with institutions co-ordinating EC funded projects and how we learn from their experiences.

⁸ www.bawe-uk.org/
www.fcem.org/
www.everywoman.co.uk
women.de

SECTION 8: IMPROVING HUMAN RESEARCH POTENTIAL AND THE SOCIO-ECONOMIC KNOWLEDGE BASE

Gender Impact Assessment Study on “Improving human potential and socio-economic knowledge”

MARY BRAITHWAITE

Tacitus, Belgium

The specific programme Improving human research potential and the socio-economic knowledge base (IHP) is rather complicated. It includes a key action on socio-economic knowledge and also a series of actions supporting mobility of researchers, high-level conferences, raising public awareness and indicators and statistics. The Gender Impact Assessment Study covered all these different activities but this paper focuses only on the socio-economic knowledge key action.

The study, which was carried out by a team of researchers based in Brussels and with specialist inputs from three leading experts, produced a series of Working papers. The first Working paper included a literature review on research about gender issues in fields relevant to the socio-economic knowledge key action. 27 fields of gender research were identified; for each field, the findings of recently published research were summarised and a short bibliography provided.

Following the literature review was a gender assessment of the key action itself. Three aspects were assessed. Firstly, the participation of women and men in the programme. Secondly, the treatment of the gender dimension in the management of the research programme (in programme documents such as the guidance to proposals and the Work programmes and in procedures and instruments). Thirdly, the treatment of gender in proposals. It is important to stress that we assessed proposals only, since only these were available for the Fifth Framework Programme (FP5), and not any outputs of the research activities financed. We assessed proposals from the first and second calls, selected by the European Commission, and which describe the intended research activities.

1. Participation of women and men in the key action

The study looked at women and men's participation in different aspects of the programme. In 1999 around 30% of experts in the evaluation panels (who undertake the ex-ante assessment of proposals for the European Commission) were women. In 2000 the figure was 39%. It is important to point out that this is double the percentage of women who are in the expert database. It represents a substantial effort by the European Commission to improve the participation of women.

This compares well with participation in research proposals. In the first call for key action proposals, around 20% of co-ordinators and partners of eligible projects were women. In common with the Gender Impact Assessment Studies on other FP5 programmes, we have doubts about the usefulness of this information. The data collected on the sex of co-ordinators and partners concern those who officially sign the proposals. This does not necessarily reflect the make-up of the scientific team, which is more interesting from the perspective of the participation of women and men in scientific research, but for which gender breakdowns have not been required or collected. This is naturally one of the recommendations of the study.

In terms of success rates, the chance for women or men to have their proposals selected, the picture is rather similar: 21% for women, 22% for men.

2. Treatment of gender issues in the programme management

Concerning Work programmes, one interesting aspect is that in the first call gender was presented as a cross-cutting dimension while for the second call it was merely mentioned under some of the thematic headings of the research. The study suggests that this difference had an effect on the treatment of gender by proposers of research projects, because there was a slightly higher percentage of proposals in which gender had been identified or addressed in the first call compared with the second call.

There are strong statements concerning equal opportunities in programme documents. A general observation of the IHP programme is that there has been a major focus on encouraging the participation of women in research and considerably less, so far, on the integration of the gender dimension. For example, the contribution of projects to European policy on gender equality is not part of the selection criteria although projects should contribute to other European policies, such as employment, education and training and environment. Moreover, there have been no specific procedures or instruments for supporting the mainstreaming of gender in the management of the programme through its phases.

It is important to say that the resolution on women and science has not required such steps to be taken, and that the gender assessment is part of efforts to improve the integration of the gender dimension in the future. The formulation of FP5 predates the specific requirements in the resolution on women and science. In general, progress on gender and equal opportunities in European research policy and programmes has moved very rapidly, in some cases ahead of the gender and science policy. In fact, the Directorate-General for Research (DG Research) is leading the way internationally on gender policy in science and research. I was keen to find out if the findings of the gender assessment of the key action were typical of socio-economic research generally. I tried to identify internationally (in EU Member States and in the US, Canada, Australia and South Africa) if similar gender studies have been carried out on socio-economic research funding programmes. I came across no similar study, although there is some monitoring of access of women and men to funding and awards.

3. Analysing proposals for a gender perspective

An analytical framework was used for assessing the proposals. First of all, we asked a simple question: is gender (or women) mentioned or addressed at all in the proposal? We also noted whether gender is potentially relevant to the themes being studied. If gender was mentioned, we then went on to assess the approach taken to the gender dimension. We identified six different ways of treating the gender dimension. These varied from a simple intention to disaggregate statistics by sex, through recognition of certain characteristics associated with one sex or the other (usually women), to recognition of differences and inequalities between the sexes, and to recognition of gendered structures and concepts.

A next step was to identify how gender was integrated into the project design: for example, just in the preamble or in the intended outputs, or work packages. This enabled us to assess the extent to which it was thoroughly integrated.

We also looked at the team composition. As indicated earlier, this was made more difficult by the fact that a gender breakdown of the scientific team was not required. We assessed on the basis of names and descriptions, but it was not always possible to tell whether the person was female or male. We were interested in assessing not only the female/male balance in the scientific team, but also how gender expertise was treated (if at all) and any measures that were taken within the project or team to ensure that gender issues were addressed.

4. Findings of the gender assessment of proposals

The majority of proposals do not mention gender at all, even though gender is a relevant factor (we called these “gender-blind” proposals). In a small percentage of proposals, we considered that gender is only of indirect significance; in this case, the absence of gender is not considered to be a problem for the research. There is a small, but nonetheless significant, number of proposals, which do not focus directly on gender issues, but where gender is integrated into the proposal. We have called these “gender-integrated” proposals. Finally, there is a small percentage of proposals where gender is the main focus of study (“gender-specific”).

When it is mentioned, gender is mainly limited to recognition of special characteristics, particularly of women, and to some specific aspects of gender differences and inequality. It tends to be mentioned in the preamble and intended outputs, and seems not to be so well addressed in the project design (methodology and work packages). What we noticed in particular – which for researchers on gender will come as no surprise – is that there is a very strong correlation between the absence of treatment of gender and two characteristics. These two characteristics are the uncritical use of universal categories and an absence of attention to the human dimensions of the structures and processes being studied. By uncritical use of universal categories we mean, for example, that “trainees”, “employees”, the “public” or “citizens” are mentioned as the subjects of study, but without any indication of who precisely these people are and of the diversity of their characteristics, such as on grounds of sex or race. Moreover, many studies focus on processes of social or economic change, but without attention to human-related causes or impacts. If the human dimension generally is not addressed, it is difficult to integrate a gender dimension.

5. Gender balance and gender integration

I spend much time insisting that there should be clear distinction between the issue of equal opportunities (that is, the participation of women and men) and integration of the (thematic) aspect of gender in programmes or research. This is because there is sometimes a tendency to reduce “the gender dimension” to merely one of counting women and men. However, in this key action, we can see clearly that there is a very strong correlation between an imbalance of men and women in a scientific team and the treatment of gender as a thematic issue in the research. When teams are composed largely of men, then gender is not likely to be addressed in the research proposal. Equally, gender is more likely to be addressed where there are more women present. But gender balance alone is not sufficient. There are some research proposals with a majority of women where gender is not addressed.

6. Quality and gender

On a final note, I would like to make a statement that merits some discussion. It is possible to have good proposals without gender, and bad proposals with gender. Gender may not be relevant in all research, even in the socio-economic field. It is therefore important to determine where and when

it is relevant and how it should be addressed. Equally, gender can be addressed in research, while falling into the same trap of using universal categories, for example by studying “women” or “female members of parliament” as if they are homogeneous groups and without identifying key diversity variables, such as age, race, education, marital or family status.

Quality standards for research should comprise a clear definition of – even a critical reflection on – key concepts. There should be clear identification of the human populations affected by the issues, processes or structures being studied, as well as key diversity variables, including gender. Then these variables need to be systematically integrated in the research design.

Response to the Gender Impact Assessment of “Improving human research potential and the socio-economic knowledge base”

NINA LYKKE

Linköping University, Sweden

My response to the study will be structured in three brief sections. The first will comment on the knowledge gap that, according to the study, exists between the gender expertise of European women's and gender studies, on the one hand, and mainstream research on socio-economic change in Europe, on the other hand. This knowledge gap is amply documented in the report and raises the question: how can this knowledge gap be diminished in future research programmes of the European Union, in particular the 6th Framework Programme (FP6)? The second section will deal with future consequences more specifically and focus on a couple of recommendations for FP6. Moreover, I will present my own background against which I selected the recommendations that are given special attention. In the third section, I will comment on a problem that I think is a bit under-theorised in the report, namely the problem of resistance against positive action and gender mainstreaming in research. Such resistance is found in mainstream research. It is important to overcome it, if the recommended mainstreaming strategies are to succeed. To highlight this issue, recent Danish debates on research policies will be taken as an example. This assumes that similar kinds of resistance can be found in other national and European level settings as well.

1. The knowledge gap between the gender expertise of women's and gender studies and mainstream research on socio-economic change in Europe

One of the very important results of the report is that it convincingly documents and acknowledges the importance of expert knowledge on the significance of gender in society, culture and science that has been accumulated by gender research over many years. The report shows how crucial this knowledge base is for a proper understanding of socio-economic change in Europe and for a scientific investigation of the priority themes of the Fifth Framework Programme (FP5) on “Improving the human research potential and the socio-economic knowledge base” (IHP). Therefore, I hope that the work of Mary Braithwaite will impact on the ways in which these important themes will be treated by future EU research programmes, in particular FP6. If gender perspectives become integrated in FP6 along the lines recommended in the study, a big step forward will have been taken for the participation of women in EU-funded research as well as for a proper understanding of crucial trends in current European social and cultural development.

The report shows that there is a knowledge gap in European research on socio-economic change. On the one hand, the report documents that there is rich and abounding literature on gender specific dimensions of socio-economic development, reflecting the in-depth knowledge accumulated. On the other hand, it shows that the majority of projects funded under the IHP programme in FP5 have not taken this literature systematically into account (Braithwaite 2001, p. 79). Over half of the proposals analysed under the key action “Improvement of the socio-economic knowledge base” were found to be totally gender-blind (53% of the proposals for the first call and 59% for the second call). It is very thought-provoking that there is an outspoken gender blindness in a majority of proposals despite the fact that it can be convincingly documented that gender is a crucial factor for the subject areas studied. Only a minority (under 10% of the proposals analysed) take gender into account in a systematic and in-depth way.

What the report documents is a highly problematic knowledge gap between gender research, on the one hand and, on the other hand, mainstream research on socio-economic change in Europe. It can be concluded that the expert knowledge of European gender research is not taken properly into account by mainstream research and, moreover, that the EU's policy statements on gender mainstreaming, on the importance of gender issues and of gender research are not sustained by matching EU-funded research endeavours. The report argues convincingly that the gender research expertise present in Europe today should be taken much more into account in future research programmes. Crucial questions are: how can this be done? Which kinds of strategies should be pursued?

2. Recommendations for FP6

In order to position my response and my background for choosing to comment on certain recommendations of the report rather than others, I will mention that I am a member of the council of the European gender research association AOIFE (Association of Institutions of Feminist Education and Research in Europe). As the name indicates, AOIFE is an association of institutions. It represents gender research programmes from about 80 European universities, which means that a substantial part of the existing European gender research programmes are members of AOIFE. One of the objectives of AOIFE is to facilitate European co-operation and initiate European comparative and transnational research projects within Women's and Gender Studies. Therefore, AOIFE has followed the integration of gender perspectives in the Framework Programmes closely. As part of this work, the AOIFE Council has suggested amendments to the Communications and Decisions on FP6. I will mention a couple of amendments that point in exactly the same direction as some of the report's recommendations.

According to the amendments suggested by the AOIFE Council, it is important to include positive action much more systematically in FP6 than it was in FP5. Positive action as an instrument to increase the participation of women in science and research should be given explicit priority among the actions envisaged; general references to equal opportunities are not enough. In this respect, the AOIFE Council agrees totally with the report. A wealth of arguments for a much stronger emphasis on positive action can be found in the report. It documents convincingly that the general references to equal opportunities and to the importance of the participation of women in science and research that were typical of the IHP programme were not enough. They did not ensure gender balance among contractors and project participants. The report documents that "The overall breakdown by sex of co-ordinators of eligible proposals submitted under five of the IHP actions is 16% women and 84% men" (Braithwaite, 2001, p. 59). In addition, the report shows that the success rate of female co-ordinators was significantly lower than that of male co-ordinators (37% for women compared to 47% for men) (id.). The small number of female project co-ordinators is reduced even more, when we look at successful proposals (and not only at eligible proposals): "Thus, among the selected proposals 13% have female co-ordinators and 87% have male co-ordinators." (id.). Whatever reasons can be given for this discrepancy between female and male success rates, the fact that it exists shows that much stronger means must be applied systematically than mere declarations of intent. The gender imbalance is very clear. Positive action is one of the stronger means that must be considered seriously.

A second cluster of proposed amendments, suggested by the AOIFE Council, regards the ample and problematic use of universal categories in the texts of Communications and Decisions on FP6 such as "people", "citizens", "users", "learners" without specifying in terms of gender and other indicators of diversity (ethnicity, age). Again, the AOIFE Council amendments match the report

recommendations to avoid these universal categories. According to the report, one of the problematic features of the many gender-blind proposals that were submitted to the socio-economic programme was an “uncritical use of universal categories such as “employee”, “citizen”, “learner”, “elite”, “public”, etc.” (Braithwaite, 2001, p. 81). Crucial power differentials related to gender and diversity issues were therefore neglected in project designs. To change this situation, it is not enough to amend programme texts. The report makes many important recommendations that go much further than this. However, since programme texts give guidelines for proposers, they should be as specific as possible. For example, universal categories should be replaced systematically with categories that reflect gender and diversity as a first step towards creating new awareness among mainstream researchers and towards avoiding gender and diversity-blind project designs.

3. Resistance towards positive action and gender mainstreaming in research – an example from Denmark

Resistance towards positive action and gender mainstreaming in research has to be taken into account in a discussion of future strategies. I feel this is a bit under-theorised in the report. To illustrate this problem, I will take the example of recent debates on positive action, gender research and gender mainstreaming in Danish Academia, assuming that the resistance articulated in Denmark can also be found in many other countries.

In 1997, the Danish minister of research, Jytte Hilden, took two important initiatives in order to promote actively equal opportunities between women and men in academia and to support gender research. Both initiatives represented important attempts to break with the Danish politics of governmental non-interference as regards equal opportunities in academia, gender mainstreaming in research and the scandalous under-representation of women in the universities, in particular at professor level.

The first Hilden initiative was to earmark 78 million Danish crowns (approximately €11 million) to the so-called FREJA-initiative. Freja is an acronym for Female Researchers in Joint Action. The goal of the FREJA-initiative was to promote female researchers as leaders of bigger research teams, and to stimulate female participation in such teams. Research groups from all disciplines and areas of science (social, human and natural sciences) could apply. In order to get a share of the grant, applicants had to submit a high quality project proposal, include a substantial proportion of female researchers in the research team and preferably establish a group with a female leader. 327 proposals (for about €428 million) came in, when the FREJA-initiative was launched. Only 16 of the many high quality projects submitted obtained funding. The amount of money granted was obviously much too small to meet the accumulated need for research grants among female researchers in Denmark. Nevertheless, the process was important in terms of making the female research potential in Danish Academia very visible at all levels from Ph.D. to Professor. Jytte Hilden's FREJA-initiative deserves to be used as an example of good practice – in other countries as well as at European level.

The second Hilden initiative was to formulate a so-called 11-point plan (Forskningsministeriet, 1997) according to which an array of actions should be taken to promote women and gender research in Danish academia. One of the eleven points dealt with professorships. Drawing inspiration from the initiative launched earlier by the Swedish minister of education Carl Tham (who among other things established 30 earmarked professorships for women), Jytte Hilden wanted to earmark 40 professorships for women. The number 40 was symbolic, because it would

double the number of female professors in Denmark as out of 700 professors in Denmark only 40 were women. However, Hilden's 11-point plan was never adopted by the Danish Parliament. Before the plan was debated in Parliament, there was an election. Jytte Hilden was not re-elected. The new minister of research, Jan Trojborg, who like Hilden, represented the Social Democratic Party, started out promoting Hilden's idea of the 40 professorships for women, but changed his mind after a campaign against the proposal conducted in the Danish press by a lobby of conservative professors. A majority of politicians were also sceptic, and the result was that Hilden's 11-point plan was cast away. Gender researchers argued for the plan in the press but the voices that influenced the majority of politicians were obviously the ones of the conservative professors. They argued that the earmarking of 40 professorships for women would lead to a disaster for Danish research, that its quality would be damaged fundamentally and that Denmark would lose its academic credentials abroad. A main argument against earmarking was that there would be too little competition if men could not apply, and this would lead to a catastrophic decrease of quality.

To put the resistance evoked by Hilden's initiatives and, in particular, by her proposal to earmark 40 professorships for women in perspective, I will compare the earmarking debate with two other public debates that took place in Denmark at the same time and which indirectly invalidated the main arguments against earmarking. (A more elaborate analysis of these debates can be found in Lykke & Bryld, 2000).

First of all, the debate about the 40 professorships for women coincided with the results of the call for applications to Hilden's FREJA-programme being made public. Only one month before the debate on earmarking of professorships, the 327 high quality applications to the FREJA-programme had amply documented that earmarking money for the under-represented gender did not exclude a very high degree of competition that would push the quality level to the top. Secondly, the debate coincided more or less with the publication of a report from the Danish Ministry of Education (Ståhle, 1998). This report showed that there are very few applicants (often only one or two) for around 50% of the professorships in Denmark. Among other things this is due to the fact that many professorships are announced within very narrowly defined areas where only a few researchers are qualified to apply. In other words, this official report documented that most male professors get their positions without competition.

These two things – the FREJA-applications and the report that documented that about half of the male professors get their positions without competition – could have strongly invalidated the arguments about quality-decrease made by the conservative professors in the Danish press. Gender researchers made this point. Nevertheless, the majority of politicians followed the arguments of the conservative professors and Hilden's 11-point plan was put down. Not only was the proposal for 40 earmarked professorships turned down, so was the whole Hilden plan, including the elements concerning support for gender research.

This is an example of the resistance which exists in the academic establishment and which has to be overcome in order to implement systematically many of the recommendations on positive action and gender mainstreaming of research that are mentioned in the report. Against this background, I would like to raise the question of strategies to overcome resistance with more force than it is done in the report. Which strategies can be mobilised in order to effectively decrease resistance against the promotion of gender research, women and gender mainstreaming in European Academia?

4. Conclusion

An answer to the question I just raised is that multiple strategies have to be used. This is very much in line with the report that lines up an impressive array of important recommendations. I will end this response by giving special attention to two recommendations.

One priority task is, in my opinion, to counter the widespread gender-blindness and create gender literacy in the research staff of European universities. A way of starting such a process could be to set up gender literacy training courses for university professors. I shall, therefore, recommend that a framework for funding such training courses be set up, for example, as part of FP6.

Moreover, I would like to support the recommendation made in the report concerning the creation of a specific expert advisory group on gender and diversity issues and research. According to the report (Braithwaite, 2001, p. 99), such a group should give systematic and regular advice as regards the relevant main components of the IHP programme of FP5. I would like to add the recommendation that this kind of expert advisory group on gender and diversity issues should be integrated into the structure of FP6 as well.

References

- Braithwaite, Mary, *Gender in Research: Gender impact assessment of the specific programmes of the Fifth Framework Programme. Improving human research potential and the socio-economic knowledge base*, European Commission, Directorate-General for Research, Brussels, 2001.
- Forskningsministeriet, *Kvinder, kvalitet, forskning*, Forskningsministeriet, København, 1997.
- Lykke, Nina & Mette, Bryld, "Mellem kunstig befrugtning og naturlig intelligens. Om skiftende betydninger af køn og kvalitet" in *Kvinder, køn og forskning*, 9. årg., 2/00, 2000, pp. 16-27.
- Ståhle, Bertel, *Kvinder og mænd i dansk universitetsforskning i 1990'erne*, Undervisningsministeriet, København, 1998.

Gender Impact Assessment Study on “Improving human potential and mobility actions”

MARY BRAITHWAITE

Tacitus, Belgium

The Gender Impact Assessment Study covered all the actions in the Human Potential programme (IHP), including various mobility actions. This paper will specifically focus on these mobility actions.

1. Absence of information and data

First of all, it is important to say that the study team had difficulties in establishing the precise nature of the gender dimension in relation to mobility. Nonetheless, the virtual absence of data and information does not mean that there is no specific problem concerning gender. The scale of the gender problem has still to be determined. It may not be a major problem, but at this point we do not know. It is useful, in this respect, to remember that MIT (Massachusetts Institute of Technology) in the US did not know the scale of their gender problem until they started researching it. They did not know – and could not believe – that research resources were unequal between women and men, or that pay was unequal.

Our reaction should be to demand the data on the relative situations of women and men concerning mobility in science and research. Which scientific fields are women and men located in? What happens to women and men afterwards, in terms of their career progression? The now well-known “scissors” diagram in the ETAN report very clearly displayed the different progression of women and men’s careers and we should not imagine that mobility is not subject to the same tendencies. We need to ask some questions about women and men’s experiences of mobility. Do similar processes and biases that occur widely in the scientific and academic world also affect mobility? For the moment we cannot answer these questions with certainty. Nonetheless, some elements can be observed and it is also possible to identify some of the gender issues that could be significant for mobility policy and actions.

2. Focus of study

The gender assessment of the 5th Framework Programme (FP5) mobility actions examined the participation of women and men as well as the treatment of gender issues. We are grateful to the Directorate-General for Research for being open to external experts examining their ongoing work. We were invited to comment on the questionnaire that had been developed in the context of the high-level group on mobility, and we also had access to the responses by the Member States. The Communication on mobility came too late, however, for us to assess.

The study also made recommendations for elements of a strategy to ensure gender equality in future mobility actions. Here I would like to insist on the term “gender equality”, because the question of what we actually want to achieve must be addressed. Is it to achieve a comfortable gender balance in mobility actions? Or is it to make significant strides towards improved gender equality, across different scientific fields and at all levels, and in the research resources that are allocated? What is the objective in terms of increased participation of women in science and research? Personally, I think and hope that, as important as it is to establish targets of participation,

the aim is to achieve a more significant impact on gender equality in science and research. Mobility actions could contribute to this, with the right strategy.

3. Participation of women and men in mobility schemes

Concerning the participation of women and men in mobility actions for the first call in 1999, 37% of individual Fellowships were taken up by women. The figures for the Host Fellowships and the Research Training Networks refer to the official co-ordinators named in the proposal, which we do not consider very significant for monitoring the participation of women and men in science and research. What is more significant is to know who is involved in the technical team, and this information is currently not available.

In terms of success rates of women and men in Marie Curie Individual Fellowships in 1999, there was a slight difference in the chances of women being selected compared with men. This may not be a significant difference, but it suggests that the figures should be closely monitored in the future.

4. Positive steps to integrate gender in IHP mobility actions

In terms of positive measures to promote the participation of women, important efforts have been put in place. Notably the extension of the age limit in the case of childcare (two years for each child) and the requirement that hosts and training sites should ensure equal opportunities in their arrangements for recruiting fellows. These measures are significant and are not always seen in some of the other actions of this programme.

What are the weaknesses in the current measures? The approach taken is “to encourage women” to apply, which assumes that women are somehow more timid and less confident than men. Personally, I am not convinced that this is the only reason why women lose out in science and research. Part-time projects are not accepted. This, together with the inflexibility and intensity of work, limited availability and high cost of childcare, can create inequalities in participation. Childcare costs can be covered, but facilities are not always available in different Member States. While mobility actions cannot address this problem, the problem should nonetheless be taken into account, and compensatory measures be proposed. One particular weakness is that no information is provided on what happens in the case of maternity during a fellowship, which, given the age range of fellows, should be addressed in the information provided to applicants.

5. Obstacles and strategies as seen by the Member States

Looking at the preparatory actions of the high-level group in terms of future policy on mobility, the questionnaire sent to the Member States included a reference to some gender-specific obstacles. Some gender issues were mentioned in the explanatory note that accompanied the questionnaire, and the questions included a reminder to take account of gender aspects in the response. One question asked specifically for statistics on gender. Not all the Member States noted this reminder, and the responses do not allow a sufficiently full picture of gender-specific obstacles and measures to be outlined. Some Member States mentioned gender-specific obstacles among their priority obstacles. These focused in particular on the reconciliation of family life, and particularly child raising, with professional careers.

In general, there is a tendency to focus, sometimes exclusively, on the issue of childcare when considering equal opportunities for women and men in mobility. Other important issues tend to be ignored.

6. Mobility as part of a wider experience

The issue of “upstream” and “downstream” is important. The mobility experience is one slice in a researcher and scientist’s career. Mobility can therefore only contribute partially to improving gender equality. Some patterns are set well before involvement in a mobility scheme. In this case, links should be made between mobility actions and other actions, such as raising public awareness, particularly in schools. Downstream from a mobility experience, there is the question of what happens afterwards. Where do women and men go in their professions? How do they reinsert themselves back into a career? Do women and men benefit equally from mobility experiences?

7. Potential barriers to gender equality

Without better information, we can only point to the potential barriers to gender equality in mobility. On the basis of a number of studies, including a report written by Louise Ackers on the experience of Marie Curie fellows, a series of potential obstacles can be identified. Age restrictions can of course be indirectly discriminating, because of the different lifecycles of women and men and the greater discontinuity in women’s careers.

Selection criteria and procedures may have hidden gender biases, as seen in some well-known cases. Commitments to ensuring equal opportunities must be backed up by a clear demonstration of equality and non-discrimination in the results of selection processes for grants and for fellows. The intensity and inflexibility of research work, particularly in terms of reconciliation of family and professional life, should also be examined.

Institutional status and gender bias could also be an important issue: the most prestigious research centres tend to be the most male-dominated in terms of staff, and often the most masculine in their culture. This could be a particular issue for researchers in the context of enlargement. There is indeed a generally higher participation of women in science and research on the “fringes” of Europe and lower figures as we go towards the centre (with Germany, France, UK and the Netherlands being particularly low). What is the experience of a female researcher from a Candidate Country for accession, for example, who would like to take up a fellowship in a university or research centre? Is she welcomed and supported, or does she experience more discrimination than in her own country? What are these “core” universities and research centres going to do to change the scientific map of Europe? We strongly suggest that this should be investigated in future mobility policies and initiatives.

Other potential obstacles to equal participation include inequalities between disciplines – mobility opportunities are clearly greater in the “harder” disciplines where men are often in the majority – and the difficulties for partners to obtain a work permit and to find a job. While this applies to both men and women, in some circumstances, it may be more difficult for a woman accompanying a man to find a job than for a man accompanying a woman, because of more limited options for women in most labour markets.

Maternity care and educational provision can also have a differential impact, as well as appropriate housing (for families) and social security provisions. While these apply to both women and men, as long as there is an unequal share of family care and responsibilities between women and men, then this will be a heavier burden on many women.

8. Objectives and strategy for gender equality

In considering a strategy for gender equality and mobility, four types of objectives and indicators are important. There is, first of all, the question of reducing vertical segregation, and of increasing the participation of women particularly at high levels in science and research. Secondly, horizontal segregation (across disciplines and occupational branches) should be reduced. Thirdly, there is the issue of professional success and recognition. Does participation in mobility contribute to professional recognition equally for women and men? Fourthly, equality of remuneration and terms and conditions should be assured.

A three-fold approach is proposed. In the first place, all forms of direct or indirect discrimination should be identified and removed. It's relatively easy to handle direct forms of discrimination through legislation, but much more difficult to deal with the indirect forms. Secondly, account should be taken, in the design of policies and measures, of the diversity of women and men's experiences through the lifecycle. Thirdly, positive actions to remove existing inequalities should be taken.

The obstacles to be overcome fall into two main groups. The first concerns structures, procedures, criteria and rules which may contain gender biases within them. If these apply generally in science and research, they may as well apply in terms of mobility schemes. The second group of obstacles relates to the unequal share of roles and responsibilities between women and men and to inadequate systems of social support in the areas of reproduction and family care. Here mobility actions should be linked to other actions within research and science or in terms of employment and social policies.

Finally, some specific elements of a gender equality strategy in mobility could include:

- Improved information, particularly taking into account the diversity of women and men's experiences (professional, personal and family-related).
- Awareness-raising and information to host research centres on equal opportunities legislation, including guidelines and examples of good practice.
- Selection criteria for host institutions could include evidence of an equal opportunities policy (or, even better, action plan).
- A contractual requirement (social clause) that, for example, institutes and universities receiving European funds respect equal opportunities legislation. This could also include the promotion of women's equal participation, the meeting of agreed targets and monitoring and reporting in terms of equal opportunities.
- More controversially, the creation of a proscribed list of institutions which do not respect equal opportunities legislation.
- A monitoring system on gender equality in mobility.

Response to the Gender Impact Assessment of “Improving human research potential and mobility aspects”

KOSTADINKA IVANOVA SIMEONOVA

Academy of Sciences, Bulgaria

Mobility is an extremely complex issue to deal with. First of all, there is a set of questions that has to be answered in order to have a comprehensive picture of mobility. Who is mobile? Who is the typical mobile man or woman? Why does mobility take place? What are the motivations? What are the expectations related to mobility and are there any determinant differences? When does mobility take place? At which stage of the career or stage in life is mobility appropriate and for which purposes? Where is mobility addressed and more specifically, why are some countries preferred as a destination than others? For example, looking at the list of the host countries, it becomes evident that the UK, France, Germany and Holland appear to be chosen more frequently as hosts. It would be interesting to know why they are preferred. Is it because of their scientific excellence or because of friendlier environment or better social conditions? Sometimes I hear from colleagues that they prefer to go to the United States because of the friendlier social environment than in some European countries. I am sorry to say this, but this comes from field research that we have done in Bulgaria.

Another important set of questions refers to the process of mobility itself. How it is organised? Is the mobile researcher given access to the infrastructure and resources at the destination? As for the difficulties, it is perhaps the most discussed issue at every meeting on the topic. I also include the internal difficulties faced by the team organising the work of mobile researchers. How can they really make use of this mobility? Finally, of course, the “output” issues dealing with effectiveness, impact and efficiency of the mobility.

I would like to underline, that the majority of these questions have been addressed by the study, which addresses them from the point of view of the two main groups of determinants of mobility. The first group is related to the research field and disciplines. Here, the opposition between so-called “hard” and “soft” sciences is considered to be an important factor of mobility. The second is related to the social context, social structures in science and cultural traditions of the scientific community.

At the beginning of the study the authors characterise the project mainly as a “desk study”, that is, based on the analysis of documents and other literature. At this point, I must emphasise the impressive number of sources and references of about 500 papers and publications used and the sound interpretation of the knowledge that is already gathered on the issue. Furthermore, these are the newest publications, from the last decade. One of the big advantages of the project is that it represents the continuity of studying mobility. Continuity means that it’s based on the previous studies and exploits the relevant information and findings. As far as the mobility of female researchers is concerned, I find the reference to the Acker’s project about the participation of women in the Marie Curie Fellowship scheme on training and mobility particularly useful. I would also like to compliment the team for the recommendations, which in my opinion reflect perfectly the findings of the study, focusing on the previously identified areas of improvement of the policy. The applied approach results in a structured two-fold strategy that elaborates a good pattern to address different political issues. Namely, it discerns the problem of the access to mobility from the problem of the participation, and concludes with the problem of the assessment of the impact of mobility on the career progression and professional achievement of scientists.

The project has many other advantages, but I would like now to concentrate a little more on one aspect, which it seems to me, is not addressed sufficiently by the authors: the regional dimension of mobility. I think that the regional approach to mobility has to be extended further because, even from previous studies like the Acker's study, it comes out that there are clear-cut differences between mobility patterns, in the northern and southern countries, in terms of issues such as success rate, intensity, etc. For instance, the success rate in the northern countries is higher than in the southern. Also, the typical characteristics of the mobile women from southern countries are different from those of the northern countries. Many specific issues of mobility are due to the pressure of the research labour market in the southern countries. They also predict and pre-determine the big differences in mobility of female researchers and the orientation towards the big countries.

So, these findings convince me that the regional approach could help us to identify some specific obstacles for specific contexts and then to justify some specific recommendations dealing with the different regions. Another reason to focus on the issue is that within the line of the 6th Framework Programme, regional imbalances have been put as one of the major structural weaknesses of European research. In this respect, I really believe that a regional approach could be very useful in further research on the mobility of researchers.

It is rather clear why the region I am coming from is less covered by the study. I thus would like to add to the information that has already been collected, the specific problems of the so-called accession countries or Candidate Countries. They do have such problems, not necessarily gender-specific, but some are related to gender. Although geographically they are not a region, methodologically we can consider them as a single group, because they face the same problems of restructuring, deteriorating science and diminishing training capacities of their own research infrastructure. The funding of science in these countries is very low. It has diminished, dramatically – with some exceptions. I would mention that the Czech Republic and Hungary have been doing better these last few years, but in the other countries the insufficient level of funding has brought a worsening of their research infrastructure. Thus, we very much need the mobility schemes and the relevant policy in order to keep our potential at an acceptable level and to be able to face the difficulties of the shortage of human potential in the coming decades.

The other specificity of the group of Candidate Countries is the stronger links that exist between mobility and migration. Many institutional leaders in our countries still think that mobility is an entry point to migration and to brain drain. This explains why in some research institutions the attitude towards mobility is reserved, or that there are certain constraints in terms of the time spent abroad for research. This is common practice in Bulgaria. For example, in our academy, we are limited to 18 months per six years, and I am sure that such a policy is not an exception. So, in our complicated situation, mobility is still considered as a potential risk for the national scientific system, although this is a misleading vision and not shared by everybody in research and development (R&D) management. I think it could be eroded by using the available instruments properly. For this purpose, the European Commission should extend the return grant system for this region. Such a policy could help to overcome the sceptical attitude towards the mobility of researchers.

The issue of “gender and research” is of particular importance for the Candidate Countries because of the higher feminisation of the East European research system. This is a common heritage from the past and an outcome of the migration processes in science. Everywhere in the region the percentage of women in research is increasing. This is not due to any specific policy but to the bigger outflow of men to other occupations, with a small exception for Hungary, where the

increase is parallel to the general increase in the number of researchers since 1998. Nowadays, the scientific profession is not as attractive as it used to be. Men prefer to turn to other professions, such as business and, at least, not to stay in science. As a result of this migration, our R&D institutions have a lot of women with low remuneration, deteriorating infrastructures and ageing staff, which is not good for our scientific systems.

To illustrate the participation of the Candidate Countries I would like to give you some data about their participation in the mobility scheme within the 5th Framework Programme. Data show that, between the first and second call, there was considerable progress in the participation from Candidate Countries. According to the annual report of the European Commission on the Marie Curie Fellowship for the year 2000, the number of participants in the Marie Curie Fellowship increased over 3.5-fold, from 82 people in the first call to 277! This impressive increase can be explained firstly by the activity of the Commission and also by the activity of the National Contact Point groups. We have a series of so-called information days, which are very helpful and which improve the dissemination of fresh information. The involvement of representatives of potential host countries plays a decisive role. We recently had an information meeting, organised by the National Contact Point within the Bulgaria/Austria-partnership for research. Two people came from the International Bureau for Science and Technology of Austria to inform Bulgarian researchers about the possible host institutions for industry and academic research in Austria. They also presented a complete picture of Austrian science, including the operating system of their R&D institutions, the conditions provided by the different institutions and so on. After the presentation, personal consultations were offered to those researchers who had shown particular interest and had special questions. In my view, this is a very efficient way to raise interest and such initiatives should be encouraged. Going back to the observed increase in participation in Marie-Curie Fellowships, I think it could be explained by the synergy of efforts of many actors at national level, at European level and also individually.

The Annual Report I mentioned has data about the applications and selected proposals by country. For the Candidate Countries the average success rate is 39.1 and for the whole European Union it is 47.5. The comparison shows that the Candidate Countries are still below the average, although some countries are doing better, for example, Romania, Estonia and, with a 100% success rate, Lithuania. But in these exceptional cases the number of applications is very low. Nevertheless, one should remember that FP5 is the first programme in which countries from this region participate on an equal basis. We are still in a learning process. We have to improve, of course, but so far, the success rate is not so bad. I personally feel that the progress is noticeable. I don't know what the assessment of the Commission would be on this.

To be more specific about female researcher's participation in the mobility scheme, it was very difficult to find disaggregated data. I extracted some data on women's participation from the Cordis database. The figures represent the current individual Marie Curie Fellowship, by country, in 2001. The average percentage of women in the total number of Marie Curie individual Fellowships from the Candidate Countries is 28%, which is also below the European average of 37.3%. So, the participation of women from the Candidate Countries is still far below the average participation of women from the Member States.

Regarding the obstacles to mobility, I would like to raise a question relating to some observations in the final part of the study. It struck me that there is some contradiction between the findings of this report and Acker's report about age limits being an obstacle of mobility. I think it is important to clarify this point. To quote from the Acker's report page 187: "The finding of the research did not

suggest that an extension of the age limits would have a significant impact on the female application rate as such". The Acker's study is a field study based on interviews and reflects the opinion of the respondents and interviewed researchers. So, the finding of the field study is that age limit is not an obstacle to mobility. The conclusion of the Gender Impact Assessment Study is the opposite. Within the approach classified by the authors "the identification of the problem in general terms" is the conclusion that the age limit is one of the first obstacles to the mobility of women. I do agree with this conclusion and I'm very glad that the Commission has already taken the relevant decision to overcome this obstacle. Gender specific obstacles are recognised mostly as related to social difficulties and family duties. However, there are many problems related to scientific life itself. In particular, this refers to the effectiveness and impact of mobility. We know from the research that has been done that the expectations on mobility are very closely related to the professional career. The interesting question appears to be: is there any gender difference in the impact of mobility on professional careers and what are the expectations of both sexes?

I will briefly comment on the empirical results from a study not specifically focused on Marie Curie Fellowships, nor on mobility. We carried out a small case study covering most of the institutes of the Academy of sciences and some universities, on the impact of international co-operation, not only mobility, but also the participation in networks, common projects, etc. The methodology consisted in providing the respondent with a set of statements and asking him/her for agreement or disagreement. It is interesting to point out that our findings support the conclusion that the expectations are very different according to the sex of the respondent. When we take the impact on so-called research performance – publications, participation in international conferences, meetings, etc. – there is little difference between male and female researchers. About 80% of our respondents agree on the positive impact of international co-operation and mobility on their research performance. There is a very strong difference in the answers when we tackle the issue of the research career: 65% of women say "No", there is no positive impact on their research career and 81% of men say "Yes" there is a positive impact. My short comment on this will be that mobility per se does not predict the professional career of female researchers if the general context, the general attitude, the institutional culture, the values, do not change. Our approach to this problem needs more complexity. The improvement of only one factor such as mobility is not enough to expect radical positive changes.

To conclude, I have some recommendations for the Commission, particularly regarding information for analytical purposes. There are very few tables in the annual report of the Marie Curie Fellowship presenting sex-disaggregated data. In the current report, I found only two tables. This cannot be very useful for monitoring or analytical purposes. For example, there is a table, which lists 19 reasons for non-eligibility of Marie Curie Individual Fellowship proposals. These include "grant duration too short", "age over the limit", "applicant not an established staff member", to mention a few. If we had sex-disaggregated data, we would know the main reasons for women being ineligible and then, the respective policy would be able to address the issue, for example, better access to information or a change in the age limit, etc. Another table in the report, which could also be very instructive, looks at mobility patterns. It gives researchers' host country and their preferred countries. Unfortunately, one cannot see whether there are any substantial differences between women and men participating in mobility, which could bring answers to the question of why such differences exist. The other important indicator needing sex specification is the age structure.

Any improvements of the monitoring system will serve as an impulse for the collection of additional data, which could be used in further studies of mobility by gender, aiming finally at the improvement of the equal opportunities policy of the European Union.

NICOLE DEWANDRE & TANYA LEIGH

Women and Science Unit, Research Directorate-General, European Commission

The Gender Impact Assessment Studies were launched with a view to examining how gender issues are being taken into account in the European research programmes, and making recommendations as to how the integration of the gender dimension could be improved.

1. A synchronised, decentralised learning process

The studies were carried out by seven research teams, representing universities, research institutes and companies specialised in gender research, selected following an open call for tender. It was a synchronised, but decentralised, operation. The work was carried out in four stages, which were addressed in parallel by the research teams:

1. Defining the analytical framework on the basis of existing “gender studies” literature in the field covered by the specific programme.
2. Analysing the implementation process of the specific programme, including the participation of women and men and the mainstreaming of gender.
3. Assessing to what extent, and how, the gender dimension has been incorporated into the content of the programme.
4. Making recommendations for the better integration of gender issues into the 6th Framework Programme.

These stages resulted in separate Working papers, from which key elements were combined to produce the series of final reports, published by the Commission, for the Gender and Research conference. A separate Synthesis Report was also published, providing an overview of the key findings and recommendations.

The Gender Impact Assessment exercise involved a great deal of work, and was not always straightforward. The starting points of the Commission officials involved (even those who were “gender-friendly” at the outset) and of the contractors (gender experts) were often very far apart. It was a learning process for all involved, and one that, happily, by the end of the contract, led to the gap between these positions being reduced.

“When the first draft of the report came out, it caused a reaction of shock within the Commission service, not in the least because of its unfamiliar terminology, with terms like gender sensitivity and gender blindness. From these experiences, the official responsible distilled some relevant points for the gender assessment process: the need for such an assessment to be done by “outsiders”, and the need for specialists to find “non-alienating” language that can be understood by non-specialists, and that is able to persuade them.”
(Quality of Life session – rapporteur: Sarah Bracke, University of Utrecht, The Netherlands).

2. A “snapshot” of gender in European research

This paper does not attempt to summarise all of the results. It is rather a “snapshot” of some of the insights provided by the studies. Detailed descriptions of the work undertaken and the results obtained are set out in the contractors’ contributions in the previous sections.

The study of gender in the *life sciences* dates back to the late 1970s and, since then, feminist research has continued to point to the gendered production and use of scientific knowledge in this field. The literature review carried out in the framework of this study showed that the thematic areas covered by the Quality of Life programme⁹ are well-represented in current gender research. The potential and relevance of incorporating gender into life science research is obvious, but the research community has yet to adopt a systematic approach to this. In terms of the participation of women in European research projects in the life sciences, almost 60% of projects are run by teams comprising only one woman or no women at all. With regard to the research content, of 240 projects analysed, 66 potentially had a gender dimension, but only 14 of these had explored this aspect satisfactorily. 79% of the projects were considered “gender blind”. As an example of how life science research is failing women, the study pointed to three trends, which currently sum up the way in which the gender dimension is considered in health research, and which constitute a barrier to gender sensitive health care:

- An increasingly medical approach to natural stages in a woman’s life, for example, childbirth or the menopause, thus reducing normal processes to physical complaints needing medical intervention.
- Attributing physical complaints suffered by women to psychological causes in non-diagnosed chronic illness, such as fatigue syndrome, headaches or insomnia, which leads other factors to be neglected.
- Women-specific health issues are not taken seriously and are not treated seriously (for example, neglecting the impact of sexual violence).

In the *information society study*¹⁰, the literature review highlighted a lack of comparative studies and primary material across Europe, against an abundance of studies from Canada and the USA, where advanced research on the information society is combined with a strong academic interest in gender issues. Current work in this area has looked at gender-specific issues relating to the “digital divide”, showing that women generally have less access to new technologies than men do and that there is a divergence in the level of confidence and in Information Technology (IT) skills between women and men. The study argued that the participation of women in the programme is very low due to its very technological approach and the predominantly male “public face” of the programme in promotional materials. In terms of content, the study highlighted that projects addressing technology for end-users had most potential for incorporating gender issues, as they could cover questions of affordability, gendered use of technology and gender imbalance in the information society. Unfortunately, few of these projects, and of those focusing on the socio-economic dimensions of the information society, gave any real consideration to gender issues. The study highlighted very clearly that, if no specific explicit attention is paid to the gender dimension, information technologies tend to reinforce existing stereotypes and segregation, at user level (with regard to the internet for example), and in the labour market. The neutrality of information technology thus has an indirect negative impact on equality.

⁹ Quality of life and management of living resources programme.

¹⁰ The IST study assessed the User-friendly information society programme.

“Sometimes women’s specific needs get narrowly reduced to the conciliation of family life and working life. While there is no doubt that this is an important issue, reducing examples of women’s issues – or even gender issues – to this specific set of problems shows that knowledge about the ways in which gender systems work and collude with other sorts of exclusionary structures is largely disregarded. This is a point underlined by the study: to ensure women’s participation, but also to improve the understanding of the gender system, thereby to promote research, specifically on women’s experience and use of technology at all levels.” (Information Society session – rapporteur: Maria Puig de la Bellacasa, Université Libre de Bruxelles, Belgium).

The energy sector is male-dominated, and is largely failing to attract women graduating with the appropriate technical qualifications. This is reflected in the level of participation in the energy sub-programme¹¹, where less than 10% of those involved in proposals for European research projects are women. The gender dimension, which is present in energy research relating to developing countries, is almost totally non-existent in European research. The study pointed to gender differences in energy priorities and choices as an area that has not been given due attention. Another potential field for study is that of energy poverty, which affects women as heads of single parent households and as pensioners, in higher numbers than men. In general, among European research projects, there is a very limited interpretation of the socio-economic aspects of energy, which means missed opportunities in terms of the gender dimension. The energy study met resistance both from within Commission services, and also significantly from the wider energy world. There were, for example, only three replies to a survey in which a thousand questionnaires were sent out. This resistance from the sector to respond to a request for information, is a sign in itself. This, and the heated debate that unfolded during the conference session, are clear indications of the work still to be undertaken in this field.

“The interviews conducted showed the male image of the sectors studied to be very strong. To illustrate the point, the contractor told the anecdote of a manager saying to a woman: “It’s been five years since I had such an intelligent girl as you”. This would never have been said to a man. The contractor explained the lack of response and interest shown in the subject of the study, as follows: to get into the energy sector, it is best not to get involved in parity questions, because if you do, it is bound to lead to problems. This is why women prefer to set up their own companies, because it is difficult to fight prejudice. With their own company, they have a simpler environment, where they don’t have to fight, which is easier for them to work in.” (Energy session – rapporteur: Muriel Andriocci, University of Toulouse-le-Mirail, France).

The literature review of the environment sub-programme¹² showed that gender research within environmental research in Europe, in contrast to the USA, is largely restricted to fields dominated by social scientific approaches. For example, there are more studies looking at the gender dimension of environmental education than those investigating gender aspects in climate change. The approach of the environment sub-programme, which in effect allows for a broadening of the research horizons with multi-disciplinarity and multi-sectoral activities, provides an opening for the integration of the gender dimension. Despite this, from a sample of 2 125 proposals analysed, only one contained the word “woman”. The activities remain very technology-based, though there is clearly much at stake for women, particularly in the context of sustainability research. The inclusion of gender in sustainability objectives needs to be formalised, in order that gender issues are taken systematically into account in this vital area of environmental research.

¹¹ Energy sub-programme of the Energy, environment and sustainable development programme and the specific component “Research and training in the field of energy” of the Euratom programme.

¹² Environment and sustainable development sub-programme of the Energy, environment and sustainable development programme.

“Whereas gender research could function as a crucial bridging concept in the sustainability approach, linking the fields of the social-scientific and the natural-scientific, the researchers argued, at present this is clearly not the case.” (Environment session – rapporteur: Sarah Bracke, University of Utrecht, The Netherlands).

Both the results of the study, and the discussion in the conference session, have clearly shown that *international co-operation* in research is an essential and strategic tool for promoting equality beyond Europe. This study also showed how, even when gender is specifically referred to in the Work programme, as is the case in the INCO programme¹³, it is not necessarily followed through in the implementation of the programme and research projects funded. “Gender” has a tendency to “evaporate”. This is often because research adopts a narrow technical focus, and fails to recognise the relevance of gender to the subject under investigation. For example, the design of water wells can be regarded as a purely technical issue without gender implications. However, if researchers situate the technology in the social context in which it is to be applied, there are clearly gender issues to be looked at. The study drew attention to the importance of multi-disciplinarity and a socio-economic approach to research, if gender is to be successfully integrated as a cross-cutting dimension.

“Summing up, we can say that mainstreaming is at an embryonic stage (in the INCO programme) and is an on-going process. This is not surprising, because gender has been included only recently. Accordingly, it is more an approach in terms of equal opportunity. However, mainstreaming goes beyond equal opportunities.” (INCO session – rapporteur: Muriel Andriocci, University of Toulouse-le-Mirail, France).

In the *innovation* programme¹⁴, the study showed that the majority of participants without children (75%) are women. The majority of divorced or separated participants are also women. It is often said that women have difficulty balancing family and work life. The survey carried out within the innovation study confirmed this phenomenon from another perspective. The participation of women-led SMEs in European research projects, whether as co-ordinators or members of consortia, is less than 7%. The study pointed to the difficulties encountered by women when operating as entrepreneurs at an international level, as they do not have established networks to draw upon. It also showed how women-led SMEs function differently to those run by men. They tend to be smaller and examples of different working approaches include a tendency to work with women and to involve associates rather than take on employees. Because women run their companies differently, they have different needs, and innovation policies need to take these into account if women are to be supported equally in their innovation strategies.

“Barriers with a gender component are found at all levels: in the private sphere and personal attitudes, in the public sphere and traditional roles, at the level of social structures (organisation of family and working life), in education. Yet specific gendered barriers appear in business environments: difficult access to finance and to managerial know-how; insufficient training and a lack of role models; inadequate information due, notably, to difficult access to networks and foreign markets.” (Innovation session – rapporteur: Maria Puig de la Bellacasa, Université Libre de Bruxelles, Belgium).

In the *mobility* field, there is a lack of data allowing a detailed analysis of the gender dimension. The study¹⁵ drew up a list of gender-specific obstacles to mobility, and highlighted the fact that these are

¹³ Confirming the international role of Community research programme.

¹⁴ Promotion of innovation and encouragement of participation of small and medium-sized enterprises programme.

¹⁵ The Human potential study reviewed the mobility aspects of the Improving human research potential and the socio-economic knowledge base programme.

not only due to “family” issues (raising children, partner’s career taking priority), but also to the organisation of scientific research and to institutional culture. For example, the fact that women are more likely to be in precarious professional situations, with temporary contracts, is a deterrent to their taking up positions abroad, as professional reintegration is more difficult. Another factor is that women are less likely to benefit from informal networking, and the information about research opportunities abroad that this brings.

“Many obstacles seem to be linked to the structures of academic institutions, to the public support system and to the level of cover provided by national social security schemes (types of care provision, recognition of social rights in family policies) and to family structures (sharing the roles). The formal and informal rules and criteria governing science and research, in general, can lead to mobility scenarios which contribute to inequality between men and women.” (Human potential: mobility aspects session – rapporteur: Selma Bellal, Université Libre de Bruxelles, Belgium).

A multi-disciplinary scientific approach, including a socio-economic dimension, is essential to the integration of a gender dimension, but not sufficient in itself. The study showed how socio-economic research is often characterised by a tendency to generalise, with the use of universal categories such as “the public”, “employees”, “citizens”, “consumers”, “children” or “users”. Another feature of many socio-economic research projects is the lack of attention to the human dimensions of the structures and processes being studied. These “conceptual silences” mean that opportunities for addressing gender differences are often missed, even when the themes being studied are of obvious social relevance. Whereas in the other fields there is no clear correlation between the presence of women in the project partnerships and the integration of the gender dimension in the project content, this is not the case in the socio-economic key action. Here, the study showed that, in the sample examined, 97% of the proposals put forward by partnerships which are more than 75% male are gender blind. However, in 86% of the proposals put forward by majority female partnerships, the gender dimension is taken into account.

3. One recommendation: mainstream gender

Throughout the reports, one recommendation comes back again and again: to mainstream gender throughout the Framework Programme, that is to ensure that it is taken into account explicitly at every step of the process, to guard against the “old boys” networks being the only beneficiaries of the new instruments.

In practical terms, this means ensuring that gender is incorporated into each of the key steps of the process. Gender needs to be present in the Work programme, clearly, but it also needs to be translated and explained explicitly in the information materials. The evaluation process needs to be reviewed, ensuring gender expertise in the panels, briefing the evaluators on the subject and allowing for gender to be appraised through the evaluation criteria. At the level of research implementation, project co-ordinators need to be mobilised regarding the participation of women and the integration of gender in research content.

Other recommendations include:

- Ensuring that the hierarchy makes the link between mainstreaming and the implementation process.
- Training for staff members (the studies have in themselves already served as a tool for raising awareness among Commission officials, with internal seminars having been held to present and discuss the results).

- Supporting and developing networks to ensure that there are “nice ladies” networks alongside the “old boys” networks, promoting mentoring schemes.
- Carrying out studies to develop indicators and a better understanding of what is at stake, drawing perhaps on examples from the United States.
- Undertaking similar studies at national level because, clearly, the gaps identified in the European research programmes reflect a more general problem in the wider scientific community.
- Working to find a balance between family and work life; but bearing in mind that it is illusory and hypocritical to imagine that women will themselves be able to find a solution within their personal lives, as long as the professional system continues to demand so much from them.

Finally, on the question of quotas and positive action, the 40% target for committees and panels is widely supported by the Gender Impact Assessment Studies. Positive action measures, such as a bonus for projects submitted by women, or a budget reserved for women, have been recommended by those working extensively on this question, who have concluded that there are no alternative solutions. However, as highlighted during the conference debates, many continue to express scepticism and reluctance in this regard, meaning that it only makes sense as long as high quality of research is guaranteed.

“If the European Union is leading the way in developing a policy of awareness-raising in this field, it must recognise the obstacles and resistance (both academic and political) to equal participation in research. This reiterates the need for instruments that are more powerful than simple declarations and demonstrates the relevance of positive action measures as a means of strengthening women’s participation in scientific research.” (Human potential: socio-economic aspects session – rapporteur: Selma Bellal, Université Libre de Bruxelles, Belgium).

4. In conclusion

Overall, the Gender Impact Assessment Studies have shown that the efforts to increase the participation of women in research have been largely successful. Even though in many cases we are far from achieving the 40% target for women’s participation in panels and committees, this target has nevertheless served to increase the numbers of women involved across the 5th Framework Programme.

However, as regards the integration of gender beyond the above objective, the results of the Gender Impact Assessment Studies are much more disappointing, even in scientific areas where the gender dimension is well documented. Science continues to resist gender, as do the scientific community and the decision-makers. Our aim now must be to draw from the recommendations of the studies in the preparation of the 6th Framework Programme, to ensure that gender equality is seen to be an integral and essential component of good research practice.

The background of the page features a series of light gray, wavy, horizontal lines that sweep across the upper half. Scattered throughout the lower half are several light gray, five-pointed stars of varying sizes, reminiscent of the European Union flag. The overall aesthetic is clean and modern.

CHAPTER 5

BENCHMARKING THE PROGRESS OF WOMEN IN SCIENCE

The thematic session “Benchmarking the progress of women in science” addressed policy issues. The speakers were asked to outline the different approaches taken to promote women in science, the evaluation methods in use and any results already available. The speakers were able to present initiatives set up at institutional, national or international level, including looking at the impact of European Union policy.

Integrating processes in eight Swedish research financing authorities – gender research case study

LENA TROJER

Blekinge Institute of Technology, Sweden

1. A political opportunity for research

A special window was opened for gender research policy, at a national level, during 1997-2000, when the Swedish government created conditions for explicit work on the important issue of integrating gender research within the Swedish research financing authorities. I will present some experiences from the work of the Committee for Co-operation of eight Swedish Research Councils established by the Swedish Parliament. The specific assignment of the Committee was to further support and co-ordinate activities among the Councils, with regard to interdisciplinary research, gender research and gender equity. This presentation will focus only on gender research.

The Swedish Research Bill was, at the time, exceptionally favourable to gender research and to interdisciplinary research. The 1996/1997 Research Bill and the corresponding Budget Bills of 1997 and 1998 were very clear about the importance of integrating gender research perspectives into the disciplines, and giving gender research a regular place within the research funding system. The citations below show some of the content. The Research Bill (1996/1997:5, p. 55) stated, “It is the view of the Government that it is of significant importance to integrate gender research into established research disciplines and for the ordinary research financing authorities to allocate resources to gender research”. This was followed up in the Budget Bill (1996/1997:1, p. 147) which declared, “Gender research ought to be integrated into ordinary research and in the research financing authorities, that is, the Research Councils ought to allocate resources also to gender research. Every research authority is obliged to participate in executing the measures and in meeting the stated goals within its field of responsibility”.

2. Committee for Co-operation of eight Research Councils

Knowledge about relevant and effective strategies for the integration of gender research into research councils was lacking. Therefore, the most important mission of the Co-operation Committee was to initiate integration processes and, simultaneously, develop integrative competence. The Committee for Co-operation consisted of the Presidents or Vice-Presidents and the Scientific Secretary-General of the following eight Research Councils:

- the Swedish Council for Planning and Co-ordination of Research (FRN);
- the Council for Research in Humanities and Social Sciences (HSFR);
- the Medical Research Council (MFR);
- the Natural Sciences Research Council (NFR);
- the Council for Engineering Sciences (TFR);
- the Council for Social Research (SFR);
- the Swedish National Space Board (SNSB);
- the Council for Forestry and Agriculture Research (SJFR).

The government appointed an external President for the Co-operation Committee, a professor in gender research (the signatory). In order to avoid any confusion, the situation concerning the

Swedish Research Financing System changed after the period of this initiative. A new authority structure was launched at the beginning of 2001. The assignment of the Co-operation Committee was very clear about separating gender research and gender equity activities. This separation was an important prerequisite. Gender research is an academic field of study which needs to be integrated within different research areas. Gender equity means equal representation of women and men in the internal and external activities of the Councils.

3. Expert Group for integration of gender research

Less than one year after the creation of the Co-operation Committee, an Expert Group for integration of gender research, within the eight Councils, was launched with the aim of fostering the development of priority and decision structures in order to facilitate the evaluation and support of gender research within the eight Research Councils. The core issues were the following:

- identification of different understandings and different developments of gender research within the different disciplines of the eight Councils represented;
- frameworks and processes of evaluation;
- alternative research processes;
- the impact of the theoretical and methodological development of gender research in mother disciplines, that is the transformation of mother disciplines.

The members of the Expert Group included representatives from the eight Research Councils as well as resource persons from three Nordic countries – Sweden, Norway and Denmark. There were working meetings in Stockholm, seminars in Norway and Denmark and, finally, a Nordic conference in Stockholm in September 2000. The result of the work of the Expert Group is presented in the report “The Relevance of Gender Research”. This report can be seen as a manifestation of the status of gender research and gender research policy in Sweden, and in some of the Nordic countries, in the late 1990s and beginning of 2000.

4. Some conclusions

The conclusions may seem self-evident. However, we have to keep in mind that these Research Councils were only starting to spell out the words “gender research”. For example, the Swedish National Space Board was responsible for knowledge areas within which it was possible to integrate gender research. Nevertheless, gender research was a new concept for them.

- It is important to confirm gender research as a field of scientific qualification. This is not obvious in the presented context, as we easily slip into discussions about gender equity. Although gender equity is essential, we must also put on the agenda that gender research is constituted by scientific competence.
- Gender research is developing quickly, nationally as well as internationally.
- Gender research is generating theory and benefit in a variety of contexts.
- Gender research has a different focus and theoretical framework within different disciplines. Identification of gender research within the fields represented by the eight Research Councils has started and has manifested itself in various ways. Examples of the different disciplines are given in the report.
- In order to integrate gender research, we need explicit research priorities. The experience confirmed the significance of the Research Bill which needs to be very explicit in giving priority to gender research. Such research policy signals are important for transformative work in bodies like research financing authorities.

- Gender research integration is a challenge to the hegemonic knowledge system.
- A double strategy is needed. We need both an autonomous body in the research financial system and a concrete and explicit working of integration into the different Councils.
- The conditions for integrating gender research, competence and co-ordination among the research financing authorities are long-term efforts.

The Expert Group summarised the needs for integration processes of gender research. First of all, a long-term dialogue between researchers with adequate competence and the relevant Council is necessary in order to identify jointly the relevance of gender research in the specific field of the Councils' responsibility. A lot of work has to be invested in this dialogue. It is not enough to put a book in the hands of the Council staff and expect them to carry out a project supporting gender research. Secondly, we need an explicit and anchored policy of gender research integration within the research financing authority, which brings us back to the important policy signals. Finally, we have highlighted the importance of having gender research applications evaluated by gender research experts in the specific scientific fields. This might seem self-evident, but experience shows that it is not the case.

It was very fruitful to work in the Expert Group with colleagues from Denmark and Norway. The exchange of experiences between Research Councils and other research financing authorities at Nordic, European Union and at international level is important in order to strengthen the work of integration and transformation.

Bibliography

- Research Bill, Research and society, Swedish Parliament, Prop. 1996/1997:5.
- Budget Bill 1997, Swedish Parliament, Prop. 1996/1997:1.
- Trojer et al., *The Relevance of Gender Research, Report from the Expert Group for Gender Research Integration under the Committee for Co-operation between Swedish Research Councils*, Stockholm, September 2000.

Women in science: the Italian legislative and institutional framework for gender mainstreaming

FRANCESCA CANTÙ

University of Rome and Ministry of University and Scientific Research, Italy

1. In quest of visibility: an introductory remark

In Italy, in the recent past, the presence of women in University and in the research field has generally been uneasy. Nevertheless, under their guidance, a remarkable volume of knowledge and practices, an important part being on Women's and Gender Studies, was accumulated. This showed a lack of institutional recognition, or very weak institutionalisation, in the past. Some examples: absolute curricular options; teaching without reward; placement of their topics outside the official courses; didactics carried out by the lower levels of teaching or unpaid apprenticeship and research projects evaluated as fringe or scarce legitimate problems. As such, women's and gender studies were generally judged as an anomaly – which caused a delay in comparison with the situation of other European countries. Nonetheless, Italian (female) researchers have been divided among themselves as to whether or not it would be useful to push for an institutional recognition of these studies. How to bring about a cultural and political change with regard to the appreciation of gender research and women's promotion in science, was not a crucial point in the scientific and academic debate, in spite of (or perhaps, according to) the evident male predominance in that field.

2. 1996-1997: a turning point

In 1996, a woman was appointed Minister for Equal Opportunities for the first time in Italy, and she was responsible for important mainstreaming functions. In March 1997, the Italian Government adopted a relevant Directive with the following main aims:

- empowerment of women to create the conditions for an increasing presence of women in decision-making bodies;
- raising awareness on gender diversity;
- development of employment policies including the reduction of occupational segregation and help to reconcile work and family life.

The Directive resulted in the consultation of (female) researchers' associations and the creation of favourable conditions for women's access to the research field and to university chairs. In 1998, following the proposal of the Minister for Equal Opportunities of the Prodi Government, a working group on "Culture of the Differences and Women Studies in the University", was appointed by the Minister for University and Scientific Research. The aim was to analyse didactics and research problems, along with professors' careers, from a gender point of view.

From the beginning, the working group could identify, in the on-going reform of the university system, the needed positive conditions to make women's contribution relevant in defining the route for change. Strong opportunities to build up a culture, not merely "universal", "neutral", "homogeneous", but with attention to the differences (between men and women, but also between generations, traditions and cultures) have been identified in the autonomy given to universities. This is particularly the case in the organisation of didactics (educational plans, flexibility in curricula,

methods of evaluation, structures of orientation and tutoring) and in the spaces left to the different components of the academic world to test and to introduce innovations.

For the first time, in the Italian context, the need to use sex-disaggregated data and gender indicators in assessing the performance of universities, both in teaching and research, was brought to public attention. Women have been increasing their level of participation in higher education and have carried out a significant “overtaking”. In fact, women now constitute more than half the student population; their percentage of spin-off is lower (10.3% as compared to 15.4% for men) and female graduates outnumber male ones (55.2% of all graduates). They also perform better than their male counterparts in all academic fields and graduate summa cum laude more often than men (26.9% as compared to 17.7% for men). All this makes the gender gap in scientific and academic careers even less legitimate. Asymmetric data, or rather discriminating data, could not be highlighted without raising the issue of “equal opportunities”. Women are less than one third of the academic staff in total and they advance to the top levels of the career with difficulties: in 1999/2000 they were 41.3% of all researchers, 29.4% of associate professors and 11.5% of full professors. Even though, in recent years, there is a slight increase in the presence of women among the successful applicants, women and men do not have the same management positions in universities: women are absent in debates which shape policy and do not participate equally in decision-making. Every academic year, 23.8% of men are expected to be appointed to positions such as rector, pro-rector, president, vice-president and head of department; women’s prospects of achieving such offices are about half that of men (11.8%).

The problem of ensuring a gender balance in the recruitment system was almost ready to be faced when Mr Prodi’s government was brought down. The new Minister for University did not renew the working group and it was dissolved. The disappointment was very strong. However, we can make some interesting evaluations about this phase. The question of promoting women in academic and research fields had been put on the political agenda. The working group had highlighted the need for gender mainstreaming. The constitution of the group inside the Ministry of University and Scientific Research had given its members an institutional point of view. Finally, the experience of women and gender studies in Italy, which had been developing in a rich and open way in international relationships, but without any official character, was introduced as an important target. This will allow for the development of a more “European” gender equity and support, thus creating a European dimension within the university system.

The capacity to read institutional strategies and the need to find new tools for analysis and intervention represented a new context for women who were often very busy in scientific, cultural and social fields, but used to being “transparent” in their university and research institutions. At last, a new synergy of targets and means, among gender problems and policies of equal opportunities, was being tried. This was fundamental for creating new conditions for gender mainstreaming.

3. New tools for new trends

The newly appointed Minister for University and Scientific Research did not show a great deal of interest with regard to gender issues. He adopted the usual academic policy of appointing only men for top management positions and top committees. It was necessary to change course. At the beginning of 1999, the new minister for Equal Opportunities appointed a counsellor for university and research policies. In this way, the centre of action shifted towards the Minister for Equal Opportunities, who started to play a leading role. The action of gender mainstreaming was included in a new institutional framework. Relations with the Ministry of University and Scientific Research

were maintained inside the action of the Government, partly because the procedures of reforming the University and the Research Agencies were reaching the legislative phase. However, the Minister for Equal Opportunities and her adviser made a strategic choice to adopt a new policy. Their privileged institutional partner was not the “centre” of the university and research system (the Ministry) but, if we may say, the “outskirts” of the system, representing the individual universities, that is to say, the Rectors gathered in the Conference of Rectors of Italian Universities (CRUI). This choice happened to be, and still is, extremely interesting in view of the growing autonomy given to universities by the University Reform.

On 18 December 1999, an Agreement was signed between the Minister for Equal Opportunities and the Rectors’ Conference, providing support for the gender dimension in scientific research and greater gender equity in the development of professors’ careers. A steady co-operation was formally established with the appointment of a new kind of Rector’s delegate, namely Delegate for gender studies and equal opportunities. All the appointed Delegates form a Conference that meets periodically with the aim of promoting gender research, specific evaluation criteria and incentives concerning women’s participation in decision-making. The Conference forms a network, which brings together formally independent institutions in a long-term relationship involving information exchange, interactive programmes and direct co-operation. Moreover, according to their position, and in the performance of their duties, these Delegates express the belief that gender-mainstreaming charges have to be related to the policies ruling universities.

At present, half of Italian universities (36 out of 72) have a Delegate for gender studies and equal opportunities. There were already Committees for Equal Opportunities operating in many universities, appointed by the law of 1991, and ruling the labour contracts in the civil service, whose members are representatives of the academic body, the administration personnel and even the trade unions. This mixed composition complicates their operation but many Delegates are also acting as chairman in these Committees, which increases their visibility and effectiveness. The Committees are entitled to promote inquiries, sex-disaggregated statistics to monitor progress towards gender parity, positive actions, teleworking, care services for children and directives against sexual harassment. Similar Committees are also working in Public Research Agencies.

The Agreement between the Ministry of Equal Opportunities and the Conference of Rectors of Italian Universities emphasises the European dimension of the promotion of gender equality. There is strong support from the European institutions to build up policies for gender equality, in order to support the full integration of women at all levels of political, institutional, social, economic, scientific and technological life, as an unavoidable resource for development. The action of mainstreaming in the university system must be seen as a solution to this. It will allow more reasonable levels of democratic participation and fairer social integration. We can thus identify new areas of educational training and research programmes in many fields that may concern public policies, public administration, the labour market, information and communication, quality of life and sustainable development, enterprise creation and growth, welfare reform, health care and the strengthened fight against discriminations. All these gender mainstreaming policies have become strategic factors of innovation. In the conceptual framework of the Agreement, the necessity to carry out mainstreaming policies is linked to each university’s capacity to answer to the needs of a new society. In this, innovation, as a crucial factor of change and growth, is an interactive process based on the potential of human resources existing in a plural society. A better gender balance, in education and training, in decision-making, in the handling of models of organisation and operating instruments, is the best way to manage such resources.

The Agreement settles many operational objectives and binds the Rectors and the academic management to do their best to carry them out. Among the listed objectives we can highlight are:

- developing new interdisciplinary “curricula” in order to build up new competencies for evaluating and monitoring gender impact in different policy areas;
- improving the gender dimension in scientific projects, identifying the potential for a gender dimension in research;
- career guidance in order to avoid gender stereotypes and the dominating social models about women’s role in family and society that abound in cultural and professional projects drawn up by young people;
- special support for women’s participation in telecommunications and high-technology training courses;
- improving the international and European dimension of all these enterprises and activities, also considering the more ambitious target to address the co-operation in these fields towards the creation of European models and university degrees.

The various initiatives that were promoted as pilot projects include: academic degrees and masters in gender studies or equal opportunities; Ph.D. degrees on women’s history or feminist studies; research and documentary centres concerning gender mainstreaming or gender issues; collection of sex-disaggregated data and specific studies and inter-disciplinary research in social and economic areas. Some universities are trying to extend the model of the Agreement to their relations with Local Agencies (Regions, Districts, Municipalities). In fact, the Ministry of Equal Opportunities succeeded in binding 10% of the financial support awarded to the Italian Regions by the European Social Fund to the monitoring of progress towards equal opportunities targets. It is a large amount of money and the local Agencies often do not spend it because of their lack of competence and instruments. Universities can play a major role in ensuring appropriate knowledge and skills related to gender issues and equal opportunities, training and awareness-raising actions, classifying and selecting projects, providing the collection and analysis of appropriate data or the elaboration of equality indicators. Thus, gender studies and gender research are able to bring new strategic resources to the academic institutions and for this reason, finally, many universities begin to look at them favourably. It is a totally new procedure that requires women to develop a new capacity to move in an institutional framework. All this has been made possible because the action of mainstreaming has registered an interesting result at a legislative level.

The Reform Law of the Italian University came into force in November 2001. As a result, the knowledge arising from gender studies and gender research in the fields of economic, statistical, social, administrative, linguistic and literary, psychological, pedagogical, medical and historical sciences, has been inserted explicitly into the formative aims of the entire university system. In this way, new academic degrees can be planned, new disciplines admitted, new needs for skill formation fulfilled in order to ensure gender mainstreaming and appropriate knowledge and skills in equal opportunities issues. Research institutes and universities ought to bear in mind the objective – now institutionalised – of specialising in gender issues with a new transdisciplinary perspective. There is obviously some resistance from academic authorities (still with a clear predominance of men) that do not think that these new specific and interdisciplinary subjects are useful for the content and traditional assets of their disciplines. Moreover, they are afraid of seeing the corporate management of power (masculine, of course) questioned by these innovations. Building a consensus for further action is an urgent issue that needs a strategic approach.

While the conditions of female researchers in private research agencies is still widely unknown, much has been done in the last two years to try to promote significant changes in Public Research Agencies, where there are approximately 6 000 scientific workers. According to data from 1999, women represent 29.9% of personnel, on average, but significantly, 39.2% of new recruitment. This shows an increasing presence of women in total as well as in percentage, although it is not proportional to the leap forward of women in universities. The legislative process of reforming the research agencies has created the conditions to open a debate on the position of women as researchers and on their presence at the level of decision-making and of research management.

In 1999, the President of the National Research Council (CNR) created a Commission for the Promotion of Women in Science with the task of encouraging the participation of women in the European 5th Framework Programme and setting guidelines for the organisation of an Observatory on female careers in scientific research. The most interesting result of this complex activity has been the publication of the *First Report on women's careers in national public research organisations* (Figlie di Minerva Report). This also proves the impact of the report on *Science policies in the European Union – Promoting excellence through mainstreaming gender equality* (ETAN Report) on the Italian situation. Without the ETAN Report it would have been hard to think of an Italian Report with all its efficacious statements.

The National Steering Committee appointed in December 2000 by the Ministry of University and Research to support the achievements of the Helsinki Group and the Women and Science Unit in the Directorate-General for Research, gives new strength to the actions being taken in Italy. A new working group, named Women and Science, with reference to the European model and aims, has been appointed with the task of supporting gender mainstreaming in the building of the new European Research Area. The most interesting goal of this group was the establishment of a Foundation, financed by the public research bodies with free contributions to enhance mainstreaming policies. Negotiations were under way when, in May 2001, elections took place in Italy and a new political majority led to a new Government.

Today we are facing a major question: how can the institutionalisation process and the construction of a legal framework survive the changes in the government's policies? While the government is changing the political personnel in the Ministries, what will happen to the technical advisory boards? Notwithstanding the many goals achieved during only two years, women remain weak subjects for promotion in research and academia.

I would like to highlight some key aspects of the Italian experience. In our situation, an institutional framework for gender mainstreaming proved not to be an optional precondition, but an essential one. However, it needs time to become consolidated and sustained by a shared practice. New tools are needed for new trends, and women's academic and research bodies are firmly requested to be creative and sensitive to institutional strategies. A very sharp eye is needed to identify the resistance, even when it grows among women themselves (which is not as unusual as we would like to think). In our context, the European framework has clearly produced an added value with regard to the promotion of gender awareness and to the strengthening of a real mainstreaming policy. Considerable progress has been made through supporting the synergy between national policies and Community added value.

The promotion of women in science and in academic life has taken advantage of being connected with learning and institutional innovation. Mainstreaming activities have to be an integral part of a more general project of reducing the discrimination mechanisms, enhancing resources and

promoting innovation in the formative and research systems. Finally, real mainstreaming action must place itself inside the great movements of the reform and rewriting of rules, that is, the European and national commitment to create “the European space for higher education” and advance “towards a European Research Area”. This last point requires an enduring attention and a great ability to interact with many institutional actors. It also requires a substantial pool of new ideas, strategies and experiences. Maybe the anchorage to European policy and issues is the best way to overcome the floating nature of domestic politics. At the moment, this is our firm hope and we assure our best and most resolute co-operation to all our European partners.

Essential bibliography

- Dipartimento Pari Opportunità, *Donne 2000. A 5 anni dalla Conferenza mondiale di Pechino: le cose fatte, gli ostacoli incontrati, le cose da fare*, Presidenza del Consiglio dei Ministri, Roma, 2000.
- Carabelli Anna, Parisi Daniela, Rosselli Annalisa, *Che “genere” di economista? La professione di economista nell’Università italiana*, Il Mulino, Bologna, 1999.
- Palomba Rossella, *Figlie di Minerva. Primo Rapporto sulle carriere femminili negli Enti Pubblici di Ricerca Italiani*, Franco Angeli, Milano, 2000.
- ISTAT, *Le donne nell’Università*, Il Mulino, Bologna, 2001.
- Di Cori Paola, Barazzetti Donatella, *Gli studi delle donne in Italia. Una guida critica*, Carocci, Roma, 2001.

Obstacle without obstacle

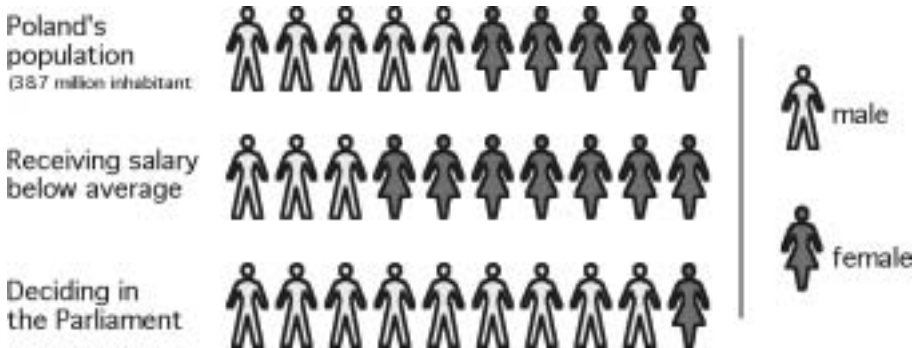
JOANNA PININSKA

Warsaw University, Poland

1. Introduction

The population of Poland is 38.7 million inhabitants (1998 data; Small Statistical Yearbook, 1999). The total area of the country is 312 685 sq. kilometres and the average population density of 124 persons per sq. kilometre. The number of people of production age is 23.2 million. The female population exceeds 50% and women in Poland have enjoyed equal political and educational rights since 1918. But, according to the diagram in the popular female journal “Wysokie Obcasy”, the actual situation is different.

Figure 1: Half-democracy (Wysokie Obcasy, No 34/2001)



According to the Polish Press Agency PAP (Zycie, 4 July 2000, Saj), 69% of Polish women consider that they are discriminated against. It is unknown to what extent this opinion is shared by scientific women as this issue has never been explored and as successful female researchers, who could address it in a competent way, are much too involved in their different occupations to raise it. However, statistical data indicate that the formal equality of women in science is not fully reflected in their academic career. Disparity between men and women in the development of scientific careers in Poland is much less visible than the one regarding women's participation in science administration and the shaping of science policy, which is even considered to be negative segregation. The latter issue is of utmost importance. In the State Committee for Scientific Research (Komitet Badan Naukowych, KBN) – the supreme administrative body to shape the foundations of national science policy, established by the Act of 12 January 1991 – there are 4 women out of a total of 60 elected representatives of the science community (6.6%). In the Polish Academy of Sciences (Polska Akademia Nauk, PAN) – another decisive and consultative body in the area of scientific research – there are 9 women out of 328 national members (2.7%). In the board of management of the Academy, we find one woman out of 31 members (3.2%).

Participation of women in the Polish Parliament amounts to 13% to date (Zycie, 4 July 2000). During the communist period, there were more women in Parliament but their participation was of an ideological character, and their voices were of no importance. The question of gender equality in the socio-political life attracted exceptional interest during the preparation of this paper because of the forthcoming parliamentary election (23 September 2001). Thanks to the favourable conditions resulting from the election period and the lively media discussion, the promotion of women's political activities on an unprecedented scale was possible, without restricting their role to just pro-family activities or protection against pathology and aggression. The Pre-election Coalition of Women, an agreement of a few significant female organisations, established in February 2001, publicised the necessity of equality or even promotion of women in the election. This was on the assumption that "a real democracy is when men and women have a 50% share in the parliament, government, state institutions and managerial positions..." as this would reflect the 50% women's share in Poland's population (Wysokie Obcasy, No 34/2001). Female slogans like "no more admiration – we need democracy", "whole salary and half of the power" became popular. During the election campaign there was a lot of positive support for women in pre-election declarations expressed by "high" politicians. Regardless of the success of the election campaign and the actual future implementation of pre-election postulates and declarations in the long run, these events seem to be of a long-lasting character and, in the longer term, important because of their psychological significance. The media publicity of the necessity to increase women's share in public life, and the presentation of examples of their success as decision-makers have changed many stereotypes regarding the role of women in contemporary society. Promotion of women, due to their deficit in the decision-making bodies, is no longer "embarrassing" and has become a current requirement and a nation-wide necessity.

Breaking existing psychological barriers of women aspiring to fulfil their natural functions is particularly important for women representing the scientific community as they are strongly inhibited from enforcing the rules of equal treatment in a spectacular way. There is a common belief in Poland that the possibility of development of men and women's scientific careers are perfectly matched. Female scientists themselves share this belief and, in their opinion, any attempt to promote them could be understood as unreliability. Therefore, they do not emphasise the adversities they have to overcome because of their gender and are not eager to identify themselves with the entire promotion-seeking weaker group when successful. They disregard whether success was achieved at the cost of sacrifice, enormous effort or due to extreme aptitudes.

In the period before World War II, few women worked, even though they were university graduates, because social and financial family structures did not require so, and a very prestigious role of "housewife" satisfied even women with high aspirations. Following World War II, and with the socialist system, the social role of women changed substantially. Propaganda towards equality of sexes and the post-war economic conditions forced women to take jobs. As a result, the majority of women presently work. However, it is getting more difficult to obtain jobs, especially for women, even if they are highly educated. According to OECD data (1998 database) the rate of unemployment in Poland for employees with M.Sc. and higher is between 2.2% and 2.8%. The overall rate of unemployment is 7.5% for men and 10.8% for women. The fear of unemployment triggers a bigger demand to increase the level of qualifications to improve job opportunities. Rates of employment of university graduates (M.Sc. and higher), according to the same source, are still high, but remain on the level of 90.1% for men and 84.7% for women. Despite the same educational level, there is no full equality of employment opportunities and it is not always possible for women to meet the rules of scientific work satisfactorily. In spite of the fall of the "housewife" prestige, women continue to fulfil the obligations resulting from this role. Although there are records

referring to equality in the Polish constitution, there is no definition of discrimination, which makes it impossible to claim any rights. In the field of scientific research it would be, in any case, difficult to point out concrete examples of discrimination. Maybe the need for promotion in scientific affairs itself could be questioned by women, as this could indicate that women are less valuable than men of a similar status.

In the current situation the well-based belief of equality for women's chances in scientific career development is so strong that any activity in this field arouses negative reactions of the male academic community. Most often it provokes indulgent smiles or makes colleagues ask "what is this all about?"

2. Importance of the Helsinki Group activities

As mentioned, from the legal point of view, and also, unfortunately, in the public understanding, there is absolute equality for women in science in Poland. It is formally ordered and, since 1918, appropriately distributed according to the existing tradition and will of women themselves. That is, women study, conduct scientific work and obtain scientific degrees if they wish to. According to the statistics, the real situation, is slightly different. Hence the title of this paper, "Obstacle without obstacle".

In Poland, like in other post-communist countries, the government faces too much economic trouble and has to carry out too many programmes to be able to focus on the problem of the role of female scientists. Therefore, in spite of increased pre-electoral interest in the question of equality, one cannot count on solutions to these issues without stimulating pressure. At the same time, the noticeable lack of appropriate and democratic representation of educated, professional and efficient women in the Government, and other decision-making bodies, closes up this "vicious circle" and the problem remains practically ignored. Proving the "non-existent" is difficult in these conditions. The Helsinki Group programme initiative "let's start from the statistics" is the only way to break the accumulated stereotypes and passivity. Only when the actual situation has been revealed, can one acknowledge the problem and ask the question "WHY"? It is necessary to convince the communities of scientific women themselves. The women belonging to elitist groups are less active than other social groups in opposing external problems and limitations, and are more focused on personal creative achievements in their institutes and professional scientific associations. The specificity of scientific work also leaves very little room for the perception of topics beyond the professional field and social identification with them. Thus, it is difficult to overcome the existing passivity in the community of female scientists. The role of the Women and Science programme in this field is extremely valuable. It makes women from scientific circles aware of the necessity of actions in areas ignored so far, which eventually will contribute to a shift in women's participation in the decision-making bodies that shape their work conditions and science policy.

The establishment of the Helsinki Group supports a number of actions in Poland, which in part, could already have been completed within the framework of general tasks included in the National Programme of Action for Women (Council of Ministers, April 1997) if there had been greater pressure. The programme was set up as a Polish reaction to the IV UN Global Conference on the problems of women (Beijing, 1995). It aimed at breaking existing barriers against the practical implementation of equality of women and men, which prevent women from full realisation of their rights and active participation in all areas of social life.

During 1998-2001 it was planned to monitor the state of implementation of selected strategic objectives and tasks included in the programme and to publish a report. "Due to the lack of

allocation of financial resources”, these activities have not yet been completed. Therefore, when starting up actions for women and science in Poland there were insufficient data to show women’s activity in the field of science and all actions had to be started again. Thanks to the inspiration of the Helsinki Group, the activity of the EU programme and the appointment of the national representative for women and science, a number of questions have been raised. The problem of development of women’s scientific career and their importance in society will probably be better perceived now. The crucial moment in the activation of “women and science” in Poland was when the collection of statistical data was undertaken by the KBN – not an easy task for a big country like Poland. The KBN provided the organisation and decision-making basis for the women and science activities under the leadership of Deputy Minister Ms Małgorzata Kozłowska, and under the auspices of the Chairman of the KBN, the Minister for Science.

Having started from the ground level and after one year of activity, one has to consider the achievements as satisfactory from the point of view of basic identification of the “status quo” as well as statistical data gathered to date and still expected. These data enable the planning of further steps and the opportunity to use the pre- and post-electoral favourable atmospheres to specify and execute both local and European-wide objectives and postulates connected with the problems of women and science.

3. Statistical data

According to data from the Ministry of National Education (MEN) (*Oswiata i wychowanie*, 1999/2000, Main Statistical Office 2000) the gender structure of students in primary education reflects the structure of the entire population of primary school age (100 boys compared to 94 girls). In secondary schools we find a similar situation but with a horizontal gender segregation according to the type of school. In grammar schools, there is a diminishing majority of girls. There is also a slight majority of girls in technical and professional high schools but it tends to decrease. In secondary vocational schools there is a substantial majority of boys, this remaining a stable situation.

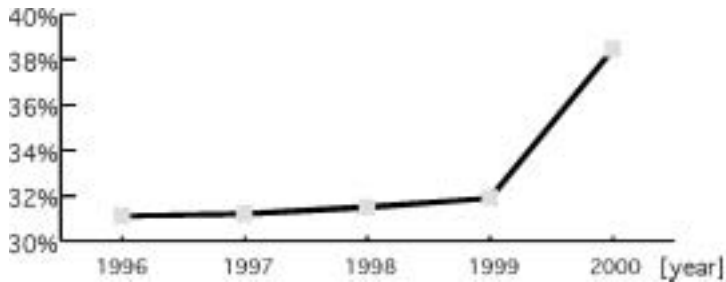
According to the same sources, in the schools for adults, “the interest in the increase of qualifications of adult men is much bigger than that of adult women. During the years 1990-1999 the number of male students grew from 122 000 to 199 000, while the number of female students increased from 103 000 to 125 000”. According to the authors these proportions result from women’s higher level of education and their family life functions (home, children).

University education in Poland is provided both by private and state-owned universities. According to 1998 data (*Directory of Polish Science* v. I, 1997/1998) there are 112 state-owned universities and 136 private ones. The state-owned universities comprise: 14 general ones, 18 for technology, 2 for naval/maritime studies, 5 for economics, 9 for pedagogy, 9 for agriculture, 12 medical academies, 8 universities of theology, 11 military academies, 8 musical academies, 7 fine arts academies, 3 academies of theatre and 6 academies of physical education. This gives a total of 248 university-level educational units. In reality, the figure is higher because many state-owned universities have branches in other cities. The number of young people starting university education is now growing constantly. The total number of Polish university students in 1999/2000 was 1 418 075 of which women were almost 60% (819 988). Out of the total, the number of Ph.D. students was 32 139, including 9 713 women (*Oswiata i wychowanie* 1999/2000, Main Statistical Office 2000). This shows that, relatively speaking, almost three times fewer women than men with a university education decide to take up a scientific career.

3.1. Statistical data on women's scientific career in vertical and horizontal division

Recently, the total number of scientific employees has been growing in Poland. Out of 78 091 scientific employees, there are 30 027 women, that is 38.5% (MEN 2001, MSO 2000). One can notice a significant growth in the percentage of women employed in the field of science compared to 1996-1999 (Figure 2).

Figure 2: Participation of women among scientific employees in Poland



In Poland, as in other countries, the vertical segregation in women's scientific careers starts at Ph.D. level. It is currently not so strong (10%). There doesn't appear to be any strong horizontal segregation either, except in Engineering and technology, where the percentage of women is below 20% (Table 1). Looking at the number of completed Ph.D. courses, the absolute difference between women and men is surprisingly small. This could be a proof of greater effectiveness and responsibility of women taking up doctoral obligations. However, a more detailed investigation, based on multi-year data, would be needed.

Table 1: List of scientific Ph.D. degrees granted in 2000 according to gender, showing distribution of scientific areas as per Frascati classification

DISCIPLINE	TOTAL	WOMEN	%
Agricultural sciences	453	202	44.6
Engineering and technology	774	140	18.1
Humanities	1 133	551	48.6
Medical sciences	1 394	661	47.4
Natural sciences	862	386	44.8
Social sciences	432	197	45.6
TOTAL	5 048	2 137	42.3

The data elaborated in the Frascati system (OPI 2000) and previous data worked out by the KBN (W&S report, 2000) show that 14% of women with Ph.D. degree reach D.Sc. degree, whereas the proportion for men is higher at 19%. As a consequence, the vertical segregation is getting deeper and, from almost 50% at Ph.D. level, women's share drops down to 30-40% of the total at the level of D.Sc. (Table 2). At D.Sc. level there is no significant horizontal segregation, except in Engineering and technology where women represent less than 10%.

Table 2: List of D.Sc. scientific degrees granted in 2000 according to gender, showing distribution of scientific areas as per Frascati classification

DISCIPLINE	TOTAL	WOMEN	%
Agricultural sciences	86	25	29.1
Engineering and technology	152	14	9.2
Humanities	240	94	39.2
Medical sciences	228	84	36.8
Natural sciences	217	63	29.0
Social sciences	64	23	25.9
TOTAL	987	303	30.7

Further deepening of vertical segregation appears at the level of professorship where only a maximum of 30% are women (Table 3). Horizontal segregation is also important. In the Frascati horizontal division the highest percentage of women is seen in Agricultural sciences and Medical sciences, while the percentage of female professors in Social sciences as well as in Humanities and Natural sciences, is surprisingly low. Compared with the number of D.Sc. degrees a relatively high percentage of women reach the title of professor in Engineering and technology (11.3%). So the women who reach the degree of D.Sc. in this field (10%) seem to carry on their scientific career freely.

Table 3: List of scientific professor degrees granted in 2000 according to gender, showing distribution of scientific areas as per Frascati classification

DISCIPLINE	TOTAL	WOMEN	%
Agricultural sciences	56	17	30.4
Engineering and technology	62	7	11.3
Humanities	160	42	26.3
Medical sciences	67	20	29.9
Natural sciences	86	19	22.1
Social sciences	47	9	19.2
TOTAL	478	114	23.9

Figure 3 shows the “scissors” rate of success in the vertical distribution of scientific degrees (Ph.D., D.Sc. and professor). One should note the steadily growing share of women with Ph.D. and D.Sc. degrees in the field of science. However, the career development of female professors is of an oscillating character. This may be connected with horizontal divisions, typical for this process, which in turn may result from current trends. Nonetheless, it does not change the negative image that the rate of success of women at the level of professor does not exceed 30%.

Figure 3: Total percentage of women in scientific degrees granted during 1992-2000

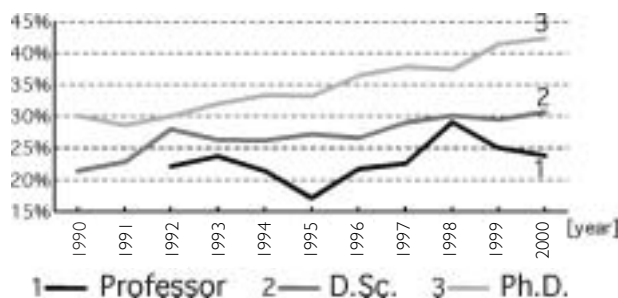


Figure 4 shows that some outflow of female scientific staff takes place straight after the Ph.D. title, at the age of 30-39 years, and also that a considerable number of women remain at Ph.D. level until retirement. At the same time, according to the statistical indications, part-time employment – which, in Poland, mainly results from parallel employment at several universities – concerns mostly men and is most often taken up by male professors above the age of 60 (Figure 5).

Figure 4: Full-time employment of women and men – distribution according to age structure

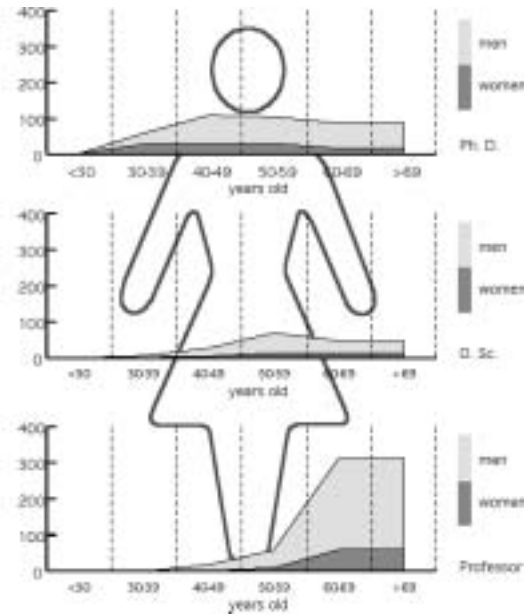
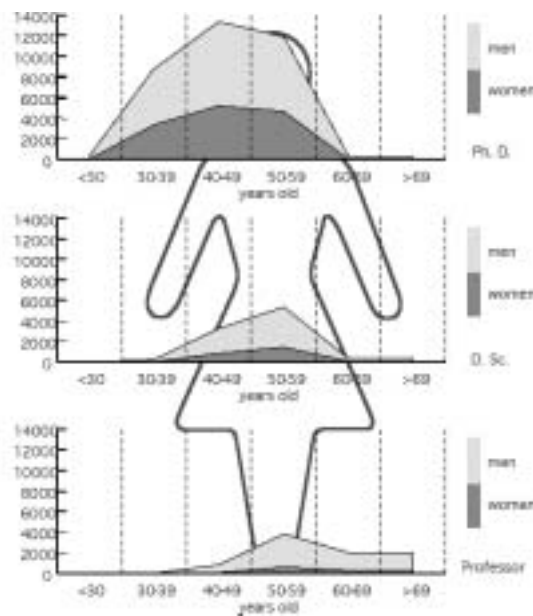


Figure 5: Part-time employment of women and men – distribution according to age structure



3.2. Statistical data regarding head posts in decision-making bodies in university scientific units, research institutes and others

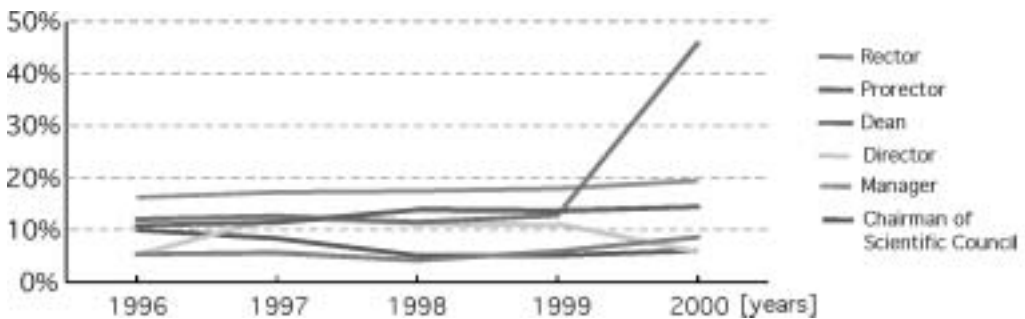
Women's participation in decision-making bodies in university scientific units and research institutes looks very poor, as their share of head/manager positions oscillates at a few percent. Women mostly take the positions of deputy managers, where their share reached 20% (data from 1996-1999; W&S report, 2000). Data from the Information Processing Centre show that this situation has improved (Table 4, Figure 6).

Table 4: Number of persons with managerial positions in scientific units and research and development units – distribution according to gender

POSITION	TOTAL	WOMEN	%
Director	1 509	88	5.8
Dean	578	265	45.8
Manager	4 300	840	19.5
Vice Rector	362	52	14.4
Chief of Scientific Council	328	20	6.1
Rector	279	24	8.6

A substantial growth in the number of women at the position of Dean, which in 2000 reached the level of 45% of all posts, is optimistic. However, the participation of women in managerial positions in scientific decision-making institutions is exceptionally low. Women also occupy, to a small extent, decisive positions in science-related foundations and associations, mostly as directors, heads or deputies and advisers.

Figure 6: Composition of head posts in science



3.3. Social activities supporting women

Many organisations and associations in Poland carry out social activities aimed at ensuring equal opportunities for women in all aspects of political and social life. However, opinions of only a few are of importance. Furthermore, not many can achieve actions aimed at ensuring that the practical implementation of legal acts is in line with equality.

The League of Polish Women (LKP), an organisation of big tradition and whose activities are well established in the women's movement, presently carries out numerous activities. Importantly, to

extend the scope of activity of women and science, and as formulated by the president of the League, Professor I. Jaruga-Nowacka: "LKP evaluates, among others, the functioning of existing legal acts in the field of equality legislation and intervenes in cases of violation of the principle of equality of sexes and promotes participation of women in the social, political and professional life. LKP also makes women aware of the important influence of education on their lives". Last year, it implemented a programme called "Mechanisms of law enforcement in Poland in comparison with present legislation in the EU countries". However, the active nation-wide operation and voluntary character of work has not, so far, provided sufficient capabilities to deal with the elitist issue of women's activity in science, compared with the huge extent of the problem as a whole.

Other organisations support women on a short or long-term basis depending on needs. Since their number grows every year and their objectives are very different, the Centre of the Advancement of Women Foundation produced and published the Directory of Women's Organisations and Initiatives in Poland (FCKP 2000). The organisations mostly deal with care-taking or charity activities. Others provide legal support for women in the labour market, which is getting more and more difficult. However, new organisations promoting women's participation in the public life emerge as well; many of them gathering businesswomen. The influence of these organisations on the creation of policies to meet the needs of women, to remove the barriers preventing the implementation of equality and to raise women's social awareness of equal rights, is still too weak. Against the background of the active networks on women and science it does not matter much. Out of 70 women's organisations, federations, clubs and informal groups, 14 foundations, 5 associations and religious unions, 5 trade-unions and party groups, only 2 act in the academic community. The most promising way for women in science seems to be to develop co-operation with LKP in the framework of a broadly understood programme of exerting pressure aiming at an increased participation of women in decision-making bodies both at local and national levels.

4. Conclusions

1. Polish legislation, aiming to ensure equal educational rights to women and men, and thus an equivalent development of their scientific career, has been specified since 1918. Following the well-established formal tradition of women's free choice of their professional career, Polish scientific communities are unaware of the disparities in the development of women and men's scientific careers. At the same time, an over-a-century-long tradition of women active in science, which can be exemplified by Maria Skłodowska-Curie, enables women at high scientific positions to enjoy social prestige and not suffer from discrimination.

2. Against the background of general problems of transformation from which post-communist countries, including Poland, suffer, the problem of women's access to the real and widely supported equality in science is too marginal and elitist to involve actively the decisive state structures, represented mainly by men. Without increasing the number of women within those structures, this closed circle will go on rotating.

3. General activity for the equality of women, by those women who enjoy a professional success in science, is still very low in Poland. One of the reasons is excessive workload. The women are usually busy with managerial tasks (as managers or deputy managers) in addition to pure scientific work. They also have to struggle against many time-consuming economic, administrative and financial troubles (still unclear and unstable in a country during transformation) at their workplaces. This limits time for their extra-professional activities to a minimum. This could lead to a characteristic negative selection of the women's movement "activists" to involve "less professionally successful"

and thus “over-demanding” persons. This, in turn, undermines the credibility of the women’s movement, which, particularly in the scientific community, is pejoratively perceived. Women who have been successful in science are not willing to be identified with such a movement as they could lose their scientific credibility.

4. It seems to be a priority task to make the problem credible, to make society aware of the fact that using the scientific potential represented by women lies in the interest of the State, and not in the interest of women themselves who, “can do somehow”. These activities force a realistic statistical look at the representation of this gender, its talents, demographic and economic conditions, in the broader European context, and thus, are helpful in shaping educational and research trends of the State, and in helping to stop the negative “over-demanding” image.

Benchmarking gender, science and technology in Latin America: current position and prospects for the future

GISELA ARGENTI

Gender, Science and Technology Secretariat for Latin America (SEGECYT), Uruguay

1. Does gender equity really matter?

This paper, which presents the situation of women in science in Latin America and the instruments for the benchmarking of their progress, is based on two key ideas. Firstly, it is time for the *Science and Technology (S&T)* policy to include new voices in the orientation of development and the satisfaction of social needs. Secondly, it should be understood that gender equity is central among the diverse forms of equity to be integrated into the new “social contract” between science and society.

A participatory and wide-ranging approach to S&T requires the inclusion of all forms of equity, aimed at enriching the exclusive approach adopted by the experts or “elites” responsible for S&T policy. Arguments towards a greater public participation in decision-making are numerous. All citizens who support, and are in some way affected by S&T development, aim at being able to participate in decisions, in a democratic system. There is also considerable empirical evidence pointing to differential situations in S&T, between girls and boys, women and men, with regard to access to education, management positions, salary levels, technical change, impact and decision-making processes. Like any other complex phenomenon, gender inequity in S&T does not respond to a clear causal relationship or “sense of incidence”: there are also “third” factors or rival hypotheses that need to be checked. From cultural reasons, discrimination, interruption and postponement of careers due to the sexual division of labour, to the predominance of gender stereotypes in S&T and the relative scarcity of women in decision-making posts, there are a wide number of rival explanatory hypotheses, some contradictory and others that converge.

Leaving aside the variables that help to explain this lack of equity, there is a growing consensus, now also reaching the developing countries, about the relevance of these differences. Gender equity mainly matters for:

- ethical, social justice and human rights reasons;
- scientific and economic reasons, because women have a relevant potential for S&T communities throughout the world;
- social reasons and, in general, for the social construction of knowledge. This is the way in which the integration of visions, worries, needs and aspirations of men and women can improve the institutional, political, social, economic and cultural conditions in order to advance and improve in the area.

Statistical evidence indicates major changes in the progress of women in S&T. This is also observed in most Latin American countries, for example, in the number of women attaining top university grades in career areas that are traditionally male-dominated. However, the lack of sex-disaggregated data has so far hampered the construction of valid and relevant Gender, Science and Technology (GST) indicators. This lack of quantitative information is a major problem as indicators are a powerful instrument for evaluation and policy definitions. There has been a huge advance in the region, in the last ten years, regarding the conceptual and institutional consolidation of S&T indicators. In the case of GST there has not been, up to now, a serious, rigorous, systematic effort

to make measurements and statistics. Although Europe now has a comparative report on the situation of women in science, in Latin America information is still scarce, not easily accessible and not comparable between countries. However, trustful, valid and pertinent indicators are an essential input to make a more impartial and less arbitrary decision. The necessity becomes obvious: aggregated data can lead to conclusions of little use, and which are sometimes distorted.

In Latin America and the Caribbean (LAC), international commitments that were established for national governments regarding gender equity in S&T – expressed in the Beijing Platform, the UN Commission on Science and Technology for Development (UNCSTD), UNESCO, OECD, IADB, World Bank, UNIFEM, among others – were not substantially reflected in policies. In this region, knowledge on the topic is very scarce. Only recently has interest in GST, as an issue of research and policy-making, developed in Latin American countries¹. With few exceptions, the size, structure, characteristics and determinants of the female contingent of the national scientific community have not been analysed systematically. At present, one can only use partial and not homogenous empirical evidence. Though there are clear differences according to contexts, these data show significant inequalities related to sex in all the countries that have been researched.

To look at the situation of women in science, consideration must be given to the differential impact of, and access to, scientific and technological knowledge as well as its conformation with, and its later legitimisation by, the academic community. There are two main variables: the tension between the personal life of women and the nature of their scientific work; and the institutions that receive them, where we generally find traditions that correspond to the masculine stereotype. In this sense, recommendations to improve the position of women in S&T should point to modifying the rigid, restrictive and conventionally reduced definition of the scientific role, at an institutional level, but also in society as a whole.

In spite of this, things are changing in Latin America and some advances have occurred. The Gender, Science and Technology Secretariat for Latin America (SEGECYT) made a summons in October 2001, to present works in the GST indicators area. This clearly showed that many of the countries in the region counted on “critical mass” and access to information so as to elaborate indicators which could fulfil both prescriptive standards of the international organisations’ manuals and local capabilities and needs². There are clear signs of a growing awareness of the importance of gender analysis in the LAC region (Argenti, 2001b). For example, at an institutional level, there has been the constitution of this Secretariat as a regional organisation for Latin America, sponsored by UNCSTD, and its policy mission. Other examples include the creation of a “network of networks” including focal points and national committees, the existence of groups involved with gender in S&T national offices and universities, and the recent launch of the regional UNESCO Chair on Women, Science and Technology.

¹ Professionals, technicians and women in executive positions, within the public and private “white collar” sector; do not constitute an “empty whole” in Latin America, as it comes out from the charts about work, education and gender (Argenti, 2001a). Surprisingly, in the LAC region, this social group has been relatively ignored in research concerning work, women and development. However, the aggregated data from several Latin American countries show that there are educated working women who can potentially develop activities in the area of S&T and Innovation.

² In peripheral and developing countries, basic characteristics of high level of informality and low degree of institutionalisation of the S&T national systems have to be taken into account in designing, applying and interpreting indicators of S&T activities. These “new” indicators have to meet the twin requirements of “standardisation” (international comparability) and “relevance” (sensitivity to the peculiarities of specific cases). This needs to be taken into account in the measurement and benchmarking of the progress of women in science in these countries, while avoiding previous mistakes. Both requirements – standardisation and relevance – are met through the exhaustive review of the indicator systems available in the international literature, its adaptation and the creation of new specific indicators related to the historical conformation and current specificities of the S&T system (Argenti, Filgueira and Sutz, 1990).

An element that should be considered for S&T in Latin America and the Caribbean is its total heterogeneity and the predominance of small countries³. Nevertheless, there is a paradox: diagnoses, studies and, in general, the existing knowledge about the LAC region, are frequently based on the experience of the dominant countries. Whatever the area under consideration, there has been a tendency to transfer recommendations, measures and policies, that have been devised for the large Latin American countries. Brazil, in particular, has become a reference model for S&T policy. Now, after more than 15 years, GST studies in the region seem to be on the way towards a more sensitive focus on national specificities, without disregarding the valuable contribution of international organisations and agencies. The work by the European Commission for the assessment of women in science gives a clear leadership in the consolidation of a relevant and fruitful field of co-operation with Latin America.

2. Women and S&T in Latin America: current trends

Papers presented during the First Workshop on Gender, Science and Technology Indicators, regarding studies conducted in Argentina, Brazil, Ecuador, Mexico, Peru, Uruguay and Venezuela, are available on SEGECYT's web page (www.segecyt.org.uy). Despite the heterogeneity among the different Latin American countries, the complexity of the issue, and the apparently contradictory trends going on, empirical evidence shows some common features between these countries and also with the European situation, such as the scissors effect, horizontal and vertical segregation and pay gap.

In Venezuela for example, rates of students and graduates, at all levels of the educational system, are generally higher for women. As in the rest of Latin America, the female active economic population presents a high proportion of professionals and technicians: 22% in 1990, whereas the figure was only 8% for the male working population. There was a majority of women as white-collar workers (59%) and as professionals and technicians (56%). The majority of women with higher education can be found in this category. However, only 6% of active women with higher education were in the category of "managers, administrators and directors" at the beginning of 1990. When considering the distribution of careers and hierarchies in the S&T system, horizontal and vertical segregation show a concentration of female enrolment in areas traditionally associated with women and their main role in the field of human care (social sciences and humanities, education and health). Despite the evolution in all careers, the branches of engineering and basic sciences still show male predominance, which could indicate a differential incorporation to scientific activity.

The exception of Venezuela, compared to the Latin American general tendency, with a female predominance of 55% at the Faculty of Sciences (half or more in chemistry, biology and computing) would suggest a hypothesis that women make significant advances within a quickly expanding system (Vessuri, 2001). This co-existence of contradictory tendencies is also seen in Peru. Women represent more than 50% of the total population of the country, and in the Peruvian elections of April 2001 they accounted for more than 51% of the voters. Of the total number of Peruvian women, 44% of them live in poverty and 19% in extreme poverty, 50% have not finished their secondary education and a quarter of the households have a woman as head of family, a tendency that is increasing considerably. Thus, we have a very high share of women at university involved in

³ Of the 32 countries in Latin America and the Caribbean, only two have more than 80 million inhabitants, three have between 20 and 31 million, and four between 10 and 20 million. The remainder are either small (5-10 million) or very small (less than five million). An alternative classification, according to GDP, shows the same results.

all subjects, including engineering, and at the same time, the persistence of a high rate of female illiteracy. Illiteracy among women is 2.6 times higher than for men, mainly because the incidence of adolescent pregnancy and the need to generate supplementary incomes for the family, provoke the desertion of women from schools (Carazo, 2001).

This empirical evidence must be interpreted carefully, with a relativistic view. A naïve look would only give the positive view that universities in Latin America have a high level of female students in almost all of the scientific and technological subjects (engineering, agronomy, veterinary). This dynamic presence of women in traditionally masculine areas is certainly important. However, we cannot measure the modernisation processes only by the participation of the different actors within these social, cultural and political movements, as if we were in the 1960s or 1970s. The high participation of women in universities takes place at the lower levels and, in this way, these data need to be cross-referenced with other important variables such as age, field and level. For example, the situation in Argentina, which shows a stagnation of wages in the public sector, in particular the university sector (Di Filippo), is similar to other public universities in Latin America. Secondly, there is a loss of prestige in the university career in most of our countries. Finally, professional careers are very precarious and thus extremely important for women. Work is generally very badly paid and demands a total dedication. Moreover, the institutions that receive women, frequently from up country, keep traditions corresponding to male-dominated stereotypes. In developing countries, without significant scientific traditions, the definition of the scientific role has a tendency towards restriction, rigidity and conventional reductionism that affect the role models of both women and men in science. So there is a series of negative factors for professional fulfilment for women. The personal situation of women explains a great deal of the nature of their scientific work. Recognition of this will help in solving the tension between the two dimensions and in understanding the whole personal path of female researchers.

Another empirical result, also found in developed countries, is the absence of women in the assessment mechanisms in Latin America, which are cumbersome and partly the key to the system. There is a lack of transparency and democratisation in these processes in which very few groups manage bureaucratic control mechanisms. Furthermore, there is a reduced presence of women in the higher steps of power. It is true that there is a greater participation of women in the management bodies, but there is also a greater discrimination in the management boards. This is why, even in those fields with high female participation, the most frequent scenario is that the director is a man and that 50% of the heads of groups, 75% of the support staff and 100% of the administrative personnel are women. So, it is a clearly defined hierarchy.

Finally, in most Latin American countries, many official speeches about education make reference to gender equity with regard to educational access. Several legal frameworks mention explicitly the importance of establishing equality between sexes as a goal for plans and development programmes. However, the majority of the people in the region do not count on public policies that favour a greater participation of women in S&T. Besides, even when some legal changes are achieved, these are not reflected in the institutional structures, in the effective access of women to decision-making levels, or the modification of socially rooted stereotypes. In this way, people do not have access to the educational system in equal conditions: not only are there gender differences, but also ethnical, regional and social ones, which are not taken into account in the making of laws, rules, agreements and educational programmes. In particular, the omission of differences and the absence of a gender perspective, even in S&T plans, lead to homogeneity of education, which prevents the achievement of an even situation. There is no room for specific proposals to help permanent and efficient graduation for students of both sexes who are in a disadvantageous

situation. Even if the performance of this sector has improved in the LAC region in the last few decades, there are still serious problems concerning access to and permanence in different educational levels. These affect the female population, above all if they live in rural areas or in urban areas with a high degree of exclusion or high indigenous concentration. Despite the advances in some countries of the region, the highest rates of illiteracy are registered in the female indigenous population (Zubieta, 2001).

Summing up, the construction of indicators and statistical measures, as well as methods for benchmarking the progress of women in science, requires a systematic effort within which different tasks are possible and necessary. The improvement of statistics and the creation of indicators, not only related to the participation of women, but also to the performance or results of their activity⁴, should be complemented and enriched with qualitative studies and information from research efforts. This will be necessary in order to define actions and policies aimed at closing the gender gap in science and technology.

Regarding the interpretation of the empirical evidence we have two imperatives. A systematic effort to construct valid and pertinent indicators at national, regional and international levels to support the different policies must be made. Actions and policies cannot be established without reliable information that justify, support and legitimize them. These indicators should be read, elaborated and used with a precautionary approach. The “standard” indicators generally give us a biased, partial and insufficient vision of the reality of our S&T systems and should be complemented with specific multiple dimensions indicators in the analysis. Variables of disagreement or imbalance, to reflect tensions and conflicts, should also be included.

Finally, the recent literature demonstrates that there are many ways of combining the scientific and domestic dimensions in life. The diffusion of role models for female scientists (non-existent forty years ago), the motivation and the creation of areas of exchange and contiguity with female colleagues, allow progress in correcting the social and intellectual isolation of women, and in supporting them in their career. There is not doubt that national and cultural features influence this matter.

3. Conclusions and recommendations

Without data there can be no clear vision of the problems and thereby, no priorities. Latin American countries should strengthen the systematic gathering of sex-disaggregated data, following the recommendations made by international agencies and particularly, the recent initiatives proposed by the European Commission. This means steady work, from the improvement of statistics to the creation of “new” indicators and the quantification of qualitative information. National teams involved in the building of GST indicators can specialise in some of the strategies that together constitute the long-term work, which will lead to the improvement of these measures. Interaction between the diverse tasks and a feedback system will be required. The methods of evaluation for the promotion of women in science should provide a context for indicators and test them with a deep and critical reading.

The lack of GST information, quantitative as well as qualitative, that is systematic, accessible and comparable, is a major obstacle that Latin America, at a distance, shares with the European Union.

⁴ Zubieta (2001) makes an exhaustive proposal for the indicators that should be elaborated to measure the situation of women in science. Narvaez-Berthelemot and Russel (2001) give a detailed list of the indicators that can be obtained using the data and statistics of CONACYT of Mexico, available through its internet page.

This, added to the empirical evidence common to both contexts (scissors effect, horizontal and vertical segregation), turns the GST area and the measurement of women's participation in science into a privileged field of co-operation between developed and developing countries. This co-operation should integrate the efforts to measure the position of women as well as the actions and policies aimed at closing the gender gap in S&T. Since the topic has attracted little attention up to now, even in developed countries, treating it as a priority area for international co-operation should aim at accumulating and socialising knowledge, actions and best practice. In general, Latin America has been relatively insensitive to international recommendations in the GST domain. Only recently has the use of quantifiable information capable of producing GST indicators started. This is thanks to the actions of regional organisations such as the SEGECYT, which have succeeded in establishing national and international mechanisms for monitoring the gender dimension within S&T organisations.

Participation of women varies according to the type of R&D organisation and the geographical region. The social formation of working areas is partly the result of the transfer of values, habits and other socio-cultural elements of the institutions and the local society in which activity takes place. Institutions have a key role to play in achieving changes towards gender equality. It should be acknowledged that in spite of the advances, the extent of women's scientific production depends more on family circumstances than for men. In addition, the organisation of labour and the communication patterns of institutions influence women's potential.

To strengthen the effort of benchmarking the progress of women in science, co-ordination with international entities is important. The accumulation and socialisation of experiences are based on the creation and transmission of knowledge. A collective benefit will derive from these processes. The Gender, Science and Technology area is a privileged field for co-operative social interaction that produces a benefit that extends far beyond the involved actors.

Bibliography

- Argenti Gisela, Filgueira Carlos, Sutz Judith, *From Standardization to Relevance and Back Again: Science and Technology Indicators in Small, Peripheral Countries*, World Development, Vol. 18, No 11, Pergamon Press, November 1990, pp. 1555-1567.
- Argenti, Gisela, *Gender, Science and Technology in Latin America*, 2001a [paper presented at the Gender and Research conference, Brussels, 8-9 November 2001].
- Argenti, Gisela, *Genre, Science et Technologie en Amérique Latine*, 2001b [PowerPoint presentation and paper presented at the Gender and Research conference, Brussels, 8-9 November 2001].
- De Filippo Daniela, Estébanez María Elina, Kreimer Pablo, *Participación de la mujer en el sistema de Investigación y Desarrollo en Argentina* [paper presented at the First Workshop on Gender, Science and Technology Indicators, Montevideo, Uruguay, 18 October 2001. See: www.segecyt.org.uy].
- León T. Magdalena, *Paradojas de Género en la universidad ecuatoriana* [paper presented at the IV Encuentro de Universidades de la Subregión Andina Género y Realidad Andina, Cuenca, Ecuador, 26-28 January 2000].
- León T. Magdalena, *Participación femenina en actividades de ciencia y tecnología en la universidad ecuatoriana: primeras evidencias* [paper presented at the UNESCO Regional Forum "Mujeres, ciencia y tecnología en América Latina: diagnóstico y estrategias", Bariloche, Argentina, October 1998].
- Narvaez-Berthelemot Nora, Russell Jane M., *El factor género en las estadísticas del CONACYT México* [paper presented at the First Workshop on Gender, Science and Technology Indicators, Montevideo, Uruguay, 18 October 2001. See: www.segecyt.org.uy].
- Vessuri Hebe, Canino María Victoria, *El género en la ciencia venezolana: 1990-1999*, UNESCO ref. Contract No 883.112.0, Documento de trabajo, Caracas, Venezuela, 2001.
- Zubieta G. Judith, *Progreso o rezago de la mujer en la Ciencia y la Tecnología: propuesta de indicadores para su medición* [paper presented at the First Workshop on Gender, Science and Technology Indicators, Montevideo, Uruguay, 18 October 2001. See: www.segecyt.org.uy].

Women in science in Israel: past, present and future

HAGIT MESSER-YARON

Ministry of Science, Culture and Sport, Israel

The situation of women and science in Israel could be much like the one in Poland, as presented by Joanna Pininska. The main difference is that, at a specific time, I moved from university to government and was thereby in a decision-making position. Some change is related to this fact and it raises the question: is it accidental or is it going to stay this way?

1. Helsinki, November 1999: the turning point

In October 1999, Israel, as an associated country to the Fifth Framework Programme, was asked to appoint someone to a meeting of national civil servants on the topic of “women and science”. As no civil servants could be found, they asked me to represent Israel. At that time, I was Professor of Electrical Engineering at Tel-Aviv University, personally interested in the topic of women in science, mainly because I spent my professional life as a minority in a man’s world. At the Helsinki meeting, I learned about the ETAN report and more, and soon after, I was appointed as Chief Scientist of the Ministry of Science in Israel. One of the main reasons I agreed to take this responsibility was because, after Helsinki, I knew what should be done and I was given the opportunity to do it.

2. Past

Before this turning point of the Helsinki meeting, there were no formal national activities, monitoring or statistics regarding women and science in Israel. There were some voluntary organisations, non-governmental organisations and sporadic activities. The atmosphere was right, but nobody organised it altogether, it was bottom-up. People did things, but they didn’t know about each other. In universities there were equal opportunities but no affirmative action. Research and Development (R&D) and high-tech activity in Israel was blooming and there was a need for more scientists/engineers.

Examples of “before Helsinki” activities:

- In the Israeli Parliament (Knesset) the Committee for Scientific and Technological R&D, together with the Committee for the Advancement of the Status of Women, initiated a yearly discussion in their committees on the status of women in academia. Both Heads to these Committees were women who were interested in this topic.
- A forum of women as managers in industry was established in 1993 and has been active since. Every few years, it publishes reports (surveys) on the status of women as managers in industry. The report looks at general industry, rather than just high-tech industries, so most women are in finance and in human resources, but at least it gives a general picture.
- In 1988, the Association of University Heads in Israel recommended to appoint a female faculty member as “consultant” on the status of women at each university. This idea was only partially adopted. In fact, only one of the seven universities, the Israeli Polytechnic Institute (Technion), has fully adopted it and they are the only institute to have such a position since 1988.
- Different public and private programmes for encouraging high-school girls towards a career in science and technology were initiated all over the country.

- In 1999, Intel had a shortage of professional technical people in Israel so they organised a special programme to hire potentially suitable women and train them on the job. The Women Campaign ran for 11 weeks (ww. 35-46) and focused on an extended profile emphasising the opportunities for women at Intel. For example, the pictures usually showed a mature woman with a child saying, “I’m proud of my mother. She works for Intel”. There were a total of 16 full-page ads. As a result, after receiving about 3 000 calls, around 70 persons were hired and about 40% of them were women.

3. Present

What happened after Helsinki? In February 2000, I was appointed as Chief Scientist at the Ministry of Science, Culture and Sport. As such, I am responsible for the “science” part of this Ministry. I have too much to do, but I can devote some time to “women and science” and it seems to be sufficient to make some change. I plan to get back to the university as soon as possible, once I have stabilised the situation with respect to women and science in Israel. My first condition before I accepted this job was to put the promotion of women and science as part of the official policy of the Ministry of Science. This was easy, since the Director-General and the Minister supported it. One of my first actions was to establish a Council for promoting Women and Science in Israel. The Council is national and is operated by the Ministry of Science. So, by February-March 2000, just after the Helsinki meeting, the topic of women and science gained two official operational mechanisms in Israel: the national Council and the Ministry of Science. Now we can start talking about a “top down” rather than a “bottom up” approach, because there have been changes at governmental level.

The main activities in Israel at present are:

- Networking: mainly through monthly meetings of the Council.
- Monitoring: we publish a yearly report.
- Raising public awareness: we run conferences on these topics. Also, we help NGOs and others to initiate new programmes and we have some special operations.

Looking in more detail at 2000-2001, we have regular meetings of the Council, which serve both for networking, co-ordination and for policy-making. The Council officially consists of about 12 members, but its meetings are open to all people interested in promoting women in science and technology (university professors, people in high-tech industry, NGO leaders and so on). About 30 people attend each meeting, which makes them an important networking tool. We have already had two national conferences, and we are planning the third. We succeeded partially in getting some attention from the media. Five or six items in national newspapers cover our activity. I myself give public lectures on women and science and related topics whenever I’m asked to. Last year, we published a national report on the status of women and science in Israel (in English). It is widely used as a reference. We are going to publish such a report every year to be able to monitor the dynamics of the situation. Monitoring needs reliable statistics. My Ministry financed the annual survey on Research and Development in Israel. In early 2000 I asked the Central Bureau of Statistics (CBS) in Israel to start to put a gender dimension in their survey. The CBS had never been asked for it before, so I didn’t realise it was necessary. Once I asked, it was easily done. This is my experience all over: many times, you just need to ask. It is also another example of how one can easily make a change when in a decision-making position.

Other activities:

- We try to raise awareness at the decision-making level by reporting directly to the Knesset and to the Government about our activity.
- One of the sub-committees of the Council deals with women in academia. They are just starting a new mentoring programme.
- At the end of 2000, the Ministry of Science had some “end-of-the-year budget” left, which we used for a special programme. We gave 78 grants to under-graduate female students under the main criterion that they go to school to get a degree in topics in which less than 20% of the students are female. Naturally, most grantees were in engineering; each received a grant of about NIS10 000 (about US\$2 500) covering the tuition. However, each grantee is obliged to help in promoting women or girls in science and technology for about 100 hours a year. Now we have an “army” of role models. They go to high-school, they give talks and they help female students in science. This is a wonderful activity that we are going to continue in the future.

The first meeting of the Council was in April 2000. It started as an open forum of men and women alike with a special interest and involvement in strengthening the role of women in science. This was the only criterion for people to join. At first, I just asked people to join it, then other people heard about it and came from all over the country. In November 2000, the Council was formally established by an official governmental decision. The government’s Committee on Science and Technology decided to endorse the Council and to grant it a formal status of National Council for promotion of women in science and technology in Israel. So now it has a governmental “roof”. We had some legal problems, because you cannot give a governmental roof to an open forum, but we found a creative way around it. About 12 appointments for council chairpersons and other ex-officio members for three years were issued by the Minister. We then added an open advisory forum, which is informal but practically speaking, we all work together. We meet about once a month and have a forum of about 50 professors, high-tech managers, army officers, governmental officers, Parliamentary members, women’s organisations, etc. It’s a very successful operation.

3. Future

Change in Israel seems to be very much people-dependent. So what will happen in the future? What will happen when I go back to my academic life? When will the Minister be replaced? I believe that the change is there to stay. Although I had much to do with it, I succeeded because the atmosphere was right, and because – as I demonstrated – much had been done before. I just needed to implement the appropriate mechanism and to stabilise it. Having the National Council recognised by the Government is one important stabilising act. Another is that, from 2002, there will be an earmarked budget for women and science at the Ministry of Science, as part of the official budget. The annual budget is approved by law, which usually gives it the same structure. So, to remove this item from the budget in the future, one will need to justify it. I believe that promoting women and science is “politically correct” in the view of any party in Israel. Therefore, I don’t think that the next Minister, whoever that will be, is going to change this policy. I also think that our current activities and the resulting momentum contributes to the awareness of decision-makers, the media and the general public, and therefore adds stability to the operations regarding women and science in Israel.

I conclude by saying that “Helsinki 1999” made “things happen” in Israel. I personally believe that the change is there to stay, and I will do my best to guarantee it.

The policy foundations of the women's programme in South Africa

BOTLHALE TEMA

Department of Arts, Culture, Science and Technology (DACST), South Africa

The policy foundations of the women's programme in South Africa can be traced to the national Constitution itself. The basic clauses, which entrench women's rights in all forms, are as follows.

1. Basic clauses

1.1. Equality

"The State may not unfairly discriminate directly and indirectly against pregnancy, marital status, ethnic or social origin, colour, sexual orientation, age, disability, religion, conscience, belief, culture, language, birth".

1.2. Education

"Everyone has the right to:

- a basic education, including adult basic education; and
- further education, which the State, through reasonable measures, must make progressively available and accessible".

Whereas the Department of Education responds to this mandate by providing formal education to all, the Department of Arts, Culture, Science and Technology (DACST) supports the formal education systems through non-formal educational programmes. The Department of Education has developed a higher education plan on the basis of the White Paper on Education, which commits South Africa to providing education for all.

2. National Plan for Higher Education

The National Plan for Higher Education aims to develop a higher education system that will:

- Promote equity of access and fair chances of success to all who are seeking to realise their potential through higher education, while eradicating all forms of unfair discrimination and advancing redress for past inequalities.
- Meet, through well-planned and co-ordinated teaching, learning and research programmes, national development needs, including the high-skilled employment needs presented by a growing economy operating in a global environment.
- Support a democratic ethos and a culture of human rights through educational programmes and practices conducive to critical discourses and creative thinking, cultural tolerance, and a common commitment to a humane, non-racist and non-sexist social order.
- Contribute to the advancement of all forms of knowledge and scholarship, and in particular, address the diverse problems and demands of the local, national, southern African and African contexts, and uphold rigorous standards of academic quality.

Another general policy to buttress redress of previous disadvantage has recently been developed. This takes the form of the Employment Equity Act (EEA) of 1998.

3. The Employment Equity Act (EEA) No 55 of 1998

According to the EEA, affirmative action measures should be taken to ensure that suitably qualified employees from designated groups have equal employment and are equitably represented in all occupational categories and levels of the workforce. Finally, the government is in the process of developing a National Human Resource Strategy (HRDS) which takes into account all the needs of the various Ministries. The Ministries of Education, Labour and Arts, Culture, Science and Technology are directly involved in the implementation of this strategy. Equity and redress are seen as critical success factors for the HRDS in order to meet its objectives. An effective HRD programme in science, engineering and technology is therefore vital to redress this imbalance and target women and black academic staff in order to bring equity in the system. The capacity to deliver on HRDS proposed objectives and success indicators depends on well-trained women and black people.

4. The White Paper on Science and Technology

The women's programme at DACST takes place under the general programme of Public Understanding of Science, Engineering and Technology, which in turn is embedded in the Department's policy of Science and Technology of Innovation. The White Paper on Science and Technology states the following in this regard: "For the national system of innovation to become effective and successful, all South Africans must participate. This requires a society, which understands and values science, engineering and technology and their critical role in ensuring national prosperity and sustainable development. The White Paper thus lays the foundation for special programmes that promote science and technology among the general public. Two main problems with regard to women in science in South Africa have been identified and these are: limited participation and poor performance at school level; and poor retention and limited upward mobility of women in professions".

To address these issues, reliable data and sound theoretical underpinnings are required. Both the Department of Education and DACST have embarked on programmes to make available figures to track down the trends. For example, the Department of Education provides disaggregated statistics in both enrolment and performance. DACST, on the other hand, has a number of programmes that address the substance of the issue women in science and also encourage greater participation of women in the sciences.

5. Examples

The following are examples of programmes to improve the performance of women and girls in science and to encourage greater participation.

5.1. Science camps for girls

The purpose of this programme is to take girls to a camp where they will receive intensive experience in various aspects of the science subject and also interact with role models (women who already are in a scientific profession). The girls are also taken to scientific sites where they can identify possible scientific careers that they can follow. In other words, the camps have both a direct curriculum input and a motivational importance.

5.2. Reference Group for women in science

To mainstream gender and women in science in particular, DACST is in the process of putting together a gender Reference Group that will be a broad representative stakeholder body, which

will meet periodically to discuss issues relating to gender and science. The following are the key functions of the Reference Group:

- Develop and review indicators for gender equity.
- Monitor women's career paths in institutes and capture nuances in professional discrimination in institutes.
- Evaluate on a periodic basis, institutional responsiveness to gender and institutional preparedness to diagnose gender-based complaints, and nuances in gender-based professional marginalisation.
- Pro-active development and creation of spaces for the indigenous scientific knowledge in the present mainstream practice.

5.3. Research capacity development

Programmes of the National Research Foundation (NRF) address inequity in the research field. However, the Foundation makes the point that in the South African context, the issues of gender and race are closely interwoven. For this reason, it is impossible to consider gender issues without reference to race. The system of legislated apartheid policy gave rise to a system that marginalised black people and women in all sectors of education but impacted most negatively on black women. The South African patriarchal society locates women as inferior to men and consequently denied women and girls equal opportunities for education and training.

As a result, the redress programme of the NRF is directed at black people and women. A recently announced research development programme aims to achieve the following:

- To accelerate movement of the designated research group into the mainstream of national and other support.
- To improve the qualifications of the designated research group to doctoral and postdoctoral levels.
- To contribute to the sustainable research capacity development of the designated research group.
- To increase the number of established researchers from the designated research group in research nationally and internationally.

The core strategies are:

- Quality assessment and evaluation.
- Partnership agreement with institutions.
- Providing leadership and promoting overall partnerships and joint ventures with research organisations with the same objectives.
- Mentoring.
- Research capacity development of students.

6. Conclusion

To conclude, South Africa has completed the period of laying down policies for a non-racial and non-sexist democracy. We still have to record results from our arsenal of policy to address equity issues in science and technology. However, the quality of these policies and their synchronised nature, makes us confident that, within a ten-year period (which is a standard period of assessing the impact of policy), we will be able to report significant gains.

SESSION DEBATE

There was considerable interest following Lena Trojer's discussion on how the Research Councils in Sweden put gender research on the agenda and supported applications with gender research. How did they find experts to evaluate gender research? What types of research were carried out? It was felt that the role of different Research Councils in different countries varied: some were supportive of gender research, some only newly aware of this field.

At a European Union policy level, it was seen as important that the 6th Framework Programme should mention gender equity and gender research policy, and that the dialogue on these issues should continue. The debate considered how to ensure that women and science was mainstreamed in the European Research Area. Given the examples of the Nordic countries and Italy, perhaps some other countries should consider legislation to increase the number of women in public bodies. But how do these actions affect universities and is this the way to get more women to make a career in these institutions? Although a legal framework would help steps to be taken in the field of gender equity, there has to be a willingness to put this into action and a need to evaluate any change made.

The panel discussed the relative importance of activity at a national and international level, such as Beijing and activities of the Commission, particularly in getting the process started.

On the issue of statistics, the launch of a Commission study on specific data on women working in research in the private sector was mentioned. The idea of a gender impact assessment of conferences, even this conference, was also raised.

There was support for the need to change working conditions to try to combine work and family situations. It was acknowledged that time spent with families helps make people aware of where society and science meet. Affirmative actions were described in a variety of ways, either provocative or acceptable, depending on where there is extreme male domination. It is perhaps more promising to see actions to change the system, for example, adjusting training programmes to fit needs, rather than expecting women to fit programmes.

Promoting change through changing structures

BARBARA HARTUNG

Lower-Saxony Ministry of Science and Culture, Germany

Different views and issues on the subject “Benchmarking the progress of women in science” were discussed. Firstly, the fact that there is a problem should be acknowledged. Then the problem should be made visible and analysed. The question “What can be done about the problem?” should include measures that have been successful so far, not those that have not. Finally, the impact of European Union (EU) policy must be ascertained.

1. Raising awareness

To raise awareness on the “problem” there are two main approaches. The first focuses on the women, the second looks at the structures. The first track leads to positive action measures, such as raising the qualification levels of women and the number of women in science. The second track is heading towards gender mainstreaming, that is, it focuses on the analysis of the impact or outcome of certain measures for women and men and on enhancing the quality of science itself.

There was good consensus during the session that women are certainly not the problem but, of course, can present many solutions. The growing participation of women in science will enhance the democratic legitimisation and the economic competitiveness of the scientific system – a system which makes full use of all its potentials and therefore ensures the quality of its output. The resources and the capacities of women should be fully recognised and integrated into the system of science. The under-representation of women in science, especially among professors, becomes more and more illegitimate with the increasing numbers of female students which, in most countries, exceeds the percentage of male students.

2. Making the problem visible

This is, in itself, quite an aspiring task. In some countries, in South America for example, there seems to be a consensus that there are differences in the participation of men and women in science, although there are no hard data to show the differences. In other countries, such as Poland, there are statistics showing an under-representation of women (but not quite as pronounced as in many EU Member States). The situation was described as an “obstacle without obstacle”, that is, the scientific community in Poland seems unaware of disparities in the development of women and men’s scientific careers.

It was agreed that the first necessary prerequisite for tackling the “problem” is sex-disaggregated statistics. They should create the necessary transparency to show the levels of the scientific career, whether or not there are obstacles for women. Without data there will be no transparency and therefore no clarity for visions or development of possibilities to fix priorities.

Another important point is to look separately at the area of gender equity, which means promotion of women concerning increasing numbers, on the one hand, and gender mainstreaming, comprising

gender research, which concentrates mostly on the structures and on the quality of science, on the other. We agreed that in many parts of the world it is still necessary to spell the word “gender”, which is one of the most used but least understood words.

3. Analysing the situation

The analysis of the situation should focus on the central points under discussion. It is paramount to identify the right questions to set in motion the benchmarking process. Otherwise benchmarking might start along lines that are not really important and not likely to change the situation. The following main topics should be discussed intensively:

- Why are the numbers of women in science at different qualification levels so different when compared with the number of men?
- What explanations can be given at a national/international level?
- Is it a problem of the women or of the structures? (We answered that question, of course women are not the problem, the structures are.)
- Can a real mainstreaming action be carried out without placing itself inside the great movements of reform and rewriting of rules?
- What are the necessary conditions for a successful gender mainstreaming?
- How can gender research be fuelled into the right channels to change the awareness of gender inequity and the development of solutions?

4. What can be done?

The discussion focused mainly on the variety of proposals of what can be done. First of all, we answered the central question, raised by Francesca Cantú, “Can real mainstreaming actually be done without placing itself inside the great movements of reform and rewriting of rules?” In unison, “NO!”. It is of paramount importance that the structures of the scientific system be changed. This implies a reform of the legal framework and other rules which determine the science sector. The aims of the institutions, especially universities, have to be clearly defined and integrated within the rules.

In Sweden, the 1996/1997 Research Bill, as well as the Budget Bills of 1997 and 1999, were very clear on the importance of integrating gender research perspectives into the disciplines and giving gender research its regular place within the research funding system. In Italy, a structure of delegates for gender studies and equal opportunities at the universities has been set up and a co-operation between the conference of rectors and the Ministry of Equal Opportunities has been established formally.

The recommendation of the ETAN Report to set up a national steering committee on women in science has been implemented in most EU Member States and has proven very useful. Such committees, as well as councils for women and technology, or reference groups of equal opportunities officers, initiate discussions about gender issues between a variety of people with different backgrounds. These could be from universities, government and industry that share or should develop a shared commitment for the cause of women in science and technology.

The change of structures under the heading “gender mainstreaming” should be tackled at all levels, that is, national and international, governmental and non-governmental. These changes should help to integrate the gender dimension and help policy-making to gain influence. The system of regular reports to the responsible governmental agencies by universities and other institutions is a valuable instrument

to ensure that change takes place and the topic of women in science is not forgotten. Furthermore, the structures should be implemented so that they can take strong roots, they would then be unlikely to be overthrown by governmental changes or elections. Therefore, the structures should be given survival training in case of adverse political circumstances. The impact of a single person in the right place can be tremendous – but make sure the system will go on without her or him!

Assuming the qualification potential of women is there, but is hampered by structures, then specific measures could be helpful to unfold this potential, especially amongst young women. There are very encouraging examples in South Africa where science camps for girls have been set up. They will receive intensive experience of various aspects of science subjects and also interact with role models, namely women who already hold a profession in science. These camps have both a direct curriculum input and a motivational importance. In Israel, there is an “army of role models” under construction. There is also a special grant programme for under-graduate students who are given grants under the condition that they promote girls in science and technology by spending 100 hours per year helping in this topic. The aim of these measures is to build capacity and confidence among women, brought about by a meaningful, and not artificial, collaboration between the important actors in this field.

The importance and impact of gender research should be stressed. Gender research should be acknowledged as a scientific qualification and the gender perspective as a scientific tool, which enhances the quality of science in itself. The debate should therefore be focused strongly on the gain of quality for the institutions and for science as a whole by integrating the gender dimension.

These examples of best practice highlight that the changing of structures is only one part of the task. Just as important is the raising of awareness for the gender dimension and the change of attitudes towards this topic. Bringing about the necessary change in people’s head – mostly, but in no way exclusively, male – is a long-term effort which requires much patience and power.

5. What impact does EU policy have?

By focusing on “women in science”, especially in the 1990s, the EU has had a remarkable impact on the international and national debates. By setting up various programmes for women in general, and especially women in science, as well as by commissioning the ETAN Report, the EU has given the topic due attention. The Helsinki Group instrument, which was set up to follow-up the ETAN Report, has had, so far, a measurable impact on the discussion in the Member States and in the Associated States, and even further, as our colleagues from South Africa and South America reported. Furthering the dialogue between experts and decision-makers at a national, EU and international level – on an equal footing between the EU Member States, the Associated States and other countries of all parts of the world – is an important task for the future. It is also important to integrate gender aspects in the policy of the EU and of the individual Member States and Associated States. Last but not least, good ideas need good financing. Above all, there should be enough flexibility to be able to react quickly to new ideas, which require new tools and appropriate financing. By these co-ordinated efforts, changing structures and raising awareness should bring about visible change.

The background of the page features several thick, light gray wavy lines that sweep across the upper half. Scattered throughout the page are several light gray five-pointed stars of varying sizes, some appearing to be part of a larger constellation or pattern.

CHAPTER 6

SHAPING GENDER IN RESEARCH

The “Shaping gender in research” thematic session was based on the critical analysis of women’s experience in science. Scientists, from different countries and academic background, were asked to present their experience and analyse how they, or others, were confronted by male bias. A key point was to look at how progress can be made to produce gender equality in science. Possible areas to consider included a critical assessment of excellence recognition, scientific career structure, work organisation and choice of research area.

Sexism, support and survival in academia: the Finnish experience

LIISA HUSU

University of Helsinki, Finland

I will deal with sexism and gender discrimination as experienced by academic women in Finland. Finland is the country with the highest proportion of women in the professorate within the European Union (EU), 20% in 2000, and one of the leading countries in the world when it comes to relative gender equality (UNDP, 1995-2001). Finland is also a country that invests heavily in research and development (R&D). The input in R&D almost doubled in the 1990s, rising from 2% in 1991 to 3.2% of the GNP in 1999, which was the second highest level after Sweden in the EU. Finland now ranks among the top countries in the world in R&D intensity, alongside Japan, South Korea, the United States and Sweden (*Science and Technology in Finland*, 2000). As a counter-balance to accounts of sexism and gender discrimination, I will also address perceived support in academic women's careers and survival and coping strategies they employ, in order to stay and advance in academia. This paper is based on my recent doctoral thesis in sociology at the University of Helsinki (Husu, 2001).

Formal obstacles to women's scientific careers have been abolished in most industrialised countries and overt discrimination can currently be challenged by using gender equality legislation. In Finland, the Gender Equality Act, which came into force in 1987, made gender discrimination more visible and some academic women have made use of it to make formal discrimination complaints. In 1988-1999, the Equality Ombudsman had given a statement on 68 work-related discrimination complaints from universities, and in 2000, received nine such complaints (Husu, 2001). Some of them have proceeded to court, and in some cases, universities have paid compensation to the plaintiff for breaking the Gender Equality Act. However, no systematic analysis has been conducted on these complaints and their outcomes so far. Sanctioning of gender discrimination by law has thus, on the one hand, made blatant discrimination more visible because of the possibility of taking one's case to the court. However, on the other hand, it has led to lots of gender discrimination becoming more subtle and covert and thus more problematic to intervene against. Universities and, more generally, the scientific community, aim to promote women's research careers in many ways and by many measures. For Finland, see for example, University of Helsinki <http://www.helsinki.fi/tasa-arvo/english/>; for the Academy of Finland, see <http://www.aka.fi/in-English/About-Academy/equality-policy>; on European perspectives, see Fogelberg et al., *Higher Education in Europe*, XXV:2, 1999.

Internationally speaking, women's educational level is very high in Finland. Working age women are already better educated than equivalent men are (*Women and Men in Finland*, 2001). When it comes to higher education, Finland is the only EU country where, on average, more women aged 25-64 have higher qualifications than equivalent men (34% for women, 28% for men). In most EU countries men tend to have these qualifications slightly more often than women, the EU average being 22% for men and 19% for women (Eurostat, 2001). In Finland, women comprised 45% of those obtaining a Ph.D. in 2000. However, according to several recent surveys conducted in Finnish universities, academic women and men assess the realisation of gender equality very differently (see Husu, 2001). When asked about this, the majority of men see the situation as rather non-problematic from the gender point of view. Women are more critical and dissatisfied with their situation.

The key question in my study was how persistently gender inequalities are reproduced but also challenged in the Finnish academic setting. I approached this issue by studying academic women's accounts of experiences of sexism and gender discrimination, especially its subtle and covert forms, as well as the support experienced in their career and their survival strategies. The study used Joan Acker's framework of gendered organisations (Acker, 1992). The study was a qualitative study using in-depth interviews and written accounts by academic women, altogether 102 informants from 11 (out of 20) Finnish universities and 33 disciplines, representing all major disciplinary fields. Informants ranged from young academics in the early phases of their career, to those in mid-career and well-established female professors. Among them were women with various class backgrounds, women who were single or divorced and those who lived with a partner, mothers and non-mothers, feminists and non-feminists. The data was gathered in 1995-1999.

Some key highlights would be, firstly, that gender discrimination experiences were not restricted to any career phase, for example, before or after obtaining a doctorate. Women at all stages of their careers reported and described various gender discrimination experiences, either their own or those occurring to other women and which they had witnessed, and in some cases intervened against. Also, gender discrimination experienced by academic women took multiple forms and occurred in various academic arenas. The qualitative methodology facilitated the exploration of processes of discrimination and their contexts rather than restricting the study to individual incidents. The significance of a single event that was understood as discriminatory or sexist can often only be understood when placed in a process perspective or in a biographical context.

Informants described a variety of discrimination experiences and there were a variety of academic "arenas" where women experienced gender discrimination in the seemingly gender neutral and gender equal Finnish academia. To list them very briefly some discrimination experiences were linked to academic culture and workplace climate. These were women's relative invisibility, exclusion, isolation, sex role spill over, women being treated more as women rather than as colleagues and professionals (see Gutek and Cohen, 1992). Discrimination was experienced sometimes in recruitment to academic posts and research groups and in career advancement. Some informants had made formal complaints on the basis of discrimination in recruitment to academic posts. Gender biases were found in assessing merits. Women reported various non-transparent practices of recruitment. One example of this is the procedure of appointment of professors by invitation in Finland (for a more detailed account see Husu 2000 and 2001), that is also taken up in the ETAN report (2000).

In working conditions, different subtle discrimination could occur in the formal and informal division of labour in departments, laboratories or research groups. Differential treatment of women and men was sometimes reported in the division of office or laboratory space, equipment, computers, sometimes in the possibility to use secretarial help. Sometimes, women also felt discriminated against in access to information, that is, the problem of getting access to preliminary, important, strategic, often confidential information, not the information academics are currently bombarded with electronically and by paper. Academic women, in some cases in relatively high positions, sometimes told me how they were sidelined or excluded from this kind of information flow in their academic settings.

The doctoral years appeared to be a vulnerable career phase in many ways. Pregnancy and maternity leave was another problematic time for many, and these two vulnerable phases often coincide. Finland has, from an international perspective, good provisions for parental leave and publicly funded childcare. However, young academic women in fixed-term contracts experienced

various forms of differential treatment, because of pregnancy, motherhood and parental leave. These women wanted to combine an academic career and family (and most Finnish academic women do so) but the research system treats these young academic mothers in many ways that are against gender equality principles. (For more details on how academia encounters motherhood in Finland, see chapter 8 in Husu, 2001).

Sexual harassment takes many forms in academic settings. Finnish universities developed policies and interventions related to sexual harassment only in the late 1990s. The harshest cases in my data included sexual harassment by the doctoral thesis supervisors towards the women they were supervising, some of them very long-term. These cases were really difficult to intervene against from the perspective of the doctoral students. Senior female academics who had attempted to intervene sometimes became targets of retaliation themselves. Sexism and gender discrimination take multiple forms and often, subtle discrimination takes the form of “non-events”: silences, omissions, absences, subtle exclusions, ignoring and invisibility, lack of support and lack of encouragement. What happens is actually that “nothing happens”: you are not seen, heard, paid attention to, asked along, referred to. Responding to these kinds of non-events or ignoring is difficult, and sometimes nearly impossible.

Discrimination and sexism are often sensitive issues and difficult to take up. Thus they may remain covered and unknown to most people in the organisation except those directly involved. Women prefer not to talk about their discrimination experiences in public and often not even to their colleagues, because they may be afraid of causing difficulties in their career or being labelled as *persona non grata* or as “non co-operative” or problematic. It proved to be emotionally difficult and challenging for academic women to discuss gender discrimination and sexism. Speaking or writing about these experiences could be described as repulsive or psychologically threatening or dangerous. Despite that, it should be stressed that most of my informants described various ways in which they tried actively to counteract and intervene in sexist or discriminatory practices they had encountered. Thus they were active actors, not passive victims.

What supported women in their academic careers? The support from their close academic setting (own department or unit) proved to be rather scarce. Very few had developed their careers with the protection or help of a powerful academic mentor. However, some of the senior women had had peer mentors who, interestingly, were self-acquired. These were, in some cases, businesswomen, or successful female artists or women working in high positions outside academia. It should be pointed out that official mentor programmes in Finnish academia are scarce and quite a recent phenomenon. The support academic women experienced from the academic community was also gendered. Female professors and colleagues were described as more supportive, and this support was qualitatively different from the one from male colleagues. The support from women was described as more long-term and more profound. Support that came from the private sphere was paramount. Parents, partners and friends were described as very supportive indeed. Academic endogamy – having a partner who is also an academic – was very common among the interviewees. One can ask whether academic monogamy is a subconscious survival strategy for academic women. This is an issue that should be discussed and studied more in detail.

How do academic women survive in academia? I divided what I chose to call their “survival strategies” into action strategies, on the one hand, and reflective strategies, on the other hand.

Action strategies included those focusing mainly on the individual, or mainly on interaction, or mainly on the organisation. Briefly, individual strategies included, for example, hard work and

effective time use, moderating one's looks, dress, voice, stressing one's maternal role in order to protect oneself from sexual harassment, and tactically timing and sometimes shortening maternity leave. Interaction strategies included, for example, building unofficial support networks, searching support from outside academia, tactically using humour in interaction, behaving as "a good bloke" and aiming to preserve the face of male academics in interaction. Organisational strategies included, for example, allying with other women in the setting, mentoring younger female colleagues, and searching alternative routes when the traditional ones looked stuck.

In reflective strategies, the main focus was not action but contemplation and reflection on one's own place in academia and one's own opportunities. Many of those women who were in insecure non-tenured positions told me that they mentally kept a "back door" or "back gate" open, an alternative career option, outside academia. An interviewee in natural sciences, who left academia and has made a very successful and upwardly mobile career outside academia, being currently in a high management position reflected: "I think I am pretty good in that, that when they try to raise a wall in front of me in some issue, I'll always find some kind of a route that those who have raised the wall have never been able to imagine [...]. But I have thought many times that it does tell something sort of quite awful about the Finnish power system, I mean about these unwritten laws, that a person has to be in a way as strong and as independent as I am [in order to cope]".

Discrimination experiences could also be seen in new light as a result of some dramatic life events, death of a close relative or own serious illness. And finally, one reflective strategy was "sisu", as we call it in Finnish, a certain kind of perseverance: not giving up despite difficulties. As one of the interviewees, a head of department in a very male-dominated field would advise her young female colleagues: "You cannot do anything else, so you have to defend yourself, you must never go into hiding, but you have to become stronger and more ruthless, and play the same game or attack when the situation changes or becomes visible".

Finnish academic women didn't believe that their position would improve by itself when academia became more feminised, but believed that gender equality issues should constantly be kept on the agenda in academic environments. The means suggested to improve things were diverse: more research on gender issues and inequalities in academia, more media coverage, training courses, equality committees, etc. Many interviewees saw that multiple methods and arenas should be used, "everything helps". A successful female professor in her mid-50s, head of department with a large research group, reflects on how to promote gender equality in academia: "Generally, let's say that discussion helps, one cannot forbid stupidity by law; violence, aggression, domestic fights cannot be forbidden by law. There are many people that nothing helps [...]. But then there are also quite many people who are surprised that "oh dear, this did not come into my mind at all". In that sense, it is important to bring out examples, publicity, writing and different channels, where you can complain, or quarrels that do not lead anywhere, but keep the issue on the agenda. Because this issue [of gender equality] has not been gone through fully. [...] Another new hard macho generation is coming up again, so this issue will possibly never be solved, but it should be kept up all the time. A little like smoking. It was believed that some kind of achievement was reached, after ten years doing anti-smoking campaigns. [...] It was believed that people are not smoking anymore. You do not need to be lazy in preventing publicity, but after a year or two, smoking bursts out everywhere again. It is quite the same with gender equality."

References

- Acker, Joan, "Gendering organizational theory", pp. 248-260 in Albert J. Mills and Peta Tancred (eds.), *Gendering Organizational Analysis*, Newbury Park, London and New Delhi, Sage, 1992.
- ETAN (European Technology Assessment Network), *Science policies in the European Union. Promoting excellence through mainstreaming gender equality. A Report from the ETAN Network on Women and Science*, European Commission, Research Directorate-General, Brussels, 2000.
- Eurostat, "Education levels in the EU constantly rising", *News Release*, no 57/2001.
- Fogelberg Paul, Hearn Jeff, Husu Liisa and Mankkinen Teija (eds.), *Hard Work in the Academy. Research and Interventions on Gender Inequalities in Higher Education*, Helsinki University Press, Helsinki, 1999.
- Gutek Barbara A. and Cohen Groff Aaron, "Sex ratios, sex role spill over, and sex at work: a comparison of men's and women's experiences", pp. 133-150 in Albert J. Mills and Peta Tancred (eds.), *Gendering Organizational Analysis*, Newbury Park, Sage, London and New Delhi, 1992.
- *Higher Education in Europe XXV*, 2000:2.
- Husu, Liisa, *Sexism, support and survival in academia. Academic women and hidden discrimination*, University of Helsinki, Social psychological studies 6, 2001.
- Husu, Liisa, "Gender discrimination in the Promised Land of gender equality", *Higher Education in Europe XXV*, 2000:2, pp. 221-228.
- "Science and Technology in Finland 2000", *Statistics Finland – Science, Technology and Research*, 2001:2.
- United Nations, United Nations Development Programme UNDP, *Human Development Reports*, 1995-2001, <http://www.undp.org/hdro>.
- "Women and men in Finland 2001", *Statistics Finland – Gender Statistics*, 2001:2.

Gender in the career paths of Ph.D. women scientists in the scientific workforce

ANNE J. MACLACHLAN

Centre for Studies in Higher Education, University of California Berkeley, United States

1. Introduction

This paper presents the research on women scientists' careers based on a study which began in 1999 *A Longitudinal Study of Minority Ph.D.s from 1980-1990 – Progress and Outcomes in Science and Engineering at the University of California during Graduate School and Professional Life*. The project examines the graduate school success and subsequent career path of all minority graduates who earned Ph.D.s from a University of California campus between 1980 and 1990 (N=415) and a matched group of U.S. citizens (N=400) from the same departments. The data was collected in telephone interviews lasting from two to four hours, based on an extensive standard questionnaire.

While the focus of the study is on the American minority experience, people from all ethnic groups are included. Women in the study, regardless of ethnicity, occupy a minority position in that no science or engineering department at any University of California campus granted a Ph.D. to more than a few women between 1980 and 1990. When these women went on to postdoctoral positions or to other employment, they remained a minority in their respective workplace. Now commonly in senior positions, these women, with as much as twenty odd years in the workforce, have developed successful strategies for promoting their own careers while maintaining their scientific credentials and reconciling family obligations. The primary question for this paper is the extent to which gender influenced the career choices these women made and what other elements may have affected these choices. As gender discrimination is a difficult concept to measure, the secondary question is how gender discrimination can be measured.

From the already completed interviews of 36 women in this study, it is clear that there is no particular path towards a successful scientific career, but a series of choices, determined by individual desires and circumstances, often shaped by the fact that they are women. Issues along the way have included: unfortunate choices of postdoctoral work, working in a succession of positions before finding the right type of employer or work, being very successful within an organisation, but blocked from promotion, eschewing promotions if it meant giving up research. Several made the choice to do good science, which resulted in a secure and increasingly prestigious position.

The focus is on the extent to which the fact of being a woman influences her career path and how gender relations influence the career and scientific development of women. Gender in this context is understood to mean the complex of social and power relationships between men and women which particularly influence the careers of women and which can, but does not have to, result in gender discrimination. The women in this study are subject to many influences on their career choices, a very significant one being the desire to continue to do interesting science. Since the study includes women of colour, elements of racism also play a role. But so too does family background and class, political sophistication, personal desires for a particular kind of life style, and reconciling family with work.

Between 1980 and 1990, Berkeley graduated 4 138 Ph.D.s in Science, Mathematics, Engineering and Technology (SMET) fields. Of these, 771 or 18.6% were women of whom 555 were white, 105 were ethnic minorities and 95 were non-United States citizens. Of the 36 discussed in this paper, 9 are

African American, 5 are Asian American, 5 are Mexican American, 4 are Hispanic, 1 is Filipino, 11 are white and 1 is Native American. All people in the study are U.S. citizens. They earned their Ph.D.s in a range of scientific fields including chemistry, biochemistry, mathematics, astronomy, zoology, palaeontology, physiology, microbiology, biophysics, public health, agricultural and resource economics. One of the 36 women earned a Ph.D. in physics, 2 in chemical engineering. Although the largest single group interviewed is white, all of the women felt themselves to be in a minority position at one time or another, often as the only woman in her cohort in graduate school, or the only woman of colour (See Table 1).

Table 1: UC Berkeley Science and Engineering Ph.D.s 1980-1990

Ethnicity	Total	Men	%	Women	%
Asian	347	282	81.30	65	18.70
Black	54	39	72.20	15	27.80
Chicano	24	19	79.20	5	20.80
Filipino	5	3	60.00	2	40.00
Nat. American	9	6	66.70	3	33.30
Other Hispanics	57	43	75.40	14	24.60
Others	142	125	88.00	17	12.00
White	2 464	1 909	77.50	555	22.50
Foreign	1 036	941	90.80	95	9.20
Total	4 138	3 367	81.40	771	18.60

Source: UC Berkeley Graduate Division Database

2. Education, postdoctoral experiences and career paths

Many of these women completed a Ph.D. despite experiences of being the only one or one of a few girls in advanced classes and programmes in elementary school, and in mathematics and science classes in high school and college. As a result, they are distinguished by their tenacity and intelligence accompanied by a fairly high degree of self-awareness. Yet their paths to a Ph.D. were very different. All attended public or parochial schools and one attended a segregated elementary school. These paths are significant in later life in that they exercise a substantial influence on which part of the country a woman wants to work in and at what type of institution. A few went to high schools that had the full range of science and mathematics classes, but many did not. More attended rural and suburban schools than urban schools, very few had the opportunity to participate in more elaborate science programmes than their schools' science fair. Although one respondent remarked that her father's chief interest was women, the greatest majority had parents or another relative who were completely supportive and encouraging – even if, as in a few cases, neither parent had much more than an elementary education.

The undergraduate years of these women were more similar because the women were science majors and exposed to research either as part of a class, through summer employment, or an internship. For most of them this exposure to research was the key element in creating a desire for further education and a research career. Viewed quantitatively, these women were no different from men. Like any other successful science major who goes on to graduate school, they received good grades, usually finished their undergraduate degrees in four years and applied to graduate programmes in the same fields or closely related ones.

Graduate school started a process in which scientific interests were defined and developed, although graduate school and postdoctoral experiences varied greatly. Several women in this study identified the research area most congenial after one or more postdoctoral appointments. Twenty-one of the women had one or more postdoctoral appointments and for most the experience was positive, although in different ways: "What I was able to learn from people working with me got me started on research directions that I am still working on" and "I learned new topics, fields of science and of experiments to do." However, in one case, "the postdoc had less impact on my career than my graduate school experience, except for grant writing." Another "realised I was interested in alternatives to doing research in academia," and another "missed teaching, I learned I didn't enjoy full time research." Yet another had such a negative experience of academic politics that she left science and retrained as a lawyer. Whether positive or negative, postdoctoral experiences exercised a great influence on the future career development of those women who had postdoctoral appointments.

Today these 36 women hold a range of positions: 17 teach in colleges and universities, 4 hold academic research positions at universities, 5 are in federal government laboratories and agencies, 5 are researchers in private industry, one is a science librarian, one runs an alternative educational organisation, one is a lawyer, one is a senior health educator, and one has left the workforce to have children. Their paths to their current positions vary enormously although the large majority indicate high levels of satisfaction with these positions. Getting to the "right" position was not always easy and some overcame a series of obstacles along the way.

The paths of the 17 who teach in colleges or universities differed from each other substantially. Two of the 17 chose to teach at an Historically Black College or University (HBCU) and took their positions soon after graduate school, motivated by a desire to serve their communities and to return to the area of their families. One is very satisfied with her position and the other would like to be able to do more research. A third interviewee said she wished to teach at an HBCU. However, she was tied to the San Francisco Bay Area so she trained as a science librarian and works at a predominately Black high school. A fourth was also kept from realising her ambition to become a faculty member of a HBCU by family constraints. Other minority women also made choices of institution based on their ability to serve their communities better and to work in an environment they consider comfortable. For example, one minority woman left an academic job she held in the South, after three years, because of unacknowledged racism, a heavy teaching load, and little opportunity to do research. In her second position, at a much more prestigious university, she ran into difficulties because her work was superior and far exceeded the requirements of her position. Other (male) faculty members wanted her to stay in her inferior job. She was told, "You are too big for your britches for a woman and if you don't stay [put] we will run you out on a rail." She had lots of support outside of her immediate work environment as she had won very prestigious NSF funding. But it was not a good fit, and frustrated by her treatment, she left to work with an unconventional teaching group, which she finds much more in harmony with her worldview.

Other women, both minority and white, are presently faculty members mainly at the associate or full professor level at institutions such as the University of Washington, University of Chicago, University of Colorado, University of Arizona, Washington University of St. Louis, University of Minnesota, several California State Universities (CSUs), Marshall University, East Carolina University, and Mission College. Most indicate they are fairly satisfied, but academic environments can be heavily influenced positively and negatively with a change in department chair, dean, or other administrator. Colleagues too make quite a difference to department climate. Not every one of the women passed into the tenured ranks without incident, but the majority did. Quite apart from the demands of teaching and research a large number of these women succeeded in reconciling having

husbands and/or children, often by taking an indirect path to her present position. One woman worked half-time since 1985 at a major research university in order to be able to work at the same institute as her husband. To her great satisfaction she became the director of the programme she had been involved in. Others have worked part-time so that they could have and raise children. Some managed to have their children during the summer or when on sabbatical.

One of the most engaging stories was of a “wonderful and warm” job interview at a California State University. The former candidate said, “I brought my baby to the interview and was breast-feeding her. The President was a Black woman and wonderful. I preferred to be in a less prestigious place where there was support than to be in a more prestigious place where there was racism and sexism.” Another woman and her husband managed to secure good positions at the same university. Yet another who was regularly employed by a major research university as was her husband remarked, “I watched my salary drop consistently behind my husband’s for 15 years.” Her salary has recently been brought up to scale – in her view, a direct consequence of the action taken by MIT to reduce faculty inequities.

The much smaller number of women working in other areas than college and university teaching have had equally varied experiences with their employers. The five in private industry are now content. One has stayed with the same company and is now a divisional director, satisfied to be using both technical and administrative skills developed at the company. By contrast, another employed in industry held six positions – one essentially as a salesperson – before finding one that she considered a good fit. Another scientist employed by a multinational pharmaceutical firm was thought well enough of within the firm to win prizes constantly for her work. Yet she was prevented from rising beyond her classification and moved laterally to expand her scientific knowledge and to find better work environments. Eventually she resigned to have children as she saw no purpose in continuing to work for an organisation which valued her talent and expertise one way, but denied her the recognition of promotion.

Some respondents moved from academia to industry, motivated by finding that decisions about what was good science were market-driven. Those four in academic research by contrast seem satisfied with the scientific work they are doing. The lawyer would have liked to have a career in teaching, but because she wished to remain in the Bay Area she uses her scientific training in patent law.

3. The workplace environment

Whatever their workplace, those women who have been exposed to serious racist and/or sexist behaviours do not dwell on these events. Many of the minority women have referred to ineffable racism and often sexism, as have some of the white women. One woman at a federal lab was subjected to stripper calendars in the lab and sexist and racist remarks from her supervisor (characterised as a good old boy from the oilfields of Texas) from the beginning of her employment. Several rounds of sexual harassment training over 15 years have only succeeded in moving the calendar to the supervisor’s locker, and stopping the most offensive remarks. But the scientist remains at the lab because she gets to do “interesting stuff at times, despite the bureaucracy”. She didn’t even mention her supervisor’s behaviour as negative because they now both consider themselves to have come to equitable terms with one another. She did mention, however, the irony of her supervisor earning “brownie points” with the administration for hiring women and minorities into his lab.

What emerges from the experiences of these women is the frequent conflict with the system governing the workplace. Very commonly there is an organisational dynamic which women are not

interested in. They find that it interferes with their own priorities, yet can prevent them from receiving the same treatment as men in the organisation. This applies across all the workplaces discussed here. Some of the women in this study have so-called “model” careers in that they did all the right things, made the right connections, and thus passed to the upper levels of their organisations. More commonly these women are white.

Beyond this dynamic, however, is the behaviour of individual men (and women) toward the women of the study. The academy tends to be the most territorial and uncivil of workplaces according to the experience of both the men and women interviewed without respect to the broader literature. Gender, as defined at the beginning of this paper as the complex of social and power relationships between men and women, plays a significant role here and results in a range of discriminatory behaviours. Because the study is very broad and I wish to emphasise success rather than barriers, the questionnaire did not ask detailed questions about treatment of those interviewed in terms of specific discriminatory acts. Yet because of detailed questions about progress through graduate school and through every position thereafter, a large number of women reported problems. At the same time most of these women say that these problems were not that important and did not necessarily impede their careers. Generally it is not characteristic of professional women to complain. Far more characteristic is to deny that sexism exists or that they have been influenced by it.

By way of contrast it is useful to look at the structure of another study I did, whose goal was to measure the extent to which gender discrimination and sexual harassment had influenced career development. Commissioned by Women in Ophthalmology (WIO), a subgroup of the American Academy of Ophthalmology, it asked specific questions created by members of WIO and myself, relevant for medical workplaces, but in most cases transferable to other scientific workplaces. The questions were:

1. Male colleagues do not share important information with you
2. You are treated as if invisible
3. You are ignored at conferences
4. You receive fewer invitations to present your work than your male colleagues do
5. A male supervisor criticises your work, not that of men
6. A male supervisor/teacher fails to provide professional guidance or fails to act as a mentor for you
7. Men actively denigrate you in your environment
8. Male colleagues fail to consult with you or consult only rarely
9. Male colleagues do not, or seldom, refer patients to you
10. You are promoted more slowly than males at your level
11. You are actively discouraged from publishing in your field by male colleagues or your supervisor
12. You have fewer resources at your disposal than male colleagues such as space, equipment and staff
13. You earn less than men doing comparable work
14. Other

For women ophthalmologists the results deriving from these questions are stunning: 102 respondents or 80% of those returning surveys (N=128) agreed that they had experienced gender discrimination at some time in their careers. The two areas of discrimination that ranked highest were lack of mentoring and being treated as invisible, both equally ranked. The issue of least concern was whether they had been discouraged from publishing. Only 19 or 15% of all respondents, however, clearly answered “yes” to the question of whether they had career problems as a result of mistreatment (including sexual harassment).

For the 36 female scientists and engineers who participated in the current study, the reporting on discrimination, whether gender or ethnicity based, or both, is similarly muted as that of the women ophthalmologists. Very few report that discrimination had any effect on their career at all, although several report one or more instances at critical times of their career development. Examples include a professor who didn't want to write a letter of recommendation for a woman engineer, implying that women shouldn't be in engineering. (She made it without it). Another woman was told "the [x] group is no place for a woman" when she was trying to find her doctoral research group. (She went to another). Yet another experienced verbal harassment, denigration and insults in graduate school from a faculty in her department. Several Asian-Americans in the study also referred to Wen Ho Lee as a lightning rod for evaluating their own treatment in all workplaces, but particularly in National Labs. He is the scientist at Los Alamos National Laboratory arrested for allegedly passing classified data to the Chinese government. His treatment served as a catalyst for realising the extent of disparate treatment among this group and stimulated an increased awareness of workplace discrimination for other groups. More commonly, non-Asian women refer to particular instances of sexist and/or racist behaviour. They may feel it is pervasive, but few characterised it as systemic as several Asian-Americans have.

4. Conclusion

All this matters very much for understanding the career paths of American female scientists and engineers. Discrimination is hard to measure, and its effects hard to verify concretely, except in quantitative form such as lower salaries, less lab space, fewer resources. The frequency of incidents of discriminatory behaviours among these 36 women combined with forms of workplace organisation which are at best non-supportive, at worst antagonistic, can drive women out of scientific workplaces. Yet, what stands out from these experiences is the resourcefulness and tenacity in finding employment solutions that enabled these women to use their scientific training, and also serve others, have a family, and continue to do interesting science. Three women are still in positions they began immediately after the Ph.D. and most have reached their current jobs after two or three job changes, including their postdocs. Only one has changed positions six times, one has eight times, and two have seven times. A bigger constraint than any other was the need for several to stay in the San Francisco Bay Area. An astounding 13 succeeded in doing so, some making greater compromises with career ambitions than others, but still managing to find what they considered appropriate work. In this study the respondents were asked to define success and to apply their criteria to their own careers. Most of the women said they are pretty satisfied because, in addition to doing good science, they have satisfied other criteria such as bringing up healthy and happy children, teaching effectively, making a contribution to their community, caring for ageing parents, and keeping their families together. Some, of course, define success purely in terms of science and are satisfied that they are doing significant scientific work.

Have their sex and gender relations affected the careers of these women? It is fair to say, on the basis of the women's own testimony, that it has. At the same time, it is remarkable that, with between 11 and 21 years in the workforce, so many of these Berkeley women have achieved positions of responsibility and prestige, although few seem to care about prestige at all. Although they are tough and resilient, ingenious in finding ways to reconcile doing science and all the other obligations they feel, the question is open if, under less arduous circumstances, they could have been even more successful in the pursuit of science?

Acknowledgements

I would like to thank the Spencer Foundation and the University Industry Co-operative Research Programme for their generous support of this work. I would also like to thank the anonymous participants of this study for their willing participation and thoughtful contributions.

Between stereotype and reality: the need for a debate on the diverse nature of the academic career

KOEN VERLAECKT

Science, Technology and Innovation Division, Ministry of Flanders, Belgium

1. Introduction

Within the concept of the European Research Area, a good deal of attention is rightly devoted to the crucial role of human resources in the field of science and technological innovation. Human capital is the key to innovation and growth, it leads to the introduction of new processes and products in industry, and serves as a conduit for transnational and inter-sectoral technology transfer¹. Investment in human resources for science and technology is key to deliver the ambitious commitment by the European Heads of Government and Heads of State at the 2000 Lisbon Summit to make Europe the most competitive knowledge-based region in the world. Specific challenges to the European Research Area include: creating a greater mobility of researchers (both transnationally and between the academic and industrial research environments); introducing a European dimension in the development of scientific careers; giving a greater place and role to women in research; and stimulating the young generations to go for a career in science and technology². A variety of important initiatives have been initiated by the European Commission, among which the Communications “Women and Science”³, “Science and Society Action Plan”⁴ and “A mobility strategy for the European Research Area”⁵. This paper will focus on the need to involve and keep a larger segment of women within the scientific enterprise. For practical reasons, this will be restricted to the academic research community.

Reflecting on the current highly publicised under-representation of women in scientific enterprises, one might think that the political interest in this issue is mainly generated by concerns over the economic repercussions (in terms of the erosion of Europe’s potential for innovation), and not so much by a sudden realisation by the male part of the scientific world that something is structurally wrong and needs to be fixed urgently. Whatever the driving forces behind this high profile visibility, it is important to realise that the strong link between the under-representation of female researchers and its economic impact provides the European research community with a unique and crucial opportunity to start coming around and to formulate and implement structural solutions. We think it is important to adopt a strategy that raises the debate above the current stage of awareness-building. The problem will not be solved by restricting ourselves to making the problem visible and tangible through targeted statistical data collection, conferences and exchange of best practices in European Union (EU) Member States and Candidate Countries. It is not that these activities and their multiplicative effects don’t contribute anything significant to a structural solution. We simply believe that the stage of raising awareness on the issue across Europe has now gained a momentum, which should not be expanded upon for the sake of expanding it. We should think hard about ways to carry the debate forward to reach solutions. In such a strategic approach we are convinced that thought should be given to the true nature of scientific careers and to the

¹ *Mobilising Human Resources for Innovation*, OECD, Paris, 2000:7.

² *Towards a European Research Area*, Communication from the Commission to the Council, the European Parliament, the Economic and Social Committee and the Committee of the Regions, 2000:19-21.

³ COM(99)76.

⁴ COM(2001)714.

⁵ COM(2001)331.

necessity of involving men (researchers, governmental policy-makers and decision-makers at universities and research institutes) in the debate.

2. Stereotype versus reality

The way research careers in the 21st century are regarded by the outside world is heavily dominated by the output-driven stereotype of the scientist who has to publish at all costs to survive (“publish or perish”). The emphasis on the research output and the direct link between the quality of this output (still overwhelmingly defined in terms of citation indices and impact factors) and the allocation of research funds have become key factors in the strategic planning of governments and research funding agencies. In the last couple of decades, the “unwritten social contract” between science and society has changed from the unquestioned provision of public money to the curiosity-driven research endeavour in the past to an increasing demand for science being accountable to the public⁶. Measuring the quality of scientists in terms of their research output and the frequently associated use of bibliometric assessments has thus been inspired by the realisation that the use of public funds for research must fit the principle of the best possible value for society’s money. In the United Kingdom, this has been translated in the competition-generating tool of the Research Assessment Exercise (RAE)⁷. Other countries, such as The Netherlands, have also implemented a detailed system of integrated quality assessment⁸, without, however, linking this to budgetary flows. The emphasis on publications as the basic instrument in the peer review process, however important and necessary, is present throughout all the phases of an individual scientific career: publications are key to get a project funded, to get promoted or to get a tenured position at a university. Research results are only considered of good quality if they are published in well-cited and peer-reviewed international journals.

The output-driven nature of current research leads to serious competition and frictions between universities and research institutes and to increased stress for individual researchers. Healthy competition for research funds is excellent, since it sharpens creativity and reduces the chances that low-quality science gets funded. However, an over-emphasis on output-driven indicators can be detrimental to the science system. It might not only de-motivate researchers, who have to devote an increasing share of their valuable time to prepare for internal and external assessments and reviews (including meta-assessments), but it might also stop the younger generation, who represent the pool for future scientists, from becoming scientists.

The emphasis on publications as the Holy Grail of research output forgets about the crucial aspect that a scientist is a human being, whose career is devoted mainly, but not exclusively to research. Using publications as the only yardstick for quality means turning a blind eye to the diversified nature of a scientific career. Beyond research there are other activities, which represent a major commitment in time and energy by senior researchers: expert work, teaching, coaching of doctoral students and postdoctoral fellows, project management, popularisation of research results, refereeing, serving on evaluation boards, to name only a few. On top of that, the importance of behavioural and organisational skills should not be neglected when trying to assess the quality of an individual researcher. This wide variety of tasks brings both opportunities and duties⁹.

⁶ *Consensus conference on the theory and practice of research assessment, Capri, October 1996*, European Science Policy Briefing 3, European Science Foundation, 1998.

⁷ <http://www.rae.ac.uk>

⁸ For the methodology, see *Assessment of Research Quality, Protocol 1998*, Utrecht (available at <http://www.vsnunl.nl>).

⁹ Kennedy, D., *Academic Duty*, Harvard U.P., 1997.

Universities often have a threefold mission statement: education, research and so-called services to society. This third pillar poses a huge problem, although theoretically it carries the same weight as education and research. It is still too common that a researcher who is committing himself/herself to give value to his/her research results by communicating with the general public is regarded as someone dealing with less interesting things than a “normal” researcher is not supposed to take on. As long as there is no real serious assessment of the merit of such activities, we will be faced with problems.

A correct appreciation of the diversified nature of a scientific career will lead to a more attractive research environment, which is favourable to both young, promising researchers and to established researchers. Such open-minded assessments, which go beyond the quantification of quality in terms of publications only, allow us to include and to appreciate the human nature of the research endeavour. This can only be beneficial to all researchers, male and female, young and established, who suffer from a narrow-minded statistical treatment of their “output”.

3. Going for the debate

Opening the debate on the diversified nature of scientific careers creates big challenges, one of which inevitably will be the development of new diversified assessment methods (combining quantitative and qualitative parameters). At the same time, however, it will provide us with a unique opportunity to explain to the public in general and the younger generations of would-be researchers in particular, that doing science is more than publishing. In other words, it will allow the old concept of the “magic of science” in all its diversified richness to be transferred to the future generation of scientists.

Furthermore, it is to be expected that the reality debate on the human nature of scientific careers will create a larger platform for discussing and finding solutions for structural problems, which are caused by human factors, including the under-representation of women in research. As such, the debate will be owned by the academic community itself, and the drive to find solutions will be much stronger than today. In advocating this diversified approach to scientific careers, it is an absolute necessity to include male researchers and decision-makers in the debate from the very beginning. By underlining that the diversity strategy is beneficial to both male and female researchers, it will be easier to tackle the problem of the under-representation of women in senior academic research posts.

One might object that the integration of the under-representation of female researchers in a wider debate on the diverse nature of scientific careers will lead to less visibility and less leverage to solve this particular issue. One cannot deny that this poses a real danger if the debate is initiated by the senior management of universities, academies, research institutes and funding agencies, which apart from a few notable exceptions are still highly dominated by men. The debate must start at ground level, on the work-floor; between researchers themselves. This is the only way to raise awareness on the problem with decision-makers in the various institutes and government bodies. Such a grass-roots debate will generate the best opportunities to solve the existing problems in a structural way.

ROSSELLA PALOMBA

National Research Council (CNR), Italy

This paper presents data concerning the situation of women in Italian research bodies. It is based on the work done by the Italian Commission for the Promotion of Women in Science and on a recent book which I published on the situation of Italian female scientists.

In Italy today, women do better than men among university students. They drop out less, they graduate more often within the normal course time and they receive top grades, even in the male dominated disciplines, such as engineering, sciences and agriculture, and in significantly higher percentages than men do. However, when recruiting, the Italian public research bodies don't seem to take these abilities into account. For example, at an initial career level, during the last three years, 63% of all new recruits to Italian research institutes were men. There is an evident discrepancy between the university training context, where women shine in ability and skills, and the entry into the scientific world, where men do the best. Then, during their career pathway, the distance between men and women increases progressively as they move up the hierarchy. With the rise in rank, the importance of their position and their salary, the number of women decreases considerably until becoming a negligible minority at the top. In terms of percentage, in Italy, women cannot get past the ceiling of 7% visibility in the top scientific careers. This "glass ceiling" keeps the majority of women far from a normal career pathway, which would, in many institutes, have them occupying the top positions in terms of majority. The disadvantage experienced by women in the scientific world is displayed in the so-called scissors diagram, one of the most constant and regular phenomena that can be measured statistically.

We produced a report called *Figlie di Minerva* (Athena's daughter). It is the first attempt to study the career paths of men and women in the Italian public research with the aim of measuring, evaluating and analysing gender differences in scientific careers. It also aims to understand the reasons for the existing inequalities and to identify solutions, which would possibly improve women's presence. The book is really a gold mine of information on scientific personnel, analysed from a gender perspective, and it comes to three main conclusions. Firstly, data by sex is not lacking. At a national level they are kept in the staff archives of every research institute or university. What is lacking is the political willingness to collect them, to make them comparable and to analyse them with a gender perspective. Secondly, it's not the horizontal segregation determining the vertical one, but gender. We demonstrated this via rigorous scientific and repeatable statistical methodologies. Thirdly, existing stereotypes concerning the reasons why women are disadvantaged in the scientific environment can be counter-acted, demonstrating their incorrectness.

We found two career models, which converged to the single result that men hold the overwhelming majority of top positions. We called the first one the "impossible pursuit", which characterises the technical disciplines or the so-called "hard sciences", where it's impossible for women to recover or to maintain even the minimal numbers that they begin with at their entry levels. They start with a disadvantage and this increases. The other one was called the "overtaking". It characterises disciplines where women start with an advantage over men in terms of numbers, even a considerable one, but then progressively lose ground until they end up as a minority in the top positions, both numerically and percentage-wise. For example, one can observe that women working in social, economic or biological disciplines, starting with a slight advantage when they're recruited, are then passed over by their male colleagues at the second step of their career. At the end, you find an absolute majority of men. Things are even worse in the field of humanities where women represent a substantial majority at initial level, but their numbers progressively decline until the final career stage when they are even fewer than in the scientific sectors.

There is a strong stereotype used to explain these patterns. Women lack success in scientific careers because they enter the scientific environment later than men. Since women arrive later than men, it's obvious that they have less seniority and are less present in the top positions. Their under-representation should naturally disappear overtime as the number of women increases at entry level. Because I'm a demographer, I used a cohort approach to counter-act this stereotype. I analysed a cohort of more than 1 000 men and women who entered the National Research Council in the same year, so seniority was the same. I showed that women constantly had a lower probability of being promoted than men. For example, after 11 years in the job, women have a 16% probability of being promoted when their male colleagues have a 35% probability. Taking into account the differences in the number of publications, age and promotion, a considerable gap remains between men and women. The conclusion of the statistical analysis was that the factor mostly affecting promotions is gender. The same analysis carried out for university professors, showed again that men have more than double the chances of women of the same seniority to become an associate professor and 30% better chance of becoming a full professor.

The second stereotype is that this can have something to do with productivity. In the scientific community, productivity is one of the most widely used criteria to evaluate researchers, both for starting careers and access to higher levels. This measure, in most cases, relates to publications. Analysing publications is complex, because it's not only the number of publications that matters, but also the quality. In addition to that, very few scientific institutes have a database of their personnel's publications. Furthermore, the authors' first names are often indicated by initials only, so analysing data by sex is very difficult. I compared personnel files with authors and co-authors of 15 000 publications of researchers from the National Research Council and 8 000 from the National Institute for Material Physics to analyse them by sex. We found that, on average, female researchers published slightly less than men did. Women have almost 5 publications per year, compared to 6.2 for men. Using a statistical method for analysing the differences in scientific productivity doesn't explain women's lesser success in science, leaving open again the possibility that other factors, possibly gender, are acting. Differences in terms of impact factor were low: 1.8 men compared to 1.7 women, so they have practically the same impact factors. If we look at the distribution of publications by age, women tend, in the majority, to publish mostly after the age of 40. Men by contrast publish actively between 35 and 39. This means that when women are ready to participate in the competitive exams to be promoted, men already occupy many posts. In addition, holding a position of responsibility of any type, management of projects, heading research units, etc. tends to multiply the publications of men – sometimes dramatically. We found men publishing 20, 30 and even 40 articles per year.

We noticed that inequalities are produced through a wide variety of small differences. It makes the discrimination mechanism less visible, but not less effective. Introducing modifications to this situation for women and science will require political interventions. From rigorous studies as "Figlie di Minerva", it's clear that the situation will not ameliorate itself. Women are being discriminated against and their rights disregarded. We have to say it openly. The Scientific Commission for the Promotion of Women set up in Italy proposed an initial set of requests which have been discussed at the Ministry for Research and have been approved by the Presidents (all men) of the National Research institutes. To date, only a few (such as maternity leave for women with scholarships) have been implemented. So it's clear that the actions require co-operation from scientists, administrators and policy-makers. These actions also require an investment, both in terms of money and in political terms, to demonstrate the will to set the recognition of women's achievements in science as a priority. The road is clear but long. There is no miraculous formula and there is strong resistance to be encountered. Nonetheless, a first step has been taken in Italy.

SYLVIE MOREAU

National Centre for Scientific Research (CNRS), France



I'm a woman in science, not a *research* scientist, but a senior manager at the French National Centre for Scientific Research. Therefore, I have personal experience and knowledge that the CNRS considers gender parity a very important issue for all female employees, in any capacity. The issue of sexual parity in science is, in the view of the CNRS, something which is not just related to female scientists, but in fact a question for all women and the place of all women, whether scientific researchers or not.

The aim here is to present the CNRS' viewpoint and describe the institutional changes that are being implemented to enforce parity and equity between men and women. This initiative was launched in response to French and European Union political decisions. Its main goal is to provide women with access to the positions that they deserve in a large scientific organisation. Before illustrating how the CNRS does this, I'd like to highlight the fact that an institutional procedure is complex by nature. It's not easy for an institute to address such a complex issue as gender parity. There are many stereotypes, some of which are based on society itself and reinforced by many individuals, male or female, researchers or not, managers or not. This process of change is a complex institutional phenomenon. It brings together politics, society and also the individual; by its very nature, there is a type of authority involved. Where does the credibility of this institutional activity lie on an issue such as gender parity? Looking at the CNRS, in addition to our current activities, led by the management or the Ministry, there's also the progressive development of a collective will to obtain some achievements. This is not easy to build up. Having said this I would like to outline what the CNRS has been doing and how it came to begin this activity to try to find short, medium and long-term responses to the whole issue of gender parity.

The CNRS considers that it is its duty to try to support national action in the area of gender parity because it employs some 25 000 people, among which about 10 000 are women. As a multi-disciplinary national scientific research centre and an observatory it has an important and experimental role. The CNRS covers all scientific disciplines and, when looking at them under the scope of gender, we've identified major differences, not only among disciplines but also within each discipline, where the situation could be rather different. This varies from one field of research to another. However, from an institutional point of view, the CNRS isn't representative of the entire scientific community, which is mostly located in universities.

The CNRS has tried to position itself as precisely as possible. One of the major difficulties in such an institutional effort is redundancy. Institutional activities, without added value with respect to the others, take a vast amount of energy but sometimes act against each other. We work with the Directorate-General for Research and we can contribute to national, European and other databases. But we can't necessarily make progress in our own area unless we get right into objectives whose scope goes wider than the establishment itself. Therefore, it's of the utmost importance to build up an institutional network.

The CNRS decided to take all useful measures to reach the objective of parity between men and women. The head of the CNRS, Geneviève Berger, started out by setting up and chairing a Steering Committee named “Disciplines, professions, careers and gender: the place of women in the CNRS”. In the overall organisational chart this committee is right at the top of the management level. It has a very large mandate. One of its main duties is to study the type of positions that women hold, their responsibilities and their career opportunities. The committee is dedicated to ensure a more equitable balance of responsibilities between men and women. However, we must watch out for any type of specific measure in this field, which might, at first, appear as positive but then turns out to backfire on the cause it was supposed to promote. To illustrate this, you could observe how responsibilities are shared within research organisations. If a male researcher produces 40 papers a year you could wonder how he managed to do so and come to the idea that other people must have worked for him, women and men, and wonder about their own visibility. This does not appear to be gender specific as presented herein. Is this data showing that women tend to be more “in the shadow” of their supervisors than men in the same positions are?

We study each discipline with the aim of explaining the unequal distribution of women among them. Then, we try to answer the following question: “If you go into an area where there’s a majority of women, does it mean that this area is protected in some way, from the point of view of gender equity?” The answer to this question is negative because we found that, where there are more women than men at recruitment, you find an unequal career progression. For instance, if we take the example of the CNRS anthropologists’ community we notice that there are 55% women, but at the research director and higher levels there’s only one woman.

Our steering committee brings together high-level representatives from all the directorates of our organisation: scientific, human resources, administrative, communication, the Secretary-General of the National Committee and so on. The steering committee has drawn up an institutional action plan, which has been widely distributed. The plan states that the CNRS should be able to produce statistical data on (the situation of) men and women in order to analyse why the glass ceiling in women’s careers occurs within each discipline. The plan also points out that actions should be undertaken to improve the distribution of women within career categories: there are more than 10 000 women at the CNRS, but more than two thirds of them are not researchers. More than 7 000 women are holding support positions, which are at the lowest levels of the civil service scales. Obviously the image of women at the CNRS is highly influenced by the positions they hold. Typically, the situation is that you find a male researcher as research director at the top of the employment scale, and a female technician or assistant technician near the bottom of the employment scale. This is one area that the CNRS intends to change. Another priority of the steering committee is to contribute to a more positive and representative image of women within the CNRS by taking examples from its own history. At present, we can only make the following statement: up to now, only examples of male successes have been shown although women have contributed significantly to inventions and discoveries. They have been important team members but their role has never been acknowledged.

Another area for action is the construction of gender. One important point is that we all, male and female, reproduce the same existing stereotypes. *A priori*, it is inherent and extremely difficult for us to eliminate this subjective idea. We can’t have all actors, male and female, pushing forward on an action plan on gender, if each of us – man or woman – doesn’t question these stereotypes. So, in order to create adequate conditions to change mentalities, we need to initiate educational programmes from the very beginning of the school years.

Another important point is to promote gender research. The CNRS is a multi-disciplinary institute with a number of teams in-house working on gender issues, thus ensuring our organisation a degree of expertise in studying these matters. Nevertheless, with a few exceptions, this research is not promoted. In other words, the researchers and experts themselves are developing gender research in such a way that it's confidential and marginal with regard to the visible tip of the iceberg. This is because they know that it won't be of any benefit to their careers. It is not a neutral issue and it raises two main problems: the visibility of teams working on gender matters and the legitimacy of gender as a research field. We would propose that a number of researchers, male and female, particularly female, could be working on this new field of research: biologists, historians, philosophers, sociologists, etc.

The action plan on the role of women in science has been drafted and approved on a volunteer basis. The real problem is to ensure that the scientific community itself and the CNRS take over this action plan and approve it. We have made progress on several fronts. First and foremost, the steering committee has set up a specific permanent task force named "Mission pour la place des femmes au CNRS" to implement its recommendations. It's the team that I'm heading and its main duty is to study the role women play in our organisation. The CNRS has initiated a first step here. In fact, most of the time, the people who deal with those aspects of equality between men and women are doing it in addition to the job that they are already doing. You can't have gender issues continuing to be studied on a volunteer basis because it is a topic that requires more staff and funds at all levels. One of the recent actions of the "Mission pour la place des femmes au CNRS" was to fund the organisation of a seminar, which took place in September 2001 within the international scientific meeting of Gif-sur-Yvette. The topic was "Women, men and science: working for parity", and both male and female scientists took part. There were representatives from the political sphere, from other institutes and actors of the scientific community. This seminar helped to build a converging approach from the questions asked by these different actors and to set priority actions. To end with our main actions, we have made a film in which two Nobel Prize women, Christiane Nüsslein-Volhard and Rita Levi-Montalcini, talk about their professional experience and the difficulties that they have encountered throughout their career. The film will be copied by the French Ministry of research to be shown in schools.

Finally, I would like to highlight the institutional challenges that institutes face when dealing with the very important issue of parity of treatment between men and women:

- any pertinent action taken will only be successful if it engages all employees in the long term to implement the changes;
- the issue of gender parity raises other substantial questions about power-sharing, access to power, transparency and recruitment systems.

Further information

The following documents will give you further information about our aims.

1. Presentation of our steering committee named "Disciplines, professions, careers and gender: the place of women in the CNRS". The main purposes of its plan are to:

- set up and conduct an action plan aimed at promoting the place of women in the CNRS;
- ensure the coherence of launched actions;
- decide upon the conditions to implement them;

- co-ordinate the actions;
- assess the results;
- recommend any measure contributing to enforce the place of women in the CNRS.

2. A few projects already launched include those to:

- Introduce gender data in CNRS statistics.
- Organise a multi-disciplinary gender school involving the CNRS administration, human resources, CNRS departments and researchers specialised in biology, neurobiology, sociology, philosophy, history and psychology. The aim of this school will be to discuss the ways to legitimize gender as a specific research field.
- Develop an ethnographic research to contribute to a better understanding of the specificity of women's careers through a "history of women's lives" with respect to their professions.
- Propose ways to reduce inequalities.
- Print a brochure on "the place of women in CNRS' history" with the collaboration of the Committee for CNRS history.
- Identification of CNRS teams working on gender aspects with the Ministry of Research.
- Develop an accurate analysis of applications at the level of research directors.
- Analyse the percentages of women in CNRS' direction committees and bodies, such as the Board of Directors, Scientific Council, Department Council and National Committee.

1. Training courses for female research managers

In 1997, Christine Wennerås and Agnes Wold examined the peer-review process at the Swedish Medical Research Council and found that women had to produce more than twice as many scientific papers of equivalent quality to those written by men to be considered equally competent. Only if they have excellent contacts can they compete on equal terms with men (Nature, Vol. 387, 1997, pp. 341-3). I would like to use the results of this study, not as sound statistical proof for the following discussion, but as an illustration. It is based on the hypothesis that the results concerning the correlation between scientific productivity and competence from that study can be generalised into a relation between performance and recognition as people progress in their scientific careers. If this hypothesis is valid – it is supported by anecdotal reports from many colleagues – it means that female scientists have many misleading, frustrating and demoralising experiences all along their scientific careers that gradually destroy whatever self-esteem and energy with which they started.

The result of the study that has caught most attention is the offset between the curves that relate performance and recognition for men and women: women have to publish 2.6 times as many papers to receive the same competence score. Of course they are not aware of this, since it is virtually impossible to measure on an individual basis (it was hard enough to measure statistically). On the contrary, at the beginning of their studies, women in science usually perceive their minority status as something positive; it is much easier to gain attention and recognition. People are impressed that they have achieved something that women usually don't, and they are proud of this. The negative aspects of gender differences are only brought to their attention from the outside: from the existence of equal opportunity officers and affirmative action plans. Most of them obviously think that this is something that only concerns others. They see no need for extra help to increase their number, which would only jeopardise their "queen bee" status. The only programmes for which they can get mobilised at this stage are those encouraging younger women/girls to follow their path into a world that is unfairly considered "male". This situation is also reflected in the MIT report: "Each generation of young women... began by believing that gender discrimination was "solved" in the previous generation and would not touch them." (The MIT Faculty Newsletter, Vol. XI, No 4, March 1999). But it continues: "Gradually however, their eyes were opened to the realisation that the playing field is not levelled at all, and that they had paid a high price both personally and professionally as a result."

This process of gradual realisation may, at least in part, be related to a second result of the Swedish study that has not yet received much attention. It is the difference in the shape of the recognition curves. Men experience a linear relationship between performance and recognition during their whole career: as they gradually gain experience and competence, their recognition steadily increases. The inverse conclusion is also valid: if their recognition does not increase (i.e. if they do not get promoted as quickly as their colleagues), their performance has not yet improved sufficiently. Contrary to that, the recognition curve for women levels out very quickly. That is, they gain experience and competence, but they do not get promoted or receive more demanding tasks. The critical thing is that, in science, they usually have only male colleagues to compare themselves with, and thereby draw the wrong conclusions and reflect back on themselves: they struggle harder and harder and want to be measured against nothing but the highest standards, that is, men! By the time they realise that this is a lost battle, it is often too late. Of course, each individual path develops

differently. But as long as they are able to compensate for the gender gap (through increased performance – factor 2.6! – or connections or other favourable factors) and perceive themselves as successful, they are not very likely to develop any gender awareness. In fact, those who are able to penetrate to the top may never develop it at all, and then we say, “they are worse than men”. If they do become aware of the gender issue, it is usually through negative experiences of an increasing discrepancy between performance and recognition. By that time, a lot of potential and qualification will already have gone to waste! Maybe the most severe consequence of the difference in recognition for the same performance between men and women is that it leads to situations where highly qualified and experienced women end up working under mediocre male supervisors, which creates severe management problems. In order to counteract these effects, it is important to raise gender awareness and introduce compensating measures as early as possible. Obviously, such measures must aim at:

- raising awareness for the gender issue with all its different facets (gender training);
- providing female scientists with chances to interact with other women in similar situations (networking; “women only” courses);
- providing them with tools to deal with discrimination constructively and compensate for the gender gap without wearing themselves out (management training);
- promoting supportive connections (mentoring);
- being attractive to women who are themselves gender blind!

2. Some first experiences

In this regard, CEWS is organising a series of training seminars focused on effective job interview technique for female scientists ready to apply for professorship positions. The idea is to give female scientists extra strength in the selection process for professorships to increase their chances of success.

We organised a sequence of training seminars related to proposal writing and contract management in the Framework Programmes. They consisted of two parts: a theoretical introduction with all the basic information, and a follow-up course about four weeks later, when participants could put into practice what they had learned in the first part. The follow-up course took place in Brussels and also included a visit to the Directorate-General for Research (Research DG) and contacts with European Commission officials. At the Jülich Research Centre, a group of 13 women entering the executive level followed a coaching programme spread over about 18 months. This consisted of several modules, including leadership qualities and techniques, self-organisation and project and time management, presentation and science marketing, and basic principles of science management and budgeting. It included visits and contacts to officials of important research organisations, the German Bundestag (national parliament), and again, the European Commission.

In these two cases the main emphasis was on providing women with additional tools (time management, writing proposals you can't refuse...) and thus additional strength. “Gender” was not formally a topic, except for the presentation of the “Women and Science” unit in the Research DG, so we did not really address the first goal explicitly (yet). It did, of course, enter informally through the discussions. This alone already worked as a strong eye-opener. At the end of the course several participants said they had not been aware of the gender problem before but now found it important that there was a whole unit devoted to it. As was found in the MIT experience, the gender aspect suddenly becomes visible when women get an opportunity to relate their

experiences to those of other female scientists. Nevertheless, we will strengthen this aspect in the future by including explicit modules on the gender aspects.

The networking part was easy in the case of the Jülich programme since all participants came from the same organisation, but from sufficiently different scientific and administrative sections that most of them would probably not have met, or at least not interacted that closely, without the programme. In the case of the CEWS project (proposal training) the participants came from all over Germany, and there, the short interaction time of two plus one day apparently was not sufficient to trigger off a self-sustained network. We will therefore give this more support within the next courses by offering an e-mail list where participants can continue to exchange ideas and experiences after the course. The establishment of helpful connections was addressed by organising contacts with high-level officials in the context of the visits to the European Commission and national organisations. In the case of the Jülich programme it was addressed more explicitly by a mentoring phase that followed the coaching phase and which is still on-going.

The last point was of course the most difficult one: how do you manage to get highly qualified and highly competitive, but gender blind, female scientists involved in a special support programme for them? As far as I can tell, key factors for our programmes were:

- they dealt with “respectable” career oriented topics (how to get money from the European Commission, research management, etc.) not with women;
- the call to participate came “from the top” (through institute directors or heads of personnel);
- the courses were accessible only to women, so they did not have to compete with men.

This last point was initially criticised, even by many of the participating women, but at the end, they all agreed how good it was to have had a “women only” course.

3. What about men?

While it is important to give women extra support through special programmes reserved just for them, it is of course equally important to educate men. This includes general management skills (of which there is still an enormous deficit in the science community) as well as specific “gender competence”. It is particularly important to make them aware of results of studies on the subject and the more generalised consequences. It is also important to develop or strengthen their awareness of family and social responsibilities and the positive influence that these can have on management skills.

SESSION DEBATE

One issue raised during the debate was whether family tradition/background in science influenced women to go into science. Although the role and support of the father was seen as important it was suggested that the academic background of the mother may be more of a deciding factor.

Information was sought on possible assistance for women making a career in science, through programmes or coaching. This is carried out by some agencies and also organisations set up by female scientists, for example the Centre of Excellence for Women and Science. Examples of organisations and their programmes were given, including career promotion in schools, for areas where take-up by both sexes is falling, and Saturday programmes for children interested in science.

An issue raised by several speakers was the discrimination experienced through “non-events”, for example women not being invited to attend events or address conferences. During the debate it was asked how it is possible to recognise this issue or raise awareness of it, particularly in Spain, for example, where there is less in the way of mentoring programmes or discussion forums. It was agreed that data are one way to show this “non-activity”, but it was recognised that even the MIT study, whilst making a difference to female scientists’ lives, was not taken seriously by all. As one member of the audience noted “how can you miss what you have never had”, measuring a perception is difficult. Data by itself, in particular quantitative data, is not enough.

It was suggested that the number of women entering science was to some extent dependent on external factors, such as the economic situation. However, there were differences between academic sectors. For example, women are generally better represented in the life sciences and fare better in that field.

Another point of discussion was the issue of “academic duty” and “other” activities carried out by academic staff. The example of having different types of professors (research and teaching positions) was given. Concern was raised that a “diversity approach” may result in the “gender approach” being lost.

Finally, it was highlighted that there was a lack of men at the conference, and that, as the “academic gate-keepers” they, as well as the many different communities within the Science community, need to be kept informed of the issues discussed.

SESSION REPORT

KNUT FAEGRI

University of Oslo, Norway

The subject of this thematic session may roughly be divided into two parts. How are we shaping gender in research, and how should we be doing it?

On the subject of how gender is being shaped, we heard from Finland, one of the countries with the best record of hiring female scientists, and from the elite institutions on both the West and East coasts of the USA. Not surprisingly, the picture is depressingly similar. Without going into particulars, some clear overall trends emerge. In many cases female scientists are not aware of the extent of gender imbalance or outright discrimination to which they are subjected. The fact that women are a minority frequently makes the separate female researcher isolated. Communication with others in the same situation, which might help to uncover the discrimination, is therefore difficult. In a way, these women are below a critical mass to establish some of the proper countermeasures against discrimination.

In many cases, the discrimination, once brought into the open, can be challenged in court or at a superior administrative level. However, this just appears to force discrimination underground, it takes on less overt forms. The hardest thing to come to grips with is the non-event – something that does not happen – such as lack of encouragement or a missing invitation. These are common social mechanisms, but used in science in a gender context, they can be very damaging. How can you pursue something like that through the legal system?

There is also the mechanism of male denial. If a complaint is from an unsuccessful woman, she complains because she was really not good enough for science, and if the complaint is from a successful woman, she really has nothing to complain about – after all, she has succeeded. It is a variation on the medieval witch diagnostic: you throw the suspect in the water, if she sinks, she was no witch, if she floats, she is a witch. It is hard to win against such odds. This part of the session showed clearly how important it is to pursue the fact gathering and analysis, to develop methods to display the more subtle ways of gender discrimination and to ask the right questions.

However, it is also important to act on the data we already have, and this was the second main theme of the session. There is action, lots of action, as evidenced by the numerous stands at the conference. One strategy is to attack the stereotypes actively: to show that some of the more common explanations for gender-gaps just do not hold. The Italian report *Figlie di Minerva* has done just that, and shown on a sound statistical basis that the idea that women are lagging behind because they arrived later to science is just nonsense. They have also shown that lower scientific productivity for women is not really statistically significant as a cause for the discrepancy. Effectively, they have debunked two myths and they have formulated political recommendations on the basis of their findings. The difficulties of implementing corrective actions in a large organisation should not be underestimated, as was shown by the gender balance action initiated at the CNRS in France. One basic problem, common to all organisations, is that while administrative directives may set the stage, it is a considerable challenge to make the individual member of the organisation take the problems and the action to heart. The CNRS case also presents the challenge of an organisation that is strongly coupled to external influences, that is, the universities that host the CNRS institutes.

Finally, there is the challenge of an employee spectrum where the lower end is very heavy with women, while the top end is heavy with men. It is a problem, where even when special measures are taken to strengthen the position of female scientists, they may be afraid to take advantage of this in order not to invoke displeasure or negative reactions in their male dominated surroundings. This was well illustrated in a contribution from the CEWS,. One solution has been to offer courses where gender is not an explicit issue, but which centres on themes of obvious interest and use to the female researcher.

Finally, one might question the entire basis for the present academic selection system. Today it is output driven, focusing heavily on publications. However, we all know that there are many other tasks involved in a scientific career, ranging from education and advising to administration and evaluation. Somehow, the full scope of these activities should come into play in the selection process. This may be dangerous, because it leaves room for manoeuvring that could eventually lead to even more imbalances, and as such must be applied with care. The paradox in all this is that, if these measures aimed at eliminating discrimination and creating greater equality by combating male dominance and abuse of positions succeed, the outcome is likely to be a better academic workplace for all of us. I think that is worth fighting for.

The background of the page features several thick, light gray wavy lines that sweep across the upper half. Scattered throughout the lower half are several light gray five-pointed stars of varying sizes, some appearing to trail off from the wavy lines.

CHAPTER 7

REACHING OUT TO SCHOOLS AND SOCIETY AT LARGE

The thematic session “Reaching out to schools and society at large” dealt with the best ways to integrate gender equality into the teaching of science at the earliest stage and into science awareness-raising activities. It is understood that recognising the relevance of the gender dimension in science will make science more attractive to the young – both boys and girls – and will open science to wider societal concerns.

ANNE-MARIE BRUYAS

City of Science, Italy

The question of education and society is crucial if we're going to improve the level of women's participation in science. Science and technology are not attracting many women – and this fact is backed up by statistics. From the early years of schooling, science and art are split. In Italy, almost equal numbers of boys and girls go to school, but only 16% of girls go on to technical college, whereas they make up 85% of the students who study tourism and 90% of trainee teachers. In scientific universities, girls go more for medical and natural sciences and much less for hard science or technological science. When they then start working, women very quickly find out that they are lagging behind in their career path compared to their male colleagues. The figures have already been examined in depth. I would like to stress one thing before examining how raising awareness in education campaigns for science could give more girls access to scientific areas.

Training of girls is being looked at in a very detailed way but doesn't prepare them for the social and cultural contradictions that they're going to face later on during their professional training and work. We therefore need to overhaul the training of young people at school to develop an approach to the sciences that will look more carefully at the question of equal opportunities. Complementary action could also be taken by the media, which could reach out to teachers and people involved in schools. Careers' advisers should make sure that careers in science look more attractive than they did in the past. It's important that a large number of mainstreaming actions are carried out at a high level to promote the presence of women in scientific research, but it's equally important to carry out grass root actions to prepare young people moving to the world of work in more gender equal terms. Girls are less prepared for science and technology. This raises the question whether they were educated to be less interested in such things. Messages given by societal vectors, family and schools and also by the mass media today give a stereotypical culture to young people.

We should also highlight the fact that young people are actually not aware of this situation. On the contrary, if one asks girls in secondary schools the differences in approach or social conditions that separate them from boys of their age, they are convinced that there aren't any. Nothing in their education prepares them for the decisions that they have to make later on, such as leaving behind an original career choice, the changing of a career structure or the slow down they might face later on in their career.

The action carried out by Città della Scienza, the City of Science, a science centre in Naples, is based on three approaches: public understanding of science, scientific training and education and entrance into professional life. These are three areas on which we can all work in order to change the cultural and social conditions to correct the under-representation of women in science and technology. Città della Scienza was set up in the early 1990s. It's different from other institutes in Europe in that it's not simply a centre for the dissemination of scientific culture, but also has the goal of popularising science and democratising knowledge. Furthermore, its goal has been to bring out an atmosphere that is more conducive to economic development. That's why its popularisation activities have been linked with, for instance, vocational training, setting up of companies and transfer of technological innovation.

During a discussion with scientific women putting together a video a few years ago, Julia Goodfellow, a professor of Biomolecular Sciences at the University of London, showed us the

results of an English study on the question of career selection. Girls went less for the technical and physical sciences. One of the reasons was that the image of science was linked to the old stereotypes of white coats stuck in laboratories. Another image was that of science itself, not the scientists. Science is often perceived as something that is counter to society rather than trying to improve the quality of our lives. This is obviously an unattractive image as far as girls are concerned.

This introduction helps us to understand why activities for equal opportunities are part and parcel of popularisation, education and vocational training. All of these factors should work together in synergy. That was the goal of the European Initiative CONNECT through which we carried out the Women Education, Employment in the Science Technology (WEEST) project. The CONNECT Initiative was launched in 1999 by the European Parliament with these purposes: to try to put together greater synergy and forge more links between education, training and culture bringing in innovation and new technology. I would like to look at the main actions carried out under the project.

1. Actions to improve the image of science and democratise knowledge

1.1. Rewriting the history of science

Rewriting the history of science would be needed to better present the few female scientists who are already well known to the public. Furthermore, the work of a large number of women who are in the background, those who have worked for male colleagues, husbands or brothers, should be brought to the public's attention. We did a great deal of work in our poster exhibition "The other half of science", which was a tremendous hit in the schools of many Member States. I should also remind you of this famous letter written by Caroline Herschel, an astronomer, at the beginning of the 19th century, but which is still relevant today because the thinking of numerous women who have contributed to sciences is still unknown. "Sometimes when I am alone in the dark and the universe reveals yet another secret, I say the names of my long lost sisters, forgotten in the book that records our science, Aganice of Thessaly, Hypatia, Hidelgard, Catherina Hevelius, Maria Agnesi as if the stars themselves could remember. Did you know that Hidelgard proposed a heliocentric universe 300 years before Copernicus? That she wrote of universal gravitation 500 years before Newton? But who would listen to her? She was just a nun, a woman. What is your age if that age is dark? As for my name, it will also be forgotten, but I am not accused of being a sorceress, like Aganice, and the Christians do not threaten to drag me to church, to murder me, like they did with Hypatia of Alexandria, the eloquent, young women who devised the instruments used to accurately measure the position and motion of heavenly bodies. However long we live, life is short, so I work. And however important man becomes, he is nothing compared to the stars. There are secrets, dear sisters and it is for us to reveal them. Your name, like mine, is a song. Write soon. Caroline."

1.2. The image of science

Throughout the history of science, the image of science is negative because of its past. Scientific research is now trying to respond more to the needs of the citizens. This is part of the "Science, Society and the Citizen" working document which the European Commission disseminated at the end of last year. It's been one of the key elements for the 6th Framework Programme for research and high-tech research in various sectors such as genetics, biotechnology, information and new communications technologies. It's trying to respond to the requirements of the citizens and has immediate repercussions on the quality of our lives. The Commission's goal today is to have broader participation of civil society in the definition of research goals and to try to achieve greater

levels of active participation from citizens. From a media standpoint, science is still a long way from the general public and efforts have to be made to put that right.

1.3. The approach to science

Science centres, as they are known in the Anglo-Saxon world, are encouraging initiation into science through interaction and manipulation with respect to the model launched by Frank Openheimer with the Exploratorium of San Francisco in the 1960s. Science has to be able to be grasped literally, the public has to be able to touch, to experiment, and the key to learning is emotion. All of these science centres, like the one in Naples, are based on active participation of the visitors. They try to awake an emotional or aesthetic response or to entice a game aimed at opening up the minds of young people, and sometimes the not so young, to the joys of science.

1.4. Human contacts

Human contacts with scientists, and with female scientists in our particular case, are primordial. That's the goal of the portraits of women, which we've placed on the web site. Women working in various scientific sectors were interviewed and their portraits were made for the web site. Tiphaine Bichot for example, product-marketing manager at Alcatel, states: "I think it's incredibly exciting to work with various careers and to try to make progress in one of them is not a question of focusing on technique as far as I am concerned but to think about them for other people in high-technology as a new approach. Engineers, for example, work on technology not simply at the request of others, but for themselves. They have also the question of how to market their discoveries. That's the idea of collaboration as far as I am concerned: products have to be thought out and created for users and users have to feel that they are the end role of the process. My job might be scientific but I have a very human job, a very specific job when the way in which I have to work differs considerably from day to day. In my job, I meet all sorts of scientists and product engineers, I meet those with artistic jobs, designers, publicists, etc. You don't have to be a pure scientist to work in a technological sphere today. All types of knowledge can feed in very successfully".

"Chat sessions" between secondary school pupils and female scientists have been organised very successfully. It's great to see how women can put their enthusiasm across and sometimes justify the tricky choices that they had to make. A young genetics student was telling of her decision to go to the US for her post-doctoral studies in an attempt to strengthen her curriculum vitae. Women find it easier than men to communicate their passion and the reasons that have led to their choices. It's important that this type of meeting be repeated at schools, at science fairs, on the Internet and in the media.

2. Education and training

There are two principles with regard to the education and training of young people: training is vital for building the human personality; and school isn't the only place where one can learn.

Introducing people to science can be done quite easily, not simply through science centres, but also in the associative life, for example, in science associations, science fairs, science culture weeks, astronomy clubs, etc. These allow young people to become interested in science for the first time, to become hooked on science and to allow science to play a major role in their lives. Lifelong learning is a concept that young people have not yet fully grasped. They want to get their school days over as fast as they can. But the arrival of new technology has started to change that concept

of training and it has to be clear to young people that the possibilities for learning don't end when they leave university. It's in the context of vocational training that a large number of initiatives to bring women into the scientific and technological sectors are being carried out successfully.

Of course, school is still the essential area for primary and secondary education for young people. It's in this very area that the old stereotypes are often inculcated. The role of teachers is therefore vitally important, and we haven't managed to get all of them to teach in a way that respects all their pupils yet. In addition, scientific and technological school textbooks are often male-oriented. Regarding equal opportunities at school, it is sometimes restricted to a number of actions and doesn't really get mainstreamed throughout school life. Preparation of teachers is often insufficient to enable them to carry out more personalised forms of teaching bearing in mind the differences between their pupils. We often hear about aptitude but the idea that men and women might have different methods of learning is something that hasn't been grasped yet. New technology has led to radical changes in the methods of learning, but are those more favourable to girls or to boys? The activities carried out in science courses should try, as much as possible, to diversify methods of learning and use them all. It should stimulate all the senses to get people involved hands-on, get them involved in team work to move from a global to an analytical approach, stimulate their curiosity and imagination and use the scientific knowledge gained to carry out socially worthwhile activities.

3. Career choices

Whether taken under pressure from school or other influences, the choice of a career is very important in young peoples' lives. People helping young people to make these choices should help them to fulfil their own desires to put together a personal project which is well thought out and not simply influenced by the stereotypes, typical models put forward by society or by opinions of their peers. It's important at this sensitive stage of life to get people aware of typical situations. Women, who have carried out a so-called masculine career successfully, show the broad range of possibilities that are open to young people today. That's why our web site includes a portal which invites surfers to visit other sites about, for example, scientific careers, successful women in what are regarded as masculine careers, different types of courses and the ability to obtain scholarships to study abroad.

4. Conclusion

The under-representation of women in science is the result of a system that doesn't recognise equal opportunities right from the outset. We need to have cross-fertilisation of various areas: culture, research, education and employment. Joined up activities help to reform institutions and, in that way, the conditions to bring about greater productivity will be created.

Girls' views of science and choices in education

BARBARA MAPELLI

University of Milan II, Italy

This paper deals with women and science from the particular standpoint of young women's education. My interest in this topic dates back to the mid-1980s and is based on a series of observations of developments in girls' education in Italy and in Europe.

Notwithstanding the enormous growth in the number of girls at school, there is still what is known as "educational apartheid". Girls continue to choose a certain course of study and avoid others and, as a result, the educational system is divided into classes that are predominantly, or exclusively, male, mixed or female. This happens despite the fact that girls overtake boys rapidly in their propensity to study. Clearly, as this phenomenon occurs in very similar ways in all the Member States, it is not only the fault of the shortcomings – and there are some – in the Italian school system. In particular, girls avoid choosing technical institutes and, even though they may perform much better at school than boys, their achievements are not that outstanding in scientific and technical subjects.

In the 1980s, many European countries started programmes designed to restore the balance both at schools and at universities. However, in many cases, these programmes were not very effective, and this was the view both of those running the programmes and of those of us who were following the European debate on these matters as closely as possible. It became increasingly clear that the reasons why young women were not attracted to science and technology were much deeper, more ingrained and rooted in thousands of years of cultural conditioning and exclusion. These reasons had to be investigated and understood before effective action could be planned for.

We therefore came up with the idea of a project designed to meet these requirements. The idea was to allow the girls to speak to each other to explain how they felt about science and to describe the obstacles and blockages that prevented them from signing up for classes and, later on, professional courses of a scientific and technical nature. Our project set out to investigate girls' actual experience of science, and what it was inside them that held them back. It was also important not to underestimate external obstacles, such as male hostility, the difficulties facing career women, cultural stereotypes and an assumption that women are not capable or suitable for certain jobs. Girls themselves are deeply conscious of these stereotypes, but the starting point for our research and the motivation for our choice was to focus on the opinions of the girls themselves. In other words, to determine whether it was these attitudes and the image of science which put them off, because their needs and desires are different. We could then draw some conclusions and proposals for changes.

In order to find out how girls perceive science, we decided to use in-depth interviews, which were allowed to range freely, and also to use tests designed to stimulate the imagination of the students. These seemed the best ways of understanding the girls' inner feelings about science. These feelings are the result of a culture that, for centuries, has alienated girls from science, thus creating images within them – because that is what they are – which they would perhaps never have thought of, and of which they are perhaps scarcely aware. In fact, as the interviews progressed, it was possible, even within the brief time allowed, to see the emergence of a critical attitude in the girls. For example, their attitudes changed from expressing feelings of inadequacy about learning science to criticism of how science is conducted and disseminated, remarks which had much in common with the criticisms aimed at science by feminist epistemology in the 1980s. However, our students were

certainly not aware of these positions, albeit relatively widespread in Italy, even though what they said often did tie in with them, in the context of this culture. We also interviewed a number of male students as a control group. The interviews provided us with a rich fund of material and the results were even better than we expected. I will make a number of brief points, some comments and outline the responses of the girls to some of the questions put at the interviews.

Estrangement from science, but a desire for science

The first questions were very general, asking whether the students had any interest in science and in what respect. Many of the girls did express an interest in science, but in a rather ritual manner, particularly at the beginning of interviews. Interviewees tend to give the answers they think are expected of them, or those answers which they think put them in a good light, but as the interview progresses, the answers become more authentic. Also they often admitted to feeling personally inadequate – which is still the most widespread stereotypical view – when it comes to scientific subjects and careers, and this is generally accepted by young girls, despite the fact they perform better at school than boys. However, in many cases they interpret “performing better” as working harder and studying more, while when boys are successful this is often attributed to innate ability and intellectual prowess. Even in an apparently neutral competition, like the Mathematics Olympics organised by the Italian Mathematics Union and the High School of Pisa, held in Italy in 2000, there were only 21 girls in a total of 301 participants selected, and none of the top twenty were girls. The factors involved here are relating to the way mathematics are perceived and “done”, but certainly there is a predominant stereotype whereby, although girls can achieve substantial results at school, even in scientific subjects, they never achieve the level of “excellence”. This view is much more widespread than we think and encourages girls and boys to have these attitudes about themselves, both as individuals and in terms of their gender.

As a result, one of the female students we interviewed said “I like the idea of becoming a scientist very much, but I know that I will not follow that path because I do not think I am capable enough”. Girls are often not used to voicing their opinions, since they will certainly never have been asked for them at school, but, particularly as discussions become deeper and more conscious, some girls go on to change their view completely. It is not that they are actually inadequate; that is just the way they are made to feel if they propose studying scientific subjects: “I like mathematics but it is far too dry and dull...”; “Physics you have to manage to abstract, which is based more on memory than practice ... physics should have some application, but the way we study it is just like another subject and I find it very dry...”; and in an even blunter way, “...in physics I have no idea what we are doing and why we are doing it...”.

However, there were some more positive replies, which, above all, show that there is a real desire to work in science and, even more interestingly, an ability to turn aside from scientific disciplines and to link them to other areas of knowledge. This is even more surprising because we know how rarely this happens at school: “...All these subjects fascinate me because I can link them into philosophical thought ... at an extreme level, science becomes an extremely humanistic thing ... it is also a field of knowledge ... which helps you approach life differently...”.

I shall come back to this “close to life” aspect later, but it also crops up again in one of the other answers when the students are asked to give their image of a scientist. The interviewer put the question in a deliberately neutral form – *what is your image of a person working in science?* – in order to find out what gender they would use. All the girls instinctively described the scientist as a man, and did not mention female scientists until afterwards in response to specific questions. It is very interesting to compare the differences between the two descriptions.

Male scientists were pictured chiefly as a stereotype figure, detached from the world and reality. A very unoriginal conventional view but also an ironic one, of a figure not only detached from reality but also very detached from himself. "...Someone who sleeps among formulae ... someone who discovers something and then has to discover the opposite to check whether he is right ... I see him in a room full of glass vessels with smoke coming out of them ... completely dishevelled ... I imagine him amongst scientific apparatus, test tubes, a microscope ... a little man who gets up early every morning, always busy, picking up things, books and little flasks ... like an alchemist of old."

However, female scientists were described differently. In the view of female students, a woman engaged in scientific activity remains a woman. This underlines both the problems and the positive aspects. There is a different way, a feminine way, not only of engaging in scientific activities but also of personifying science. It is a more complex way and one more related to the emotive side of life and, for this reason, more capable of tackling the problems facing modern society. "...I think that male scientists have their heads in the clouds, whereas female scientists are much more relaxed about things, and enjoy life more ... I think women are more sensitive than men and are likely to have a better attitude towards a wide range of problems ... women are thought of as having much less intelligence ... and are perhaps less determined ... but I think it is rather the opposite ... in other words, nowadays, it is women who have won through and they want to tackle the problems of the modern world in a different way...". More comments were: "...I think that women understand this better ... women may also be mothers and I think they are more giving ... I think of male scientists as very hard people to some extent ... they are withdrawn, whereas women are much more open, they have more contact..."

Almost certainly, these girls have not read Evelyn Fox Keller, although it is very tempting to compare their remarks with those made by this scientist in a conversation with Elisabetta Donini, proposing some different attitudes towards developing the educational process and its approach to science. "Empathy was my model for interpersonal relationships and also as a mother, so I ask myself why can it not also be a model for science? ... There's a kind of empathic knowledge in the attitudes of all parents. In all child/parent relationships there is a way of acquiring knowledge through empathy, sentiment and identification ... which means that maternal care provides a model for the relationship between representing and intervening which is different from conventional science. So what does a mother do? She certainly does not hold herself back from intervening; on the other hand, although maternal care does include touching, it does not include control and manipulation, which deprives the child of its autonomy..."

Later in the interviews, we found ways of encouraging female and male students to talk and think about certain specific cases. One very simple one was a kind of ethical dilemma: *Suppose a woman is working as part of a research team funded by a group of pharmaceutical industries. She discovers an enzyme that she is afraid could be used as a weapon of war. So she decides not to publish the results of her research.* Obviously, most of the girls and boys agreed with her decision, and in fact they had very few doubts about this. Interestingly, however, a number of the girls felt that the decision should have been taken jointly and should not have been left to one individual. "...It is important to tell others about a discovery ... partly because there should perhaps be some kind of discussion about what was discovered ... basically she should tell the company and the company should ensure that the enzyme was not used for the wrong purposes." This brings up the topic of collective responsibility and social monitoring of that responsibility and of scientific discoveries, and the idea of limits. All of the subjects which have come up in feminist debates – and elsewhere – with regard to the relationship between morality and science, wanted to ensure that science is properly grounded, as Evelyn Fox Keller puts it, and remains responsible at a social level. These approaches

enable girls to overcome the romantic idea, which still holds sway, of the lonely scientist or hero (always a man) who has the honour of making decisive choices, absorbed in his lonely torment, like Prometheus. But, as Mary Wollstonecraft said more than two centuries ago, there is very little need for this. "The welfare of a society is not founded on extraordinary feats, and if it were organised more rationally, there would be even less need for outstanding ability or heroic virtues."

The girls came back to this question of social monitoring when the discussion turned to popularisation of science. Here there was a marked difference between girls and boys. The feminine view was generally in favour (and it should be explained that there is little popularisation of science in Italy), while the masculine view was very much against. The boys shared a reasonably widespread prejudice, that popularisation would impoverish science and reduce the level of scientific debate: one boy used the word "pastiche". Nevertheless, behind all these remarks, there is a very clear and traditional conception of science: it is for the few, and it is difficult to popularise. They have an ivory tower image of science. Although the girls were generally in favour of popularisation, two different reasons were given. Some prefer wider dissemination because they are afraid of their own personal inadequacy and it would be an additional resource. Others bring the subject of social monitoring up again, in the sense that people should be enabled to understand and evaluate an issue so as to be able to make a choice.

One of the last devices used to stimulate further thoughts was discussion of some of the metaphors about science used by male and female scientists. The students were not told the sex of the person who wrote the phrase quoted, but were asked to guess. Newton's metaphor was the one that proved the most successful: "*I seem to have been like a boy playing with shells on a beach in front of an ocean of undiscovered truth.*" Generally, the students' answers show fairly standard differences. The boys were most taken with the image of the infinite ocean, the infinity of knowledge and of scientific progress, while the girls latched onto the image of the child and playing. However, a few answers moved on from the child playing with the shells to some much more complex conclusions. Here is one of them: "...it is precisely because a child experiences a game in different ways each time that I think that ... I too identify myself with the child ... and the way in which I play with those shells can be different each time...". The ability (possibility) to come up with different approaches each time indicates the complexity and variety of scientific work despite the linear approach always taken to scientific knowledge. I don't want to put words into the mouth of this student, but this complexity and variety is one of the main topics which feature in the criticisms levelled by feminist epistemology against science (and is not the only one of course). However, there is no doubt that it is one of the central questions and I shall be coming back to it.

That is all I shall say about this research project. It is more than ten years old and that is too long for one project. In Italy, at least, discussions have not advanced much further. Interest is still relatively limited, and is indeed declining over time. Projects like ours – which, at the time, generated a certain amount of discussion – are not carried out any more, and this project has remained an original and valuable one-off. Even the discussions on the criticisms by feminist epistemology which first took place in Britain and the USA and were continued in Italy through the work and efforts of Elisabetta Donini, have tailed off. In particular, as far as education is concerned, there was only a very limited response. Scientific subjects continue to be taught in the same way and the phenomenon of educational segregation is still prevalent at schools and, in different ways, at university. More recently, these topics were re-examined in the "Polite" project, which raised the issue of gender and textbooks, since the examples of subjects used included science and mathematics.

Moreover, there is the question of the new information technologies (IT), which at the time of our research, was not such a key issue. It is worth asking, yet again, if this is not the same problem of alienation of women, creating another gulf between men and women. IT is not just an area of scientific knowledge, it is also a means of communication, a means of learning, finding information and maintaining contact. IT is increasingly being used in all areas of study and life, and should not be judged in the same way as the issue of women and science. I say, "should not", but in fact the debate suffers from a very similar bias to the traditional one we have seen for science. For this reason, the two problems are very similar. I think that this would already be an interesting matter for thinking and research because this view of IT is widespread and applies to the way boys and girls (and men and women) approach and use IT.

Some comments made by women show that since information technologies are new, they are not surrounded by the same old prejudices and attitudes as science; indeed, they give women a major new opportunity. Others, on the other hand, said the opposite: women are already at a disadvantage and, over time, it only increases if nothing is done.

Some studies carried out among adolescents and at schools in Italy seem to confirm this second view. I have heard various opinions expressed by male and female students, and there is no doubt that girls – and of course, I am speaking generally – are more reticent about IT. They are also less likely to have a PC at home that is theirs alone and thus play and fiddle about much less than boys of their age. During one of our interviews, one male student summarised general attitudes to IT classes as follows: "Girls shout out 'Teacher, help, help' while boys say 'Let's see what's going wrong'; girls ... are afraid to get stuck, while boys ... enjoy getting stuck in order to find a way out". This boy's comments were made in a group interview of both sexes and no one contradicted him. I find it interesting that the other students (male and female), observed clear differences in attitude between the sexes and that, although this boy put it in a friendly way, female attitudes were negative.

I am not looking to compile a detailed set of statistics to come up with some kind of remedy. While this would be useful, I would like to adopt a position similar to the one which prompted me to carry out research into the views of female students on science ten years ago. I do not consider that we should restrict our studies and action to measures designed to make up for presumed disadvantages. These do nothing to change prevailing attitudes on the new technologies. Instead, we should realise that women express (or could express) different attitudes, understanding and practical approaches to new technologies, which for the moment are tools which follow male logic, language and iconography. If we knew about these differences and could use them, it would put women closer in touch with new technologies and change attitudes, enriching the cognitive processes whereby we use this technology for knowledge, communication and research. Finally, we should prepare a project along similar lines to the one we are now carrying out.

To conclude, I would like to sum up the main points governing the relationship between gender and science which have emerged from the brief notes I have made of our project. These could also be used as the basis for a project on the new information technologies.

I would like to start by emphasising one factor that seems important. There are two sides to the question of the relationship between women and science and technology. First of all, it is what it says, a relationship between women and scientific knowledge. On the other hand, there is a more general educational value which is (or could be) to encourage or to initiate more complex thinking on the possible co-existence of different ways of conceiving science, working with it and understanding it. Obviously this same reasoning could be applied to any branch of knowledge, but the difficulties are

greater when it comes to science. Basically, this is the question which is one of the most important to raise: would it not be possible to have a wide range of positions on science and interpretation of science, instead of the traditional image of an absolute single neutral branch of knowledge?

As Elisabetta Donini put it: “The approach which would seem reasonable to follow is not to replace today’s science, with its statements of single and objective validity, with another system of knowledge, which is structured differently but just as rigid. It is more the case that attention to the differences and awareness of the partiality of each subject developed by feminist thought – closely connected with the actual experiences of the women’s movement in all its many different forms – should result in limited and context-bound knowledge. So we welcome a wide variety of different viewpoints, which can come together and be questioned for their validity”.

All the other major issues referred to derive from that point, and they should help to give a new look at reality so that, as Cynthia Enloe said, we see the world as something which was made, and as such, can be remade. The partiality of the scientist; acceptance of a point of view, of a scientific paradigm as interpretation (one of the possible interpretations) of reality; a sense of limits; the non-neutrality of science, but its social and economic implications, the loss of “innocence” or more correctly “irresponsibility”... can all be rethought or remade.

In the educational context, the major issues that I have referred to only briefly, because we know about them, should be raised in science classes. The best way of doing that is to teach the history and context of scientific knowledge. By basing this on the fundamental question of the relationships between gender and science, it should be possible to stimulate a wide range of discussion and critical thought involving students of both sexes.

As far as scientific knowledge is concerned, as in any other discipline, if what is taught is to become knowledge, it is necessary for that knowledge to become to some extent a personal experience which helps to mould or to change the individual. Students of both sexes – although with a different emphasis – require something from school that, in Italy at least, schools hardly ever give, namely, a link with life, in order to give their research some sense and a link with their own experiences, which is the only way of providing a context for what they learn. Going back to our project, this is what our female interviewees were asking for when questioned about their images of science. They were asking for knowledge, full understanding, which can also provide a possibility for personal growth and, as a result, for changing ways of thinking, in other words, a way of approaching daily life.

The issues I stated earlier, and the issues I just referred to in the educational context, would crop up immediately and become unavoidable, if the approach to culture, reading, knowledge and relationships were based on gender. It is essential to understand the educational value of the gender issue. While this is appropriate in all fields of knowledge, it is much more important in technical and scientific fields, since these are fields which are (or are allowed to be) remote from life, kept objectively separate and neutral, and as such, are (or are kept) remote from women.

“The male identity of science is no mere artefact of sexist history; throughout most of its evolution, the culture of science has not simply excluded women, it has been defined in defiance of women and in their absence” (David F. Noble).

Why are too few girls choosing to study science?

MIEKE VAN HAEGENDOREN

Limburg University, Belgium

Ever more often it appears that the (natural) sciences have little or no support from society at large. Some even refer to this as the “scientific illiteracy”. There seems to be a gap between two cultures, a gap that widens rather than narrows. In politics, we hardly find any (natural) scientists. The public at large and the whole young generation are turning away from the (exact) sciences¹. Young people are not interested in studying science, which is disturbing, since our knowledge, especially in science, is the main critical success factor for our prosperity and economic growth.

Girls in particular show little interest for the sciences’ curricula at the higher educational level. The main reason for this under-representation is not to be found among the girls concerned, but rather in science itself: a symptom of its “unworldliness”. Apparently, outsiders now realise the problems of the gender aspect that is, the under-representation of women, more than scientists do themselves. The sciences should opt for a more societal approach. As soon as they do, they will naturally attract more young people, including girls. This is a question of image and public relations policy. But moreover, the occupations in Science, Engineering and Technology (SET) ought to be more family-friendly, and take into accounts the needs and wishes of women.

This paper comprises three main parts:

1. Girls are not afraid of studying science; they are just very selective in their choice.
2. The reason for this negative selectivity is the image the exact sciences carry for them: the study programme (curriculum), as well as the jobs.
3. What can we do to improve the sciences’ attraction to young people in general, and girls in particular?

1. Selections by girls

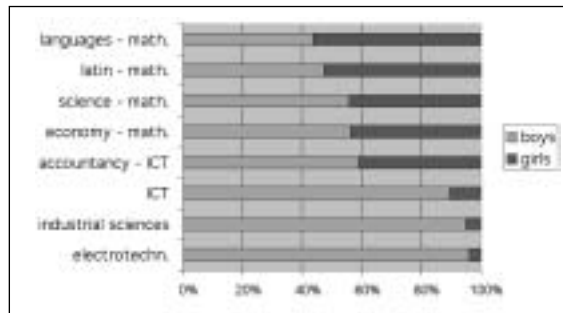
1.1. Secondary education

Girls don’t shun exact sciences as such; they are just very selective when studying science. The statistical data apply to Flanders, Belgium. A difference between secondary education in Belgium and, for instance, the UK and the Netherlands, is that, in Belgium, youngsters cannot choose subjects, but have to choose packets of subjects, for example, science-mathematics; economy-mathematics, etc.

In the general secondary school programme, roughly as many boys as girls opt for the disciplines science-mathematics and economy-mathematics, which both are gates to the exact sciences at university. Even in the technical secondary school programme, almost as many girls as boys opt for the discipline accountancy-computer sciences, but most girls run away from computer sciences, and especially from industrial sciences.

¹ Mineke Bosch e.o., *In het hart van de wetenschap*, Den Haag, 1999.

Graph 1: Girls and boys in secondary education

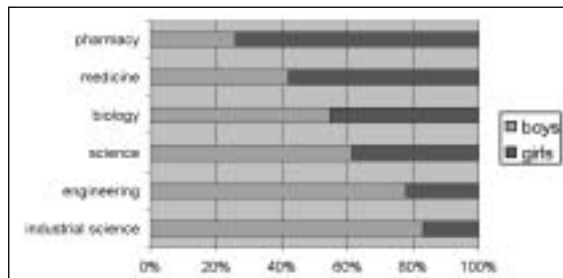


1.2. Higher education

It is only at age 18, when the major study options are taken, that most girls turn away from the industrial sciences at college level and from science at university level.

Some study programmes in exact sciences are popular among girls, such as: pharmacy, architecture, biology, mathematics and biomedical sciences. Girls opt for some of the exact sciences: pharmaceutical sciences (nearly 80% girls), medicine (nearly 60%) and applied biological sciences (50%). Engineering sciences, on the contrary, are not very popular (barely 20%).

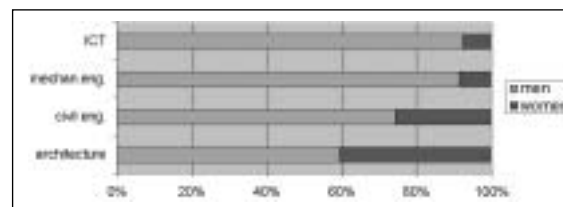
Graph 2: Girls and boys in higher education



1.3. Faculty of (applied) science

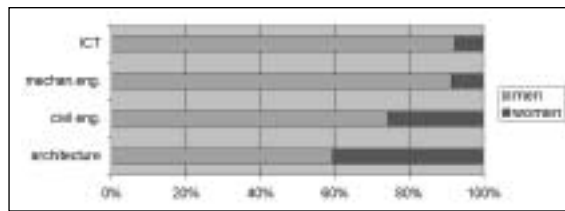
Girls opting for the Faculty of Sciences at university level are very selective again: biology, biochemistry, biotechnology and mathematics are popular, but they do not favour chemistry and physics and certainly not computer sciences.

Graph 3: Women and men in the faculties of science



As for the engineering sciences, girls maintain their selective attitude: architecture is in, and so is, to a lesser extent, civil engineering. Mechanical engineering and computer sciences are out.

Graph 4: Women and men in the faculties of applied science (engineering)



What can we learn from these statistics?

- In the general secondary school programme, mathematics and science do not particularly discourage girls.
- Some science disciplines at university are very popular among girls, even in the Faculty of Science, but a clear hierarchy remains.
- Some disciplines are popular among girls by tradition (pharmacy), others, such as medicine, became so over the last few years.

2. Reasons for negative selectivity

Why is it that girls shun the sciences so much? This has everything to do with the unworldly atmosphere in the field of science and with the job perspectives afterwards.

2.1. Science is not attractive to young people, especially girls

Focus groups in the UK taught us what girls really think of careers in the SET:

- Science is impersonal. Girls are alienated by their perception of science as regulated, impersonal and lacking social consequence; the link between formulae, experiments and a real job is not often made at school.
- Scientists are middle-aged men. Most women have no experience of female scientists or engineers. They rarely have role models in these fields.
- Scientists do it alone. Teenage girls see scientists as “stuck in a lab” and fiddling with chemicals in isolated and repetitive work.
- Scientists are really smart. Many girls question whether they have the intelligence or perseverance to tackle such a career.

On the whole, the image of science is not very attractive to girls, but the issue is even more complex.

2.2. Girls fear the “Bridget Jones” syndrome, choosing science

Girls want to study for a challenging and nice job, but they also want to have – later on – a partner, children and a normal family life. They fear that by studying science, this will be very difficult. They might be right, looking at what we learn from studies in the UK.

2.3. Girls' qualification pays off less

Young women and men with equivalent qualifications show clearly distinct occupational outcomes at an early point in their employment paths. More women than men choose to go into teaching, and their scientific employment is more short-term and discontinuous. Women are considerably more likely than men to exit from professional scientific jobs in the first two years of employment.

2.4. Vertical segregation

Different advancement rates of women result in vertical segregation. We have no precise figures for the private sector, so I limit my observation to academic employment. We see that even in those sciences where women's overall representation is high, such as the human sciences or biology, women are poorly represented in the high-level positions. This raises questions for the thesis of the so-called "critical mass". This proposition states that reaching a certain proportion of women somehow will solve the problem automatically, and that it is only a question of time.

2.5. Job/family combination

Recent study shows that, especially for women working in technology and natural sciences, it is very difficult to find a healthy combination to fit with family life. Generally, graduated women are more likely to marry later in life, to have children at an older age, or to remain childless. This is even more pronounced for women in functions such as technology and engineering.

To summarise the reasons why girls are not so motivated to study science and to look for an employment in SET:

- In secondary education they study science, a little less than boys, but this difference is not very significant.
- Programmes in the Netherlands show us that "girls like science and technology but are not motivated to study it".
- Science does not have an attractive image for youngsters in general and girls particularly.
- Girls fear the "Bridget Jones" syndrome: at a young age they need to take important decisions simultaneously concerning their career and their family life, and they are not prepared to do so.

As the reasons for the under-representation of girls in the sciences are so diverse, it must be clear that making science more attractive in education and society is also a complex matter.

3. What do we need?

Some countries have already developed several projects, but what we miss is a general European vision and plan. We need a European plan that is *implemented at national level and regularly evaluated at European level*. The history and actual procedure of the European Employment Policy is a good example of how we should proceed to reach a better representation of girls and women in the sciences:

- 1993: publication of the White Book on "Growth, competition and employment".
- 1994-2000: several European councils, with as a final piece, an employment pact and agreement on quantitative objectives.
- Agreement on four pillars to realise the targets: employability, entrepreneurship, adaptability and equal opportunities.
- Each country has to make a yearly plan (National Action Plan), that is evaluated by the European Commission.

We need an analogue plan for women in science: national plans with a mission and a vision, and with quantitative and qualitative objectives, as well as monitoring. The topics should be education, employment and public image.

3.1. Education

My most important message is that education and PR alone will not do; the problem is much more complex. For example, a decade-long effort to stimulate participation in scientific disciplines in the Netherlands does not seem to have paid off. Simple PR campaigns don't work, especially among girls. Moreover, Dutch research on the choice of exact sciences among boys and girls at secondary school level shows that, among boys, the choice has to do with a need to perform, and with a conservative mindset about cultural and economical questions in the family. With girls, this was far from clear. The researcher even suggests that a progressive family climate and liberal upbringing standards keep girls away from science, and coaches them towards disciplines with a stronger social component. This research suggests that in a post-modern society, exact disciplines do not score very well. Young people prefer to study what they like, and have little interest in starting demanding curricula. This is an immense problem for a society where technical training is so all-important. We need the following aspects in education.

3.1.1. Gender awareness

It is not normal that in an ICT class 90% of the students are men; staff should be aware that in this case something has to be done to promote positive attitudes to equal opportunities for all.

3.1.2. Teachers

We should stimulate multidisciplinary of teachers in secondary education and they should motivate pupils to study science. Teachers at the secondary school level should be better ambassadors for the sciences, especially the social component of sciences.

3.1.3. Role models and effective mentoring

More female teachers can act as role models for young girls. When role models also act as mentors and provide more individual guidance and advice, they can be even more effective.

3.1.4. Better and more contacts between schools, colleges and industry

Scholars need more accurate and up-to-date career guidance. At every level there is almost complete ignorance of careers in science and technology, not only by students but also by career guidance counsellors and teachers. The bridges between careers in the industry and as teachers should be ameliorated. As we are confronted with a shortage of teachers, it must be made possible to attract people from the private sector to education.

3.1.5. Curricula in higher education

There is a need to reform the curricula themselves. Students need to get the impression that it's great to study sciences, and that after graduating, their contribution to society will be substantial. This means that the notion of MULTIDISCIPLINARITY will have to be written in capitals².

² René De Keyser, *Wetenschappelijke loopbanen in de snel veranderende industrie. Bedreigingen en opportuniteiten*, Studiedag FRWB, Brussels, 22.05.2001.

The University of Utrecht, the Netherlands, introduced a “Medical Information Sciences” curriculum, in order to attract more female students. Indeed, many more women enrolled than before in the “pure” Information Sciences. The first year, there was even a spectacular quadruplication, which seems to prove that appealing to what several types of students find important in life – in this case caring for others – was essential.

Biomedical sciences are another clear example: a natural science, but with an explicit social dimension, it turns out to be a popular choice, especially among girls. The biomedical sciences’ success story at my university convinces me of the fact that girls are not afraid of science, but they want a socially relevant curriculum, and an option that implies working with people, not just with things.

3.1.6. Single-sex environments

Many studies have suggested that girls become more self-assured and work better in the absence of boys. Mere segregation is not an automatic guarantee of success but several kinds of single-sex training can be conceived. The creation of single-sex summer schools, with mentoring programmes for young girls, and technical training is an option. The European Social Fund already stimulates single-sex training in ICT.

Questioning co-education is of course not a wise option, and not even a realistic one, but if we want to reach certain target groups, we need to provide the right resources. This means specific methodologies, and specific programmes. In several countries, offering specific training courses exclusively for women is seriously being considered. Big American corporations already offer their female middle-management separate training programmes. Within the ESF, separate funds have been provided for ICT training, aimed at women. This means the influx of women has to be stimulated through specific methodologies. More importantly, the retention has to be guaranteed by supporting special initiatives, including networking and mentoring programmes. This is a new responsibility in the field of education, and also for the training and education of managers in companies.

3.2. Employment

We have to think about possibilities of family-friendly policies. The problem is that employers have no experience with the needs of women in that field. They do not know how to manage it and what the consequences are. Indeed, science and technology have, until now, been a typical male occupation. There are two main problems concerning employment: recruitment and retention. The last is the biggest problem. It has to do with the corporate culture as well as with the difficult job/family combination in scientific careers.

3.3. Public image

There is a need to change the public image of science. We only realise the importance of technology and science, when things go wrong: when electricity fails, when the computer crashes... We take science and technology for granted; scientists lock themselves up in their labs and when they come out their language is usually incomprehensible.

3.3.1. We have a huge need for communication from the scientists themselves

I have a successful example of good practice from the Flemish Community. In 2000, it organised courses of spoken and written communication, especially for the academic staff of universities, with

training given by journalists from the radio, TV and newspapers. The scientists were aware, perhaps for the first time in their life, that they needed to translate their language into a language that was comprehensible to normal human beings.

3.3.2. The media

The media have also an important role to play. Normally, after secondary school, the only way to keep in touch with science is through the media: reviews, magazines, newspapers and, of course, radio and TV. It is a pity that the popular media, like TV and newspapers, don't give much attention to science. A good example is the scientific programme on the BBC (Tomorrow's World) that explains scientific problems in a simple way to a broad public.

4. Conclusion

In the rich countries, we see a waning interest for scientific careers, among boys as well as among girls. Young people are attracted by a discipline that has appeal, is socially relevant and includes working with people. This doesn't mean that students turn away from sciences. At secondary school level in Flanders, we don't see significant differences between boys and girls. The problem is rather the unattractive image of both the scientific curricula in higher education and the job perspectives afterwards. The problem is not the girls, but the unworldly character of the field of science, which should become more multidisciplinary, and more oriented towards people and society. In addition, scientific jobs should become more open to the career requirements of women, with respect to the combination of job and family.

A minority within a minority: mathematics, science and technology studies among Israeli and Arabic female students

HANNA DAVID

University of Tel-Aviv, Israel

1. Introduction

The need to nurture girls in mathematics, science and technology in Israel is, as everywhere else, a feminist issue. By encouraging girls at the youngest possible age to excel in these areas, we are “opening the gate” for them to higher education in the most prestigious professions. This will enable them to become an integral part of the Israeli academia, the financial world that shapes the economic future of Israel, and the inner circles of society and politics, influencing Israeli society in all possible aspects.

However, full integration of women, in Israeli scientific and technological life, is also a political issue, which has a high priority on the public agenda. The percentage of high-school graduates with a good background in mathematics and science is very low in comparison to that in countries that have “beaten” Israel in international studies. Israel has reached the 28th place out of 38 countries in the 1999 Mathematics TIMSS Study (Martin et al., Dec. 2000; Mullis et al., Dec. 2000), while in 1963 it was number one among the 12 countries participating (Husen, 1967). Therefore, female human potential – which is only partially “used” – is the available reservoir for helping Israel to continue to be a developed country rather than deteriorating. As long as Israel holds a record in gender gaps in mathematical achievements, as was unfortunately found both in the 1995 and 1999 TIMSS studies (Martin et al., 1997, Dec. 2000; Mullis et al. 1997, 1998, Jul. 2000, Dec. 2000), this aim cannot be reached.

The human potential in Israel consists of 50% girls, most of which belong to one of the following minority groups: girls studying in the religious sector (David & Zorman, 1999), girls studying in the Ultra-Orthodox sector (ibid.), new immigrant girls, the majority from the ex-USSR and the minority from Ethiopia (David, 2000c), and Arabic girls (David, 2000c, 2001, 2002). This paper will concentrate on the last mentioned, but not least important, group.

2. The Arabic minority in the Israeli educational system

Israel is a country consisting of minorities in many aspects. About 20% of Israeli citizens are non-Jews; most of them being Arabs. The three main Arabic sub-categories are Muslims (about 80%), Christians (about 10%) and Druze (about 8%). Inequity – regarding educational level – between any two of these, especially between Christians and Muslims or Druze, is larger than that between Jews and Arabs: the educational level of Israeli Christian Arabs is not lower than that of Jews. But as Christian Arabs are only a small minority of all Israeli Arabs, the average educational level in the Arabic sector is one of the main political, social and financial problems that the State of Israel has to solve.

Some comparisons between the Jewish and the Arabic Israeli populations will illustrate the disparities regarding participation at the different educational stages. The birth rate among Israeli Arabs is higher than among the Jews. The number of first grader Jews reflects this: about 82 000 (in

1998) in comparison to 30 000 Arabs (Bureau of Statistics, 1999, table 22.15). This means that, among 6-year olds, Arabs make up 25% of the population. In 12th grade the situation is already different: 71 000 Jews and only 12 000, that is 14.4%, Arabs.

The matriculation examinations take place in Israel at the end of the 12th grade. However, the Jewish sector offers a variety of high-level technical schools, where a technician certificate can be obtained after studying for an extra 13th year and a practical engineer certificate is earned when completing the last (14th grade) successfully. When we compare the data between Jewish and Arabic 14th-graders the picture is even more astonishing: there are no Arabic technical schools where either a technician or a practical engineering certificate can be obtained. This means that a young Arabic high school graduate who wants to acquire a technical profession has either to study for the degree of engineer, give up the idea of working in a technical area, or study in a Jewish school. If he chooses the last option, he has to adapt to the Jewish society and be fluent in the Hebrew language, a task that is quite complicated for any Arabic youngster, especially for an Arabic girl.

In Israel, each pupil who wishes to acquire a matriculation certificate may choose to learn and be examined in mathematics at each of three offered levels. Pupils who study mathematics at the 5- or 4-point level, with good grades in their matriculation certificate, have the best prospects to continue their academic studies at one of the Israeli universities in the most prestigious fields, including computer science, medicine, engineering or management. On the other hand, pupils who study just enough mathematics (3-points level) to be entitled to a matriculation certificate, rarely have access to hard sciences, life sciences or mathematics.

This situation is due not just to lack of mathematical knowledge, which can be improved during the first and even the second year of academic learning, but mainly to a unique acceptance-to-high-education policy taking place in Israel, called the “bonuses system”. According to this policy 20-25 points are added to the grades in mathematics and English learned at the highest possible level, and 12.5 points at the second best (4-point) level for the calculation of the matriculation grade average. Bonuses for other subjects are smaller (for the subject list, see www.ims.tau.ac.il/md/smdp009.asp), and given only at the highest 5-point level (Information Brochure for New Candidates, 1999). Thus, candidates with high matriculation grades, but with no bonuses, have practically no prospect to study a highly prestigious, interesting and intellectually challenging profession at an Israeli university. For example, a perfect 800 score at the psychometrics and a perfect final grade of 100 at the matriculation certificate did not ensure acceptance to the computer department at Tel Aviv University in the 2000/2001 academic year. As five of the seven obligatory matriculation subjects are in the humanities, and the sixth is English, achieving an average over 100 is possible almost only by studying at least two scientific subjects and English at the highest possible level, in addition to the obligatory subjects.

Israeli Arabs suffer from many disadvantages in comparison to Israeli Jews regarding education. The percentage of special education children is higher among Arabs than among Jews. In addition, in 1998, 6% of Jewish students left school before graduation. Among Arabs the dropout rate was 14% (Mevarech, 2000). But the largest disparity between Arabs and Jews appears at the last stage of formal education, the end of high school. The percentage of high school graduates entitled to the matriculation certificate is much lower among Arabs than among Jews (Bureau of Statistics, 1999, table 22.22). While the average success rate in the matriculation examinations among Israeli Jews was 68 in 1998, this percentage did not exceed 49.2 for Arabs. While Jews – especially males – were examined in the most prestigious combinations of subjects, the percentage of Arabs taking such combinations has been much lower (*ibid.*, table 22.24). The percentage of Arabic boys choosing to

be examined in the most prestigious combination (that is, two scientific subjects, two technological subjects and at least one humanistic subject) at the highest possible level was less than a third that of the Jewish population. The next prestigious combination (two scientific, one technological and one humanistic subject) was not an option either for Arabic girls or boys. The percentage of Arabic boys choosing to learn two scientific and two technological subjects was a tenth of that of Jewish boys (ibid). Low high school achievements result in disparity at higher levels of education. In 1998, only 7% of B.A. students were Arabs; they comprised only 3% of M.A. students and 3.5% of Ph.D. students (ibid., table 22.34).

3. Are girls a deprived majority in the Israeli educational system?

Gender inequity in education has been discussed widely in Israeli professional literature. Gender differences have been found in capabilities, inclinations and subject preferences (Adler, Argaman, Zucker & Avishai, 1995), as well as in professional choices (ibid.; Kfir, 1988). The main differences have been found in mathematics and related subjects (Ayalon, 1994, 1995; David 1997, 1998, 2000a, 2000b, 2001, 2002; David & Zorman, 1999; Tamir, 1998; Zorman & David, 2000). This is related mainly to success and failure attributions (Amit & Movshovitz-Hadar, 1989) and to the general sexism still existing in the Israeli school, as a reflection of the situation in society in general (Ben Tsvi-Mayer, 1991; Shachar, 1994). Many intervention programmes have been applied to reduce the level of sexism (Zorman & David, 2000). Alas, Israel scores third in the world in gender gaps in mathematics and science among 4th- and 8th-graders (David, 2001, 2002). As a result, the percentage of girls studying enough mathematics to enable their further education in a prestigious profession is smaller than that of boys (Zorman & David, 2000).

3.1. Girls and the matriculation examinations

In 1999, 24 489 girls but only 18 631 boys were entitled to the matriculation certificate in Israel (Mevarech, 2000). In addition, in all schools, girls received better grades in all subjects. Mostly girls studied two of the scientific subjects at the highest level: 54% of the students in the general secular educational system taking the 5-point matriculation *chemistry* exam were girls; in the religious system it was 73%! In *biology*, about two thirds of those taking the highest matriculation exam – both in the secular and the religious systems – were girls.

This data might seem encouraging in terms of equity and advancement of girls. However, 22% of boys were matriculation certificates holders with 5-point level *mathematics*, compared with 14% of girls (Bureau of Statistics, 1999). This means that the way for many prestigious occupations is still almost blocked for many talented, highly achieving girls. Only 6% of the girls examined in the matriculation exams in 1998 studied *physics* at the highest possible level in comparison to 25% of the boys (Bureau of Statistics, 2001, table 22.2). The main gender disparity in the matriculation examinations has been in computer science. In 1998, only 5.5% of all girls taking the matriculation exams studied computer science at 5-point level, compared with 20% of boys. Unless this situation changes soon, the access of women to high-tech careers will continue to be very limited.

3.2. Girls and combinations of subjects

Of the four most prestigious combinations of subjects (David, 2000c), the percentage of girls is similar to that of boys only in one. In the most prestigious combination (two scientific, two technological and one humanistic subject) at the highest possible level, the percentage of boys is eight times higher than that of girls (1.6 compared to 0.2). In the second prestigious combination (two scientific, one

technological and one humanistic subject), the percentage of boys is almost four times higher than that of girls (2.7 compared to 0.7). Among those examined in one scientific, two technological and one humanistic subject, there are more than three times more boys than girls (2.0 compared to 0.6). Only among those with two science and two humanistic subjects are the percentages of boys and girls almost equal (10.7 compared to 11.3) (Bureau of Statistics, 1999, table 22.24).

3.3. *Girls and the psychometric exams*

In Israel, until the 2001/2002 academic year, there was an equal value to the matriculation grades and to the psychometric results regarding acceptance to higher education. The gender gap in the mathematical part of the psychometrics, which counts for a third of the final grade (the other two parts are verbal abilities and English knowledge), has been about half a standard deviation for more than 20 years. At the +750 level, there have been four times more boys than girls (Suessapel, 1997). As a result, many girls were denied access to scientific and technological studies.

4. *Arabic girls: the unfulfilled potential*

Arabic girls are the largest unused human potential in Israel. There are many reasons to this, despite the tendency towards a more conservative way of life. In 2000, especially among Muslim Arabs, girls enjoyed a comparatively high level of freedom concerning their educational advancement (Mittelberg & Lev-Ari, 1999; David, 2000c, 2002). The main reasons for granting such a freedom are:

- The high professional level of Arabic teachers.
- The mission feeling of Arabic teachers taking part in the advancement of Arabic youngsters in general and girls in particular.
- The high level of education in the Arabic sector in general, and for talented girls in particular, (Abed-el-Kader Yichya, 1995) for the advancement of social and economic standing.
- Much effort is invested to prevent girls from leaving high-level mathematics and science.
- The perception of mathematics and science as gender-neutral professional fields.
- The willingness of many young Arabic men to marry women with a higher educational level (unlike in the Jewish sector).
- The employment level among Arabic women being very low, highly educated girls are not perceived as a threat to Arabic men – they are mostly “out of the competition”.

As a result, there are several important achievements concerning Arabic girls:

- The dropout rate from high school was 18% for boys and only 10% for girls (Mevarech, 2000).
- Girls were the majority of matriculation certificate holders: 20% more girls than boys, and in the matriculation exams, the rate of female success was 52.5% in comparison to 45.2% male success (ibid., table 22.22). As a result, in 1998, 2 864 Arabic girls, but only 1 995 boys, were entitled to the matriculation certificate (Bureau of statistics, 1998), and the percentage of girls excelling, in all subjects and all levels, was higher than that of boys.
- The percentage of girls who succeeded in the highest-level mathematics matriculation exam was 47%, in comparison to 43% among Jews (ibid.).
- While among Jews only 6% of the girls who took the matriculation exams studied physics at the highest possible level in 1998, among Arabic girls it was 12%!
- More girls than boys took the chemistry matriculation exam (582 compared with 500); the success rate among girls was higher than among boys, thus 512 girls but only 435 boys succeeded in this exam. In total, 54% of matriculation certificate holders who were examined at the highest

possible level in chemistry were girls – the same percentage as in the Jewish secular educational system.

Nevertheless, there are still many more aims to be achieved regarding the educational level of Arabic girls.

4.1. In the matriculation exams

Though participation of girls in high-level physics studies is higher than among Jews, it is far from being satisfactory: 12% of the Arabic girls studying for the matriculation exams take the 5-point level physics exam. While it is double the percentage among Jews, it is only 40% of the percentage of Arabic boys, and far from being enough for girls who want to acquire a scientific or a technological profession.

The percentage of Arabic girls taking the 5-point Hebrew matriculation exam is still lower than that of boys. This results in lower self-confidence regarding participation in Jewish higher education institutions, problems of being accepted in such institutions, and, when accepted, in difficulties understanding spoken Hebrew and reading Hebrew learning materials.

The percentage of girls taking the 5-point English matriculation exam is less than half that of the Jewish sector. The percentage of those taking the minimal 3-point exam is double than in the Jewish sector. Taking the minimal English matriculation exams blocks the entrance to university, whereas taking the 4-point level exams is a considerable disadvantage regarding acceptance in highly prestigious departments, especially scientific and technological, and for reading the learning materials which are mostly in English in these departments.

The percentage of Arabic girls who chose to be examined in the most prestigious combination (two scientific, two technological and at least one humanistic subject) at the highest level was zero (Bureau of statistics, 1999, table 22.24). The percentage who chose to be examined in two scientific and two technological subjects at the highest level was one sixth of Jewish girls (ibid.). No Arabic girl studying in an Arabic school opted for two scientific, one technological and one humanistic subject.

4.2. In higher education

In spite of their high achievements in mathematics and science – compared both to Arabic boys and to Jewish girls (Mittelberg & Lev-Ari, 1999) – girls are the minority among Arabic students. Only 15.9% females in comparison to 20.9% males started their academic studies within six years of school graduation (Bureau of Statistics, 1999, table 22.26). No wonder that in 2000 there was only one Druze female doctor! Moreover, in spite of the high achievements in high school (compared to Arabic boys) and the high participation rate in mathematics and physics (compared to Jewish girls), most Arabic girls who choose to continue their education study in teachers' colleges.

4.3. In employment

The rate of employment among Arabic women is very low (Mittelberg & Lev-Ari, 1999; Semyonov, Lewin-Epstein & Brahm, 1998, 1999). The percentage of Arabic unemployed female teachers is higher than among Jewish teachers and among Arabic male teachers. The two main reasons for this are the average unemployment rate among Arabs, which is higher than among Jews, which results, among other things, in preferring over-qualified Arabic males (for example, highly trained engineers,

school teachers with a Ph.D.), and the lack of day care places in the Arabic sector. In addition to the difficulty many Arabic women face when they try to get a teaching job in the Jewish sector, the result is a waste of a large trained human potential. Not even one single high-tech industry operates in an Arabic settling. For Arabic girls who cannot travel out of their village or town, especially after getting married and having children, that means that the way to all highly paid and highly interesting high-tech jobs is practically blocked, no matter how educated they are.

5. Educational and employment problems of Arabic girls related to tradition

There are still some traditional attitudes among older male family members regarding the need for advanced education for girls/women. For instance, in many cases it is not accepted to continue studying when a woman marries while still in school. Many Arabic men still do not accept that the female members of their family should drive, thus women are highly limited in finding a workplace. After getting married, it is not always accepted to work out of the house. High birth rates limit women's options to hold a steady job. In most Arabic villages there are no day care institutions for pre-school children. Though a substantial part of the employed women get help from other female family members, this is not a solution for all women, especially those working in long shifts (for example nurses, doctors).

These difficulties are partially compensated by the attitude toward high education among female Arabs. The following example provides a good illustration. I have asked many young girls, university students and mothers of young girls and university students the same question: suppose you have a son and a daughter. They are 17 and 18 years old, and you don't have enough money to send both of them to university. What would you do? One said, "I would choose the best". Another said, "I would choose the girl". When I asked why, she answered, "A boy can find a job even if he doesn't have a higher education, but a girl can't". The third kind of answer really shocked me: "I would sell a piece of my land". Knowing the value of land for Arabs in general, and for Israeli and Palestinian Arabs in particular, one can only admire the sacrifice people are willing to make in order to give access to higher education to all their children, regardless of gender.

6. What should be done?

- Support Arabic youngsters, especially girls, to study mathematics, science and technology, as well as Hebrew and English, at the highest possible level.
- Encourage Arabic girls to continue their academic studies either in one of the universities or at the Technion, the Israeli higher institution of technology, located in Haifa. Since the majority of Muslim Arabs live in the Northern part of Israel, studying at the Technion enables many of them to return home every evening if their families object to their staying overnight at the dormitory or in an apartment.
- Mobilise science teachers by encouraging female teachers to teach in the Jewish sector, where there is a lack of qualified teachers, especially in the periphery.

7. An example: the Hadige high school for girls in Um el-Fachm

I have had the opportunity to carry out some research at the Hadige³ high school for girls in Um el-Fachm⁴. Um el-Fachm, a big religious Muslim village, is located very close to the Palestinian Authority border. I found some impressive solutions for the educational problems I have

³ Hadige was the wife of the prophet Muhamed.

⁴ Literally: "the mother of coal".

mentioned. The attitude of both male and female teachers is very supportive towards the students, a finding that was also mentioned in the research of Mittelberg and Lev-Ari (1999). In the all-girls high school, male teachers were sometimes more supportive than female teachers with regard to science, asking the girls not to leave the “difficult” – scientific – subjects and making them feel good when they did well in mathematics and sciences.

Though the village is considered very religious (its previous mayor resigned in 2000 in order to dedicate his time to the Islamic Movement) there was a way to enable participation of girls in a high level school. In Um el-Fachm, a high percentage of 12+ year old girls cover their head. In the mixed junior high school adjoining Hadige, 15-40% of the 12-15 year old girls already cover their head. In the Hadige high school about 75% of the girls do it, and all students wear traditional long dark costumes. It was quite obvious that for such girls it did not seem appropriate to study in a mixed school. In fact, the dropout rate of girls in Um el-Fachm was 36% until 1991. When Dr Samir, a highly dedicated educator, started the Hadige school, the girls’ drop-out rate fell to 8%.

The other amazing achievement of the Hadige high school is the results of the matriculation examinations. The girls score higher than in any other public school in the Arabic sector. That’s good for now, but that’s not enough. For example, in 2000, only five girls took the 5-point physics matriculation exam and all of them had a final “excellent” grade of 95-100. That means that many more girls could take this exam, and they should be more encouraged to do so, especially among those taking high-level mathematics.

I hope that my intervention programme for supporting Arabic girls to achieve highly in mathematics, sciences and computer science, as well as in Hebrew and English, will start operating in the 2002/2003 school year, so that more Arabic girls will fulfil their potential.

References

- Abed-el-Kader Yichya, N., *Attitudes in the Arabic family towards the gifted child*, M.A. Thesis, Tel Aviv University, 1995.
- Adler, N., Argaman, V., Zucker, M. & Avishai, T., *Gender differences in capabilities, inclinations, subject preferences, and future professional choices*, The Hadassah Institute Jerusalem, Israel, 1995 [in Hebrew].
- Amit, M. & Movshovitz-Hadar, N., “Gender differences in success and failure attribution in mathematics”, *Megamot [=Trends]*, 32(3), 1989, pp. 361-373 [in Hebrew].
- Ayalon, H., “Monopolizing knowledge? The ethnic composition and curriculum of Israeli high schools”, *Sociology of Education*, 67(4), 1994, pp. 264-278.
- Ayalon, H., “Math as a gatekeeper: Ethnic and gender inequity in course taking of the sciences in Israel”, *American Journal of Education*, 104(1), 1995, pp. 34-56.
- Ben Tsvi-Mayer, Sh., “Teaching girls to be women in Israeli Jewish schools” in Swirski, B. & Safir, M.P. (Eds.), *Calling the Equity Bluff: Women in Israel*, Pergamon Press, New York, 1991, pp. 75-81.
- Bureau of Statistics, *Yearbook of Statistics 49, Yearbook of Statistics 50*, Jerusalem, Israel, 1998, 1999 resp.
- Bureau of Statistic, *Pupils who took matriculation and final exams and are entitled to certificate 1995/6*, Jerusalem, Israel, 2001.
- David, H., “Mathematical giftedness”, *Talpiyot College Annual 9*, 1997, pp. 147-169 [in Hebrew].
- David, H., “Educating gifted children in regular or special classes?” in A. Ziv (ed.), *Giftedness and special talents: A textbook*, The Open University, Tel Aviv, 1998a, pp. 331-353.
- David, H., *The gifted girl*, The inter-disciplinary Israeli feminist conference, Tel Aviv University, April 26-28, 1998b.
- David, H., *Young women in science and technology*, The National Science Museum, Haifa, March 3, 2000a.
- David, H., *Intervention programme for minimising gaps in mathematics among elementary school children*, paper submitted to the Ministry of Education, The Philippines, 2000b.
- David, H., *Social, familial, and educational problems of the talented girl*, conference on Girls and Women in Science and Engineering, Ministry of Science and Ministry of Education, Tel Aviv University, November 29, 2000c.
- David, H., “Gender gaps in Mathematics in Israel: An international comparison”, *Aleh, The Journal for Mathematics Teachers*, November, 2001a.

- David, H., *Mathematical giftedness: The mathematics acceleration program at the Tel Aviv University*, 8. Internationale Konferenz über Schulmathematik, Vienna, Austria, December 17-19, 2001b.
- David, H., "Mathematics gender gaps in the matriculation exams and in the psychometrics in Israel", *Aleh, The Journal for Mathematics Teachers*, February, 2002.
- David, H. & Zorman, R., *The gifted religious girl, To be a Jewish woman: The First International Feminist Conference of Religious Women*, Jerusalem, July 14-15, 1999.
- Husen, T., *International study of achievement in mathematics. A comparison of twelve countries* (2 Vols.), Almqvist & Wiksell and John Wiley & Sons, Stockholm and N.Y., 1967.
- Kfir, D., "Achievements and aspirations of boys and girls in high school: A comparison of two Israeli ethnic groups", *American Educational Research Journal* 25, 1988, pp. 213-236.
- Martin, M.O., Mullis, I.V.S., Beaton, A.E., Gonzales, E.J., Smith, T.A., & Kelly, D.L., *Science achievement in the primary school years: IEA's Third International Mathematics and Science Study*, Chesnut Hill, MA, The International Study Center; Boston College and International Association for the Evaluation of Educational Achievement, June 1997.
- Martin, M.O., Mullis, I.V.S., Gonzales, E.J., Gregory, K.D., Smith, T.A., Chrostowski, S.J., Garden, R.A. & O'Connor, K.M., *TIMSS 1999 International Science Report: Findings from IEA's Repeat of the Third International Mathematics and Science Study at the Eighth Grade*, Chesnut Hill, MA, The International Study Center; Boston College and International Association for the Evaluation of Educational Achievement, December 2000.
- Mevarech, Z., "Gender gaps in scholastic achievements" in Zorman, R. & David, H., *There is another way: Girls and women – Achievements and challenges*, Henrietta Szold Institute and Ministry of Education, Jerusalem, 2000, pp. 9-13.
- Mittelberg, D. & Lev-Ari, L., "Confidence in mathematics and its consequences: Gender differences among Israeli Jewish and Arab youth", *Gender and Education*, 11(1), 1999, pp. 75-92.
- Mullis, I.V.S., Martin, M.O., Beaton, A.E., Gonzales, E.J., Kelly, D.L. & Smith, T.A., *Mathematics achievement in the primary school years: IEA's Third International Mathematics and Science Study*, Chesnut Hill, MA, The International Study Center; Boston College and International Association for the Evaluation of Educational Achievement, June 1997.
- Mullis, I.V.S., Martin, M.O., Fierros, E.G., Goldberg, A.L. & Stemler, S.E., *Gender differences in achievement: IEA Third International Mathematics and Science Study*, Chesnut Hill, MA, The International Study Center; Boston College and International Association for the Evaluation of Educational Achievement, July 2000.
- Mullis, I.V.S., Martin, M.O., Gonzales, E.J., Gregory, K.D., Garden, R.A., O'Connor, K.M., Chrostowski, S.J. & Smith, T.A., *Mathematics and science achievement in the final year of secondary school: IEA Third International Mathematics and Science Report*, Chesnut Hill, MA, The International Study Center; Boston College and International Association for the Evaluation of Educational Achievement, February 1998.
- Mullis, I.V.S., Martin, M.O., Gonzales, E.J., Gregory, K.D., Garden, R.A., O'Connor, K.M., Chrostowski, S.J. & Smith, T.A., *TIMSS 1999 International Mathematics Report: Findings from IEA's repeat of the Third International Mathematics and Science Study at the Eighth Grade*, Chesnut Hill, MA, The International Study Center; Boston College and International Association for the Evaluation of Educational Achievement, December 2000.
- Shachar, R., "Is the education system perpetuating gender inequity?" in Shachar, R. & Avrahami-Einat, Y. (eds.), *Equality of opportunities for boys and girls in the education system*, The women's lobby and the feminist forum, Tel Aviv University, 1994, pp. 13-19 [in Hebrew].
- Semyonov, M., Lewin-Epstein, N. & Brahm, I., *Modernization, participation and occupational status: Arab women in the Israeli labor force*, American Sociological Association, 1998.
- Semyonov, M., Lewin-Epstein, N. & Brahm, I., "Changing labor force participation and occupational status: Arab women in the Israeli labor force", *Work, Employment, and Society*, 13(1), 1999, pp. 117-131.
- Suessapel, K., "The 750 club", *Yedi'ot Acharonot*, 27.6, 1997 [in Hebrew].
- Tamir, P., "Gender difference in science learning: Analysis of 15 years research", in Zorman, R. & Krongold, N. (eds.), *Nurturing gifted girls in natural science*, Henrietta Szold Institute, National Institute for research in the Behavioural Sciences, Jerusalem, 1998, pp. 25-42.
- Zorman, R. & David, H. *There is another way: Girls and women – Achievements and challenges*, Henrietta Szold Institute and Ministry of Education, Jerusalem, 2000.

Reaching out to schools and society at large

HARRIET AURELL

Swedish Labour Market Board, Sweden

1. Teknikan – a think tank built upon experiences

At the Swedish Labour Market Board, I co-ordinate national projects for developing new gender-based teaching methods in IT and technology and help to develop new technological education. Our organisation is currently discussing a new strategy for solving the problems with a gender-segregated labour market. We have made a special video as a basis for discussion, a copy of which can be ordered from the address at the end of this contribution.

I am going to present the results of a project called Teknikan that started in 1995 and focused initially on providing women with a different and stimulating bridge entrance into technical problem-solving and understanding. Our courses became pedagogic micro-worlds, designed to tackle technological problems, wherein we analysed, discussed, tested and developed hypotheses about the pathways followed by women towards greater technological knowledge.

The guidance programme included hands-on training: picking apart, analysing and putting together computers, building electronic circuits, constructing with mechanical elements and gaining an overview of various technology-oriented studies and career paths. Frequent laboratory testing and group discussions were used to demystify, inspire, clarify and create a forum for discussion and learning. We even studied modern theories of psychology of cognition and pedagogy in parallel to this training.

82% of the participants became interested in choosing a technology-oriented line of further studies. Initially that made us happy until we understood that there were more difficulties for them than expected if they wanted to follow up their new-found interest. They had learned to meet technology in an inspiring way, but when they attended the courses that we suggested, they found them so poorly adapted to their pre-knowledge and technological know-how that most of them felt deeply disappointed.

The goal of Teknikan was to involve young women who were curious about technology but had not chosen a technical line of study at school. We wanted to develop a guidance methodology that induced women to take up further studies in the field of technology by making them feel deeply stimulated – not just because they felt they had to prove they were smart. Having developed our laboratory exercises and materials and sorted them after key concepts of technological understanding we found interesting patterns.

2. Building neural networks

There were some milestones in the discussions about cognition illustrated by a picture of the development of connections between nerve cells found in Carla Hannaford's book *Smart moves: Why learning is not all in your head*, where you can see all the interconnecting lines between the nerve cells. To the left are nerve cells from a new-born child, to the right from a child who is two months old.



The more you explore your surroundings the more complex the pattern of associations grows. The picture gives an idea of how subtly we build networks of our experiences with the help of associations and similarities. In order to comprehend something, we try to find relationships and patterns with the aid of our five senses and our memories. Everything we encounter throughout our life creates associations and connections to what we have encountered previously. The association lines that are created in our brain are due to the kind of experiences we meet, the kind of toys, books, problems that our brain handles, creates and sculpts the network of associations. Encountering technology is no exception.

In Teknikan this insight made us wonder: what lines of technological associations have women had the possibility to create in the female knowledge culture? Is it realistic to expect women to incorporate education programmes that do not reflect their own culture, experiences and reality that have formed their lines of associations and connections? Can the abstract theories in technology carry the same meaning, and same consequences, for women as for men, when knowledge must be linked to a given experimental reality to be useful. Furthermore, we considered the fact that men, in general, can relate technology to an established culture that includes technologically characterised experiences. There seemed to be a greater difference in the conditions for women and men entering into a technological education programme than we had first realised. We asked ourselves why these differences were so rarely discussed.

3. Pedagogic micro-worlds

In meeting our groups of women, we came to understand the magnitude of our task and sought all the more zealously after key concepts of technological understanding. Our courses became pedagogic micro-worlds, testing and discussing the pathways followed by women towards greater technological knowledge. We even realised that acquiring knowledge in the wake of failures and unexpected results sometimes is the best way to gain a more profound understanding of things. This is quite the contrary to the way we are taught at school.

We even got interested in the theories of the Swiss developmental psychologist Jean Piaget about knowledge growth. His conclusion was that the growth of knowledge is a progressive construction of logically embedded structures superseding one another by a process of inclusion of lower, less powerful logical means into higher and more powerful ones. According to Piaget's theories the human being has at first to use all her senses to explore an object she wants to understand. In the next stage, she will be able to think about things and events that aren't immediately present. After that is the stage where one has the possibility to discern visible logical

relations and mentally manipulate information. The very last step of knowledge is that of abstraction; when the human being is capable of hypothetical and deductive reasoning. Modern interpreters of Piaget's thoughts claim that these are not only the steps of personal intellectual growth but also towards all understanding. Concrete exploration and experience is the necessary base for higher forms of more abstract understanding. It makes it possible for you to create mental images of what you read or hear. This implies that all the experiences that you bear in your memory, gathered by means of all your senses, comprise the filter which you use to process and interpret new information.

4. Tacit knowledge

A concept that gave us much understanding of women's conditions in technology studies was the concept of "tacit knowledge". It is all the knowledge you construct by using your senses, yet without being able to put it into words to communicate to others. It shows up, for example, when you need to solve a problem, understand descriptions, assimilate information or build and construct. It is the unconscious, unreflective acquisition of knowledge that could explain how an individual acquires information about the rule-governed complexities of the stimulus environment without consciously attempting to do so. Tacit knowledge is even developed in the process of getting familiar with something, such as technical equipment, thus making it easier to solve a technical problem.

In theories about cognition, knowledge is described as what appears in your mind once your brain has interpreted and made the information meaningful by association with all your memories. What memories do women have to interpret technology? Usually very few, according to the traditionally male-biased definition of the technology concept. When the conditions and possibilities that are supposed to be equal are not, the psychological stress factor is huge, especially in a society that grades people by scales of "intelligence".

If you compare a young woman who has chosen to study technology for reasons of ambition and high grades in mathematics, with a man who has chosen it because of sincere interest in the subject, the amount of tacit knowledge between the two will make a great difference. The man will have much more knowledge and familiarity in his "filter" to help him understand. This filter will help associate and interconnect new information acquired from books and lectures with previously acquired knowledge and experiences.

Even men with little practical technical experience have more basic and tacit knowledge than women normally have, since they have grown up in a male-oriented culture. Values, status and topics of discussion are to a much greater degree technology-oriented even for men who have not incorporated technology into their identity and field of interests.

5. How does an interest in technology grow?

It is often said nowadays that both boys and girls are uninterested in engineering. However, when we considered the circumstances for growing interest, we found that the lack of practical experience could be one of the explanations. Today, not even young boys have many technical toys to understand. Most toys are digital and though you can learn how to operate them you cannot understand why and how they work. In the 1950s, there was a lot of hobby clubs in Sweden, as I believe was the case all over Europe. Boys were playing and building with Meccano, radio-operated aeroplanes and little railways with gears and traffic lights which could be

programmed simply. They had easy access to tools and mentors in their neighbourhood. They learned about mechanic and electronic apparatus in a very practical and amusing way, using all their senses. If you ask those who are engineers or teachers in technology today, they will most often enthusiastically describe this in vivid colour. It was during these early years that they began to find technology stimulating and interesting and that they first came to understand the basic laws of technology.

If a woman goes into an education programme where most of the students are men who have chosen technology because of an early-acquired interest, she will have to compete on very unequal terms and her self-esteem will be deeply threatened. If no one helps her to understand the existence and nature of these unequal conditions then she will probably think that she isn't as smart and proficient as her male student colleagues. A very common way to deal with a situation like this is to adopt psychological defence mechanisms. One such mechanism is to tell oneself that "I have made a wrong choice; technology didn't turn out to be what I had expected". Another is to concentrate very hard on getting good test results just to get a degree, ignoring the opportunity to instead, or also, gain a true, deeper understanding of the subject.

Most of the young girls who go on to study in technology are told that they are very intelligent because they have good grades from school. However, when they see their male student colleagues devoting less time, ambition and energy to follow during lectures and understand the teaching materials, it naturally, but equally falsely, gives them the impression that their male colleagues are more intelligent. Unfortunately, no one points to the fact that men have generally devoted more time at an earlier stage in their life to understanding technology.

The question raised in Teknikan was "what theories of understanding is traditional technology education built upon?" What theories claim that education programmes designed for people with a special kind of technological pre-knowledge are also necessarily adapted to those who have not had the time to gain the same pre-knowledge? Women and men are normally brought up in quite different knowledge cultures.

In our organisation, we have a lot of training courses in technology and IT, which are more popular among men than women. When we examined them we found that most courses' starting point was the level of understanding of technology shared by men. There is a wide gap between men and women's level of technology knowledge. The time allowed for elaboration and integration of knowledge had the men's level of knowledge as the norm. The amount of technological concepts and the literature reflected men's pre-knowledge. Many of the women, who had at first eagerly and ambitiously started studying, soon left the courses because they did not want to damage their self-esteem. We hadn't realised that women are usually at a disadvantage in courses that, unconsciously, are designed for men, something that applies to most technology courses. Disadvantages include:

- the amount and kind of prior knowledge;
- few obvious mentors among their friends;
- little awareness of how to seek out technical knowledge;
- poor access to exercise materials before starting the course;
- the fundamental conflict between technology and women's gender role (you become what you do), and
- women are less often motivated by a genuine interest in the matter than by pure ambition.

6. Package of measures

These matters have now been discussed extensively in our organisation and we realise that many gender blind aspects are hidden in our thinking of how IT and technology courses should be designed. In our strategy for minimising gender segregation on the labour market, we have planned for various measures, both in the short and in the long run. These include, among others:

- Training of all the purchasers of technological courses in the Swedish Labour Market Board to make them buy gender-equal courses. Support for in-company training to make it gender-equal.
- Arranging an education for becoming a Technology Pedagogue, targeting female artists, young female innovators and pedagogues. The education covers technology, gender theories and modern pedagogy. It will provide competence for helping educators and companies to make their teaching of technology inspiring and fascinating for both sexes.
- Creating Local After-School Technology Centres for girls/boys, women/men together with NUTEK and different municipalities in Sweden. These schools would be one way of solving the problem of lack of time in the ordinary educational system for the necessary experimental approach to raise and develop an interest in technology. Hands-on technology would especially benefit girls and women who have less access to tools and equipment to learn by trial and error. Girls and women also lack a network of technical mentors, something that is important for further developing an interest in technology and acquiring knowledge. Another advantage with public technology schools is that technology would be associated with creativity, without demands for performance. This would attract genuinely interested students – a genuine interest being the best starting point for true and integrated knowledge. Public technology schools could also provide a means of catching up for people from different cultures, who have had a lesser exposure to technology.

The Video can be ordered from:

Harriet Aurell
AF R Liljeholmen
Box 47 091
S-100 74 Stockholm

harriet.aurell@lanab.amv.se
Tel: +46 (0)8 709 34 92
Mob: +46 (0)70 686 31 82
Fax: +46 (0)8 681 67 01

UTE WANZEK

Gender Institute of Saxony-Anhalt, Germany

I will present here the results of a project that we conducted at the Magdeburg University in Saxony-Anhalt, East Germany. First, I would like to raise a couple of general points as background.

The first point relates to women as role models in the public eye in Germany. There is a women's magazine called "Brigitte" which is heavily involved in actions supporting women and in following women in innovative careers. There was a special edition called "Brigitte woman" about women over 40. While part of the magazine is beauty-oriented, the rest consists of the presentation of successful women. These women are very beautiful, they have been photographed very nicely and, typically, they have made a career as journalists, architects and nurses. There are some technicians, but no engineers or scientists amongst these successful women. The second point relates to putting gender mainstreaming into practice. In May, we set up a Gender Institute for Saxony-Anhalt in Magdeburg. One of our main tasks is to support our state (Bundesland) in introducing gender mainstreaming throughout all policy areas, including research. We held an event for the state school departments, where about 18 out of 20 participants were men. It was an interesting event. However, when we tackled practical examples and how people would consider applying gender mainstreaming, some rejected what we were saying. This helps set the framework for our project.

Our project was set up in 1997. We found that women carry out very little entrepreneurial business, particularly in innovative areas, although in East Germany many women study technical subjects at university. The questions arising are whether women who've completed this sort of education use their qualifications to set up a business, why and how. We worked on these issues with six countries through a European institutional network. We started off with some structural analysis and looked at the economic background for setting up a business and at the women who were entrepreneurs, academics, students and participants from business courses. Our aim was to establish what sort of training measures were needed and how they could be used to better target women. It was a Leonardo project. Then, the project took a life of its own due to the interesting results of the analysis⁵.

Firstly, we established that, as in other areas, there are no gender specific data. It is impossible to find out in which sectors women are setting up businesses. We used our own networks to identify female entrepreneurs to be able to answer our questions. Some of the results are summarised below.

Generally, businesswomen with a scientific or technical background do not set up a company on the basis of their qualifications. They tend to set up companies in important sectors that are seen as typically feminine sectors of the economy. From our point of view, this is a double loss. We are losing the actual skills and qualifications that these women have already gained and secondly, there is an economic loss as a high level of investment has been made to train these women but is not being carried through into their businesses. The reasons for this are the same as those why women set up any business. So this is what we were asking in Germany, the reasons why women set up companies. In other European Member States, women tend to set up businesses, not because of unemployment, but for personal reasons, such as being independent and being their own boss.

⁵ Details of our study can be found on our website: www.uni-magdeburg.de/akaa/comeast.html

Those women who do stay in the sector related to their qualifications tend to have a smaller company than men, but proportionally, they are as successful in the market place with regard to turnover and profit, they often last longer and tend to employ more people, which has a positive effect on the labour market. In a typical “women’s” sector of the economy, if women do use their qualifications when they set up their company they often constitute an economic development of a region. Being involved in economic development in a region means being involved in the development of regional processes. Moreover, we found that women in technical sectors didn’t follow any training on how to set up a business, unlike the women who were unemployed before setting up their company.

Students were asked whether they were thinking of setting up a business. In Germany and in the Netherlands about half of the students surveyed, who were towards the end of their studies, were thinking of setting up a business. In Spain and in Sweden over 70% answered yes, but only 20% in the UK. The students said that they would only set up a company if they had a good business idea. Women were no different from men in that respect. They would set up a business in order to use fully their potential, their skills and talents. Both men and women felt that they had not been prepared sufficiently at university to set up a business. For example, they felt they didn’t get enough knowledge about time management, human resources management and how to put together business ideas, but that they had a lot more knowledge on subjects such as communication and computing which were well integrated into their academic training. We came to the conclusion that students at our universities are not being sufficiently prepared in terms of setting up their own companies. Furthermore, if they have followed a technical or scientific course, they can’t necessarily go straight into a high level of management because they haven’t got the relevant skills. There are some initiatives, however, aimed at supporting students on scientific courses to enable them to get management skills and the “soft” skills needed in order to be successful managers. There are also moves towards putting these as part of university courses.

Another thing that we saw from the survey is that the image of the entrepreneur isn’t particularly attractive to people in Germany and also that people think it’s going to involve a huge amount of work.

Going back to education, we are faced with two particular problems. First of all, we don’t have enough girls choosing scientific or technical careers. Secondly, if girls do chose a scientific or technical career, they get little preparation during their education and training for what’s going to happen later on. What opportunities are being given to them during their education to prepare them for all the different opportunities available in the working world once they have qualified? I think we need to improve the way in which science and technology are taught. Gender-specific teaching in science and technology should be sustained throughout education and training, from school to university and beyond. The gender-specific perspective should also be maintained in lifelong training, for example when unemployed are seeking to get back into the labour market.

SESSION DEBATE

There was considerable interest in how research activities in this area could be continued. Could research be stimulated at the European level with a co-operation group or network that could be put forward within the context of a European programme, such as Socrates? In response to a request for a working group on equality policy in education systems, some activities carried out under the Socrates programme, looking at equal opportunities throughout European policies, particularly in education, were outlined. There was interest in how activities on research and development in education were co-ordinated within the Commission services.

There was support for the view that girls had to be encouraged to think about how products were created. It was suggested that some science teachers were too theoretical and a link was needed between the theory and everyday life. Other suggestions included looking at the syllabi and textbooks to help change the way programmes are taught, using, for example, the success of the approach taken by the Institute of Physics in the UK. The importance of activities for a range of ages were discussed – from pre-school to those in their fifties.

The other main area of debate regarded the setting up of small businesses. Women were more likely to set up smaller businesses than men were and their interest was often based on the desire to be independent. What types of policies or assistance were available for women in this area? If women were less likely to set up businesses in their own area of training, in which areas did they set businesses? Why did they tend towards consumer services or consultancies, rather than production? Were banks really less likely to lend money to women? Or were social and family pressure the main problems? It was recognised that there is a need to reorganise work time and working organisations to cope with family responsibilities.

The final discussion looked at examples of some national activities. For example, the situation in Germany, particularly the issue of partnership between schools and business, and activities to encourage girls in science and technology, such as a “take your daughters to work” day. In Spain, some activities were mentioned with a particular focus on girls, but aimed at encouraging both girls and boys to get involved in science and technological studies, for example, open-door days at universities.

SESSION REPORT

TERESA PATRICIO

Ministry of Science and Technology, Portugal

The session “Reaching out to schools and society at large” addressed the general question of how science and technology are transmitted in our society. In different ways, the papers addressed the transmission of science and technology through education, focusing on gender education and the more general process of socialisation. A central question raised in this session was how could schools and society at large be more successful in attracting young people to science and technology? A parallel question was what role do families, schools and the media play in encouraging the study of science and technology and in promoting science careers for girls and boys?

Several speakers addressed the relationship between gender and secondary school, largely focusing on the question of individual choice. Choice is involved throughout our lives: from choosing certain subjects of study and avoiding others, to areas of specialisation or choosing a profession and career. The papers addressed the question of why girls show preference for certain fields of science such as biology and pharmacy and generally tend to avoid physics and information technology. Boys generally show a greater preference for physics and engineering technologies than girls do; a recent trend indicates that both girls and boys seem to avoid mathematics. Are these general trends or are they a response to the form of education in the secondary school system? Can something be done to alter the general reluctance and avoidance of science subjects? The question seems to be inseparable from the overall approach to teaching within the secondary school system. The difficulty faced by both boys and girls when confronted with mathematics led to questioning how knowledge is transmitted in the school environment and how different disciplines are taught.

An attempt to understand gender differences is through attitudes, often expressed in stereotypes. In the case of secondary schools, girls and boys express disciplinary choices as preferences toward the different sciences. Understanding these attitudes requires searching for the roots, for deep-seated processes internalised by young girls and which may reflect a culture of exclusion. If, in fact, a culture of difference is at the root of the different choices then possible solutions require some thought on the “science imagination” or “science fantasy” by attempting to get at female attitudes towards scientific knowledge and aspirations. This in turn requires analysing images of both male and female scientists, notions of social control of science and ethical choices, views on the popularisation of science and other issues related to the image of science. By analysing the “science imagination” we can try to get at the root of the push and pull factors of science. This also involves looking at the image-makers and the role models of science and scientists. The methodology of analysing perceptions and images of science is applicable to technology as well. Through the analysis of cognitive modes of science a general call was made in terms of restoring people to the central role in shaping objectives and targeting knowledge in the field of science and technology.

Individual choice was also examined by looking at personal motivation and how this can be targeted and/or inspired by the pro-active role of science teachers and counsellors. There are various ways in which science disciplines can be made more attractive for young girls: by adapting school curricula, by promoting single-sex summer schools with mentoring programmes for young girls and through technical training with hands-on programmes. This led to an examination of the educational system and the school environment itself with proposals for a more “respectful” environment with regard to gender differences and for increased involvement and co-operation of guidance counsellors.

The choices made at a relatively young age can have lasting consequences in terms of future professional careers. So it is particularly important to identify the reasons why science is considered to be unattractive to young people. Reasons may vary from perceptions that a science and technology career is impersonal, lonely and not well remunerated to reasons connected with perceptions of having to be extra smart, and the difficulty of combining job and family life. Barbara Mapelli's study on the "scientific imagination" relied on in-depth interviews with Italian girls to ascertain their views on science and scientists. Many of the views expressed indicated low personal self-esteem and voiced criticism of the way science was taught in school, while physical descriptions of scientists were invariably stereotyped (male, mad scientist lacking common sense and devoid of emotions and practical everyday knowledge). The relevance of this study was acknowledged and it was thought important to be up-dated and comparative.

Mieke Van Haegendoren presented various reasons seeking to explain why women are not being attracted to science and why they are under-represented in research. To ameliorate the negative image and perception of science in higher education and in general, the involvement of different levels of policy action – education, employment and public image – would clearly benefit from an integrated European plan, implemented nationally. The idea that co-ordination was necessary at European level was further reinforced during the ensuing discussion.

The recent initiative undertaken by the Città della Scienza to disseminate scientific culture with a more "open" image of science helps to promote and integrate women in science and technology at all levels. Their work has engaged actively in the dissemination of "open" images of science, training teachers to communicate science, vocational guidance to students and the promotion of new technologies to women at all levels from professional training to the creation of companies. Work has also taken the form of developing personal programmes showing the range of opportunities available. The suggestion made by Anne-Marie Bruyas to popularise and democratise science is, in effect, conducive to promoting economic development and furthering equal opportunities.

Concern with student attitudes toward mathematics and science was the explicit problem addressed by Hanna David in her study of Israeli students' achievement in international evaluation tests. The decline in the rank of Israeli students in the Mathematics TIMSS Study is linked to the perception that policy measures need to be taken to tap into unused human resources, specifically girls. High priority was given to the need for good teachers.

Harriet Aurell presented an innovative programme that addresses women and technology and women as entrepreneurs from a pragmatic, action-oriented perspective. "Teknikan" in Sweden developed the idea of a pedagogic model laboratory addressing special cognitive difficulties that women face in overcoming new technologies. The objective is to attract women into technical problem-solving and understanding. Guidance programmes include computing, electronics, mathematics and mechanics as well as overviews of technology-oriented studies and career paths. Based on the notion that knowledge is information and is made comprehensive by being interpreted against the background of previous memories, education programmes should take into account gender differences with regards to past experiences and references so as to make the information comprehensible. The educational programmes developed have targeted technology pedagogues involving female artists, media persons and innovators, with an interest in technology, proposing free time technology schools for all ages, hands-on technology and a network of technology mentors to raise interest in technology. The viewing of a short video produced by Teknikan provided the visual props necessary for understanding some of the techniques utilised to get the message across that the use of new technologies can be mastered.

Ute Wanzek presented the ComEAST project that addresses the question of why so few women are involved in independent entrepreneurial activity. Furthermore, the project raised the issue of what sort of training measures and programmes are needed to promote independent businesses among women. A comparative study of six countries assessed that training needs necessary to promote and encourage women to engage in independent entrepreneurial activity, as well as women's attitudes toward such science and technology training.

The session and the discussion that followed addressed several issues raised by the speakers. One of the principal points covered was the overall concern of making science and technology attractive to young people, with a specific focus on young girls. This led to a discussion on gender differences in attitudes towards mathematics and science and the special role played by schools – from pre-school to higher education – in perpetuating the negative image of science. Throughout the session questions of communication were deemed paramount – namely, how best to improve the transmission of knowledge through the schools but also through alternative complementary forms. Communication also takes the form of the type of images transmitted of male and female scientists and several suggestions were presented to alter existing negative images of science. Furthermore, the popularisation of science and the importance of the media were identified as playing a role in making science more attractive to all.

Identifying a complex gender-related problem can help provide a new approach to science and technology education for young people – both boys and girls – that is driven by diversity, by differences between the sexes, by the rapid pace of technological change and by the needs and interests of young people. It is important not to lose track of the question “who is scholar science education for?”

The session addressed different types of knowledge – from tacit to formal and informal knowledge – and while largely focusing on the existing educational systems and the importance of science teachers, it did not fail to consider the importance of complementary forms of mentoring and tutoring.

In the discussion it was recognised that the interdisciplinary approach to the question of women in schools and society benefited from contributions from cognitive and social psychology, gender studies, sociology of education, sociology of science and technology studies. The overall concern was to ensure that schools and society are in-tune with the necessity of transmitting science and technology through the best and most appropriate means. Some of the ideas were presented as innovative ways of getting the message across, others as ways of transmitting a new message. The concern to “open the door” or “bridge the gap” involved overcoming the estrangement of science and technology in order to contribute to a fuller and more equal participation of all in society. Overcoming social resistances and cultural exclusion can help put to rest stereotypes and, through the management of diversity, society can become more productive and fulfilling.

In conclusion, the session considered the importance of funding research in this area, as well as the importance of ensuring the articulation and dialogue between the sectors of education and research and through the joint work of the Directorates-General for Research and for Education. This would help to achieve European co-ordination between research and education in a way that contributes toward overcoming negative perceptions of science and technology.

The background of the page features a series of thick, wavy, grey lines that sweep across the upper half of the page. Scattered throughout the lower half are several five-pointed stars of varying sizes, also in a light grey color. The overall aesthetic is clean and modern.

CHAPTER 8

RESEARCHING GENDER AND SCIENCE

The thematic session “Researching gender and science” focused on knowledge development about the “women and science” issue. What is the research agenda for the coming years that will allow female scientists and policy-makers to produce gender equality in science? The research agenda to be considered should cover different fields of knowledge such as policy assessment, the sociology, history and philosophy of science and indicator developments.

The new politics of knowledge – Making (sustained) change happen

ELISABETH GULBRANDSEN

Research Council of Norway

The questions I raise here concern the knowledge base for working equality at the level of mainstreaming. My argument is that we are underestimating the changes needed in order to sustain the production of gender equality in research at this level of strategy. My worry is that as a consequence of this, we may give up on mainstreaming too early.

As my questions grow out of what is perhaps a particularly Nordic situation, I will introduce them, and also suggest where to look for new resources and directions, by referring to some “trying transformations” (Aiken et al., 1987) or experiments I participated in during the late 1990s. These trying transformations gave impetus for my intervention at the Helsinki Group meeting in December 2000. Reactions and suggestions I got afterwards indicate that there may be lessons to be learnt, as well as resources and directions to pick for future experiments, if these trying transformations were presented in a fuller format, discussed and compared at a European level.

Moving on to my trying transformations, I will make an introductory remark, which also represents one of the lessons I have learnt. My focus today is on mainstreaming; that is, integration or diffraction, as the American researcher and cultural critic Donna Haraway names such an ambition (Haraway, 2000). But I want to stress that this does not mean that I am arguing against positive action. As you may know, Norway has a long and fairly strong position on positive action, on special measures, programmes and even on setting up special institutions both where gender equality and women’s and gender research are concerned. In fact, Norway is defending the use of quotas or positions, earmarked for female researchers, having been reproached by the EFTA Surveillance Agency (ESA) for discriminatory practices. I am not contesting that it is necessary and important to continue the work for equality at the level of affirmative action. With reference to the three strategy levels for working equality suggested in the ETAN report (2000) *Promoting excellence through mainstreaming gender equality*, I also want to underline that the work on laws and regulations must continue. But the experiments I have taken part in, at the level of mainstreaming, indicate that vital dimensions must be added to the knowledge base established for working at these two other levels, if and when we choose to work at the level of mainstreaming. My trying transformations also suggest that, in order to develop the knowledge base, we must question preconceived perceptions of research, of policies and politics, as well as discuss and develop new figurations (Haraway, 1997) of these rather basic concepts.

1. New edges and paradigmatic shifts

My trying transformations have confronted me with questions of a quite fundamental character. We have been asked to identify new edges to the questions concerning women and research. Maybe it is more appropriate to think and talk about paradigmatic shifts, when trying to figure out what it takes to be successful at mainstreaming gender equality in our research systems?

I will motivate this move from new edges to paradigmatic shifts and hint at some vital prerequisites for approaching such turns by drawing on three trying transformations. Let me start by presenting questions arising on my “home turf”, the Research Council of Norway, and end by drawing your attention to two experiments conducted at the Nordic level.

Taking effect in 1998, the Research Council of Norway reorganised its work on equality and on women's and gender research, in order to put more impetus on integration or mainstreaming. The Research Council is responsible for women's and gender research, as well as for gender equality in research at a national level. This responsibility is carried out in compliance with the Research Council's two main tasks, which are to initiate, fund, implement and follow-up research activities and to serve in an advisory capacity on matters concerning general research policy. This combination of funding agency and policy adviser is near to unique, and that is why I highlight it here. The main responsibility for tasks concerning general research policy rests with the Strategic Planning Division where I worked at the time of the reorganisation in 1998. To make a long and rather complicated story short: our task from 1998 was to mainstream, to make equality in research an integral part of research policy analysis and development, thus producing input for policy-making at governmental level (Gulbrandsen, 1998).

When turning to the received knowledge base for resources and directions developing our policy analysis and development after the reorganisation, we found that much effort had been invested in identifying flaws, biases and barriers in the research system, as well as uncovering and unveiling causes of these flaws. Much good work had been done by women's and gender researchers to present the complex dynamics of gender differences and gender inequalities and connect them to various historical, cultural and social structures as well as to the Good Old Boys Sitting At the Table (GOBSAT), (see News from NIKK, 1/2000, Marketing Nordic women's and gender researchers' potential contribution to equality in research). Such knowledge functions well as background for appealing to the State to devise and implement special measures to compensate for flaws and overcome barriers. We need this dimension of the knowledge base as we need positive action. But this negative gaze, characterising the knowledge base at present, must be balanced when developing strategies at the level of mainstreaming aimed at structural and cultural transformations of our research systems. When producing input for policy-making, building on the established knowledge base produced by women's and gender research, we felt condemned to always run late while pointing to flaws, biases, barriers as well as bad baseline statistics. We should have been up front facilitating and fostering alternatives, new figures, stories and meanings as well as developing strategies for struggling towards them.

2. What do we want to be equal to?

When invited to the table to integrate our concerns, we ought to be able to discuss and suggest, in fairly great detail, what kind of research systems we want to be equal to. In order to mobilise for, develop and later evaluate strategies at the level of mainstreaming, we need to focus more strongly on where we are heading. It is still necessary, but not enough, to represent the problems and point to what we want freedom from. I would like to leave a note here in memory of my late colleague Anne Søyland. Drawing on extensive experience from the Research Council and her network of equality advisers at Norwegian universities, she very quickly put us on track with her reflections on equality work and its relations to women's and gender research (Søyland, 1998).

To illustrate this shift further, I refer you to the ETAN report and its listing of principles of mainstreaming. You may remember that principle number five, visioning, is explained as gendering apparent gender neutral procedures and practices: "It involves recognising the ways in which our current systems and structures, policies and programmes, in effect, discriminate" (page 67). Our trying transformations suggest that we need to extend this principle to include visioning future solutions as well as patterns of past and present gender segregation and discrimination. Solution-oriented approaches do not necessarily entail developing extensive scenarios or utopias for the

future. Much can be achieved by initiating processes figuring out “small wins”; with reference made to an approach developed at the Centre for Gender in Organisations at Simmons Graduate School of Management in Boston (Fletcher & Meyerson, 2000). At the same time, we have learnt that we also need to beware not to buy into ready-made solutions. As we live cultures that still tend to read gender in a dichotomous way, it is very easy for women’s and gender researchers, inadvertently, to end up being read as suggesting that bringing more women in will meet most challenges and solve most troubles. Representing science as “masculine”, “pale, male and exploitative of nature”, “misogynist” and so on (Rose, 1999) invites such short circuits, even if the literature is full of explicit warnings against them. If you know anyone still in need of a sobering exercise, I refer you to chapter seven of Sandra Harding’s *The Science Question in Feminism* from 1986.

When questioning what we want to be equal to, we are also invited to consider many other broad questions, besides horizontal and vertical gender segregation, confronting and troubling our research systems at present. What will it mean to work in a mainstreamed institution? What will a mainstreamed research institution look like? In her book *Mainstreaming Equality in the European Union* (1998), Teresa Rees points out how we are still stuck with mostly negative definitions of mainstreaming. To paraphrase Donna Haraway: we need to develop performative images of mainstreaming that can be inhabited (Haraway, 1997). For now, I will cite my Italian colleague in the Helsinki Group addressing the new director of Science and Society on the ambitions of the group: “We do not want to be a forum of women talking to each other. We want to be heard at Commission level and we want to be heard before the decisions are taken, not just comment afterwards”. This way of putting it invites further questioning “what does it take to be heard – on our part?” We are convinced champions of equality in research, how do we make sense of this issue, how do we convince others of its importance? What kind of knowledge base, what kind of approach and what resources will help us make an impact negotiating with male and female GOBSATs?

3. A central tool for mainstreaming

For equality measures to make sense in a broader constituency, it is helpful to represent them as integral to some of the burning questions of leadership in knowledge organisations, to questions concerning accountability, responsible universities, to questions of governance, science, citizenship and social contact. To make this a bit more concrete, at the time of the reorganisation in the Research Council, the more permanently challenging questions in the Department of Research Policy concerned the co-visioning of research. The discussions turned around “the triple helix” (Etzkowitz and Leydesdorff, eds., 1997) as well as “the new production of knowledge” (Gibbons et al., 1994). We were not able to track down Nordic women’s and gender researchers’ contribution to this kind of questioning of our research systems. To push it a bit, it seemed to us that Nordic gender expertise (Husu, 2001) had forgotten Evelyn Keller’s warning about reducing the complex issue of gender and science to “social relations” (Keller, 1992). I find the Women and Science Unit moving to the Science and Society Directorate very promising. I was happy to read Nicole Dewandre motivating the move in *Cordis focus* (no 173) by saying that the core of the equality problematic is a science-society one.

As already hinted at, building ownership is, of course, a central tool of mainstreaming, and the knowledge base for mainstreaming must include competencies for opening up, in order to let new voices and alternatives flourish. Ready-made solutions need to be banned for this reason as well. Maybe we ought now to think about co-visioning of future solutions and small wins made by dominant and marginalised voices together? This may be difficult if the problems (and most of the

power) are represented as being localised “out there” belonging to the structures or to the GOBSAT. To be better equipped to deal with co-visioning solutions, we, who take part in the modern research complexes, must strive to develop a readiness to think and feel ourselves as part of the problems, and to learn how to use our sense of implication as resources for our transformative projects. We also have to experiment with forms and organisations, meeting places or arenas that allow us to learn from our failures as well as from our successes. In the 1970s, the slogan was “You’re either part of the problem or part of the solution”. In order to become part of the solutions for the future, I think we have to try to experience ourselves as part of the problem as well (Trojer and Gulbrandsen, 1996). As the strength of Donna Haraway’s figurations rests on this move from either/or to both/and, I will once again refer you to her work. Also, as demonstrated in Carol Bacchi’s excellent *Women, Policy and Politics; The Construction of Policy Problems*, from 1999, a constructivist approach to research and policy-making is also worth consulting when negotiating to make an impact. In her discussion on the role of gender expertise in equality work, Liisa Husu includes as the third and last point “...the ability to translate this theoretical understanding into organisational policy and practice.” (Husu, 2001, p. 182). A constructivist approach invites a much more intense and reciprocal dialogue between researchers and policy-makers right from the start, which I think is indispensable when co-visioning mainstreaming is on the agenda.

Reactions from Norwegian women’s and gender researchers, when invited to a reorganised arena for dialogue about equality work, were a bit surprising and showed us that the borders between research, policy and politics may have to be put at stake, as well as preconceived perceptions of “research” and “politics”. We were asking researchers to meddle with politics, they said. What they could deliver were not politics, but systematic, causal explanations of gender differences and inequalities (Nielsen, 1996, 1998). This brought us to question whether the scientific commitment to systematic, causal explanations of gender differences and inequalities serves our transformative ambitions and struggles as well as we wish to believe.

If we are to win change, it is not enough, as Hilary Rose claims, to focus on improving the statistical data and on improving the explanations (Rose, 1999). These are of course necessary elements in the knowledge base, but which need to be supplemented when mainstreaming is on the agenda. By our continued invitations to gender researchers and policy-makers to a new arena for co-visioning, I think we unwittingly came to question a fairly established, but silent, contract between them. According to this it is expected that researchers work up the knowledge base for delivery to policy-makers who, in turn, work out the policies for equality. In return, the researchers expect “policy for science”. I have suggested that we name this kind of contract “State-feminism” (Gulbrandsen, 1998). This designates a fairly established way to think about the relationship between research and policy/politics – not just pertaining to women’s and gender research. In fact, it is so common that it has been called “the Nordic way of governance” (Eide, 1996). I will underline that this is not a bad contract. It has been highly effective, but it is not sufficient for mainstreaming. It seems to me that this type of contract must be opened up to new and pressing challenges confronting our research systems at present such as leadership, accountability, responsible universities, and to questions of governance, science and citizenship. An inspiring feminist text representing the investments and anxieties involved in such a trying transformation without closure in sight, is Jane Flax’ *The End of Innocence* (Flax, 1992).

4. New feminist contracts

How and where can we develop and articulate elements of a more adequate knowledge base and a more adequate social contract? Where should we look for new resources and directions?

Until now, I have mentioned many problems, while advocating a stronger solution orientation. Let me once more stress that both orientations are necessary, as well as interrelated: in every representation of a problem, lies a frustrated dream or solution inviting articulation and discussion. Still, there are not many feminist versions or discussions about existing or future contracts. We have searched for them at the Nordic level, not being content with only importing feminist analyses of science and technology from the US. But before I point you more explicitly to our findings (which are two more trying transformations), I will, once again, remind you of the shift signalled by Sandra Harding in her book from 1986 *The Science Question in Feminism* and in which she is strongly advising women's and gender researchers to attend to the complex issues of questioning our research complexes, balancing up the hitherto strong focus on "the women or gender question in science".

By referring to a Nordic project conducted by eight Swedish research council experts on integrating or mainstreaming women's and gender research, I hope to inspire future efforts to discuss, suggest and design different feminist contracts at European level. This project dealt with prerequisites for mainstreaming women's and gender research. But as equality is one of the possible policy fields for gender researchers, I would argue that the discussions drawn up in this context are relevant to our struggles to identify prerequisites for working equality at the level of mainstreaming. The initiative for this experiment came from the Swedes, but as the Research Council of Norway was in the process of reorganising to put more emphasis on mainstreaming, we were invited to join in. A report on this work has been published only in Scandinavian languages. (For a presentation of this work, see the contribution by Lena Trojer, who headed this trying transformation, in chapter 5 "Benchmarking the progress of women in science". The ways of working, as well as the arenas developed during the process of identifying conditions for mainstreaming, are well worth looking into. Here and now it is sufficient to point to the contract suggestions that are presented in the report, which are based upon a discussion of new figurations of politics drawing on the work of Ulrich Beck and Anthony Giddens. One of the conclusions from this experiment, is that in order to be successful at the level of mainstreaming, we need to supplement emancipating politics, the freedom from focus, with life politics; what do we want to use our relative freedom for? The report draws resources for this move or shift from the field of techno-science. This is not because we find wonderful, ready-made solutions or new contracts there, but because these days, these fields are most intimately challenged to turn up as alternatives to received conceptions of knowledge and politics as well as the relationships between them. The prime mover of this dynamic is the shrinking of the distance in time and space between the production and the application of knowledge. The struggle and questioning resulting from these implosions, where the borders between politics and knowledge are continuously provoked, inspire the contract discussions in the report. This report is the closest we have come to feminist discussions of what I like to call "the new politics of knowledge" in the Nordic countries.

Finally, the last experiment, or trying transformation, was conducted by the Nordic Academy for Advanced Study in May 2001. It took the form of an international conference. The Nordic participants of the Helsinki Group were invited as a working group to plan the conference. One of the ambitions was to try out the balancing act between problem representation and more solution oriented approaches. On the first day of the conference, we asked what the problems were represented to be. On the second day, the questions centred on what kind of research systems or academia do we want to be equal to? The reactions to this balancing act confirmed the extent to which investments are made in gender expertise unveiling and uncovering causes and structures of inequality and discrimination. It was also emphasised that we need additional resources to work at the level of mainstreaming where we are invited to make sense and to negotiate, because "we are not negotiating with the structures". One single voice also maintained that, because gender experts

were so well trained in unveiling and uncovering past and present patterns of discrimination, more “practice” in figuring out small wins and future solutions should be welcomed.

To sum up these two trying transformations, and in order to continue developing the knowledge base for mainstreaming equality at European level, I suggest that a report on the knowledge base is drawn up, based on reciprocal dialogues on new feminist contracts between women’s and gender researchers and policy-makers.

This is where I end – by putting the obvious question to you: does this make sense?

References

- Aiken et al., *Trying Transformations*, Signs, vol. 12, no 2, 1987.
- Bacchi, C., *Women, Policy and Politics; The Construction of Policy Problems*, Sage, 1999.
- ETAN Expert Working Group on Women and Science, *Science policies in the European Union; Promoting excellence through mainstreaming gender equality*, European Commission, 2000.
- Cordis focus, no 173.
- Eide, K., *Hvem skal informere politikken?*, Nytt Norsk Tidsskrift, 3-4, 1996.
- Etzkowitz & Leydesdorff (eds.), *Universities and the Global Knowledge Economy: A Triple Helix of University-Industry-Government Relations*, Cassell Academic, 1997.
- Flax J., “The End of Innocence” in Butler & Scot (eds.), *Feminists Theorize the Political*, Routledge, 1992.
- Fletcher & Meyerson, *A Modest Manifesto for Shattering the Glass Ceiling*, Harvard Business Review, January-February 2000.
- Gibbons et al., *The New Production of Knowledge: The Dynamics of Science and Research in Contemporary Societies*, Sage, 1994.
- Gulbrandsen E., *Forskningspolitiske (pr)øvelser*, Kvinneforskning, 1/98.
- Haraway, D., *How Like a Leaf*, Routledge, 2000.
- Haraway, D., *Modest_Witness@Second_Millennium.FemaleMan@_Meets_OncoMouse™*, Routledge, 1997.
- Harding, S., *The Science Question in Feminism*, Cornell University Press, 1986.
- Husu, L., “Mainstreaming and positive action in academia: gender expertise and organisational watchdogs needed” in *Women and science: Making change happen; Proceedings of the conference*, European Commission, 2001.
- Keller, E., *Secrets of Life, Secrets of Death; Essays on Language, Gender and Science*, Routledge, 1992.
- News from NIKK, Nordic Institute for Women’s Studies and Gender Research, 1/2000.
- Nielsen, H.B., “Women’s Studies and Gender Research in Norway” in Stokke (ed.), *Gender Equality in Tunisia and Norway*, Fafo, 1998.
- Nielsen, H.B., articles in *Kvinnejournalen* 4/96, *Klassekampen* 18.09.96, *Dagbladet* 24.09.96.
- Rees, T., *Mainstreaming Equality in the European Union*, Routledge, 1998.
- Rose, H., “Hypatia’s daughters: why are they so few?” in *Women and Science: Making change happen; Proceedings of the conference*, European Commission, 2001.
- Søyland, A., *Å koke kaffe på en – eller en annen – spiker*, Kvinneforskning, 3-4/1998.
- Trojer & Gulbrandsen, “Authority in Transformation”, in *The European Journal of Women’s Studies*, vol. 3 issue 2, 1996.
- Trojer et al., *Genusforskningens relevans: Sluttrapport från integreringsarbete i åtta svenska forskningsråd*, 2000.

Is the hierarchy in universities (un)fair?

GRETA NOORDENBOS

Leiden University, The Netherlands

1. Abstract

In order to achieve a better integration of women into the university hierarchy, what has to be changed? Recently, most research has been about the question of why there are so few women in the highest positions in science, but much less research has been carried out on women in the lower positions of the hierarchy. Most research about women and science takes the existing hierarchical structure for granted. The existing hierarchy is quite stable and restricts the number of higher or senior positions. Little attention is paid to analysis and criticism of this hierarchical structure. Many female and male scientists have the feeling that the existing hierarchical system is not fair, because it is not a reflection of the scientific qualities and achievements as a scientist. The question is, however, how can we make a hierarchical system which is fairer and which better reflects the qualities of scientists? This is the main question in my paper.

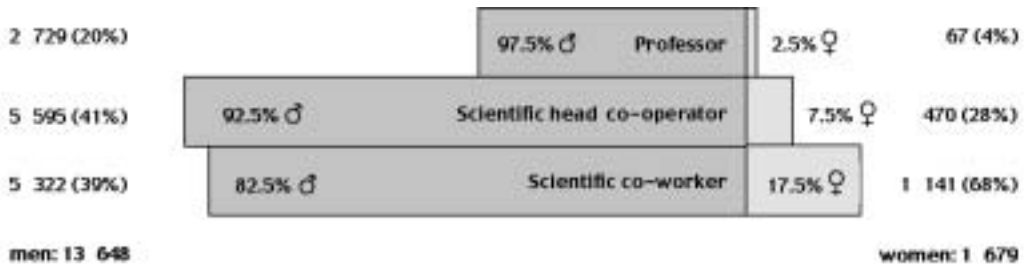
1.1. The construction of hierarchy in science

Universities have a hierarchical model, with students and assistants in the lowest levels, and lecturers and professors in the top levels. To have a more or less hierarchical structure is seen as useful and fair, because scientists function on different levels. The problem, however, is that the existing hierarchy is quite restrictive, with very few high positions, which are difficult to achieve. There is a lot of competition between equally qualified people to get these top positions as associate professor or full professor. There is a system of created positions, with more or less clear criteria on how to reach these positions and a restricted number of appointments for these positions. Moreover, in the last twenty years, the criteria for higher positions have become much more demanding. I will illustrate this with the example of the reorganisation of the university hierarchy in The Netherlands between 1980 and 1990. This resulted in a worsening situation for the small number of women, who had slowly been gaining better positions in the universities.

1.2. Restructuring the university: more demanding criteria for fewer top positions

Until 1983, we had a system in The Netherlands, which was considered to be quite fair. When a person got an appointment at the university, she or he was named a scientific co-worker. Within this position they could write a thesis and write articles. On completion of a thesis, and after 9 to 12 years of having functioned well in research and teaching, the scientific co-operator “automatically” became scientific head co-operator, which was a higher position with a higher salary. Most professors were recruited from this group of scientific head co-operators. This system was seen as fair for men and women, and the criteria for promotion were clear and transparent. From the statistics we can see that as the number of women working at universities was increasing, their position also increased after several years.

Figure 1: Number and percentage of men and women in the three highest positions in 1983

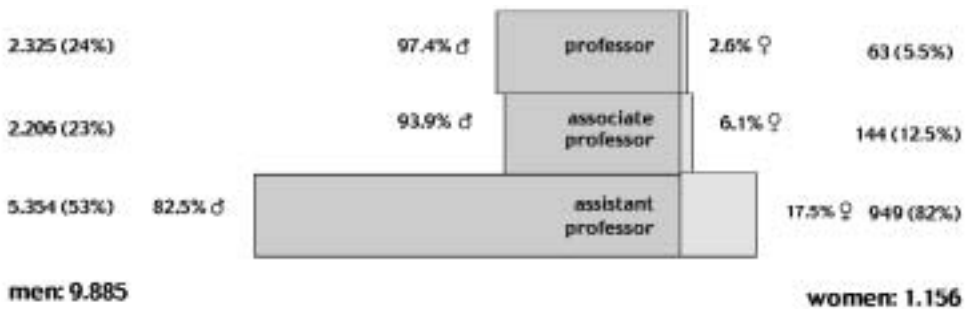


However, in 1983, the Minister for Education decided to change this “automatic” and fair system in the university hierarchy. The American hierarchical system of assistant professor, associate professor and full professor was introduced. The reason for the introduction of this system was that, in The Netherlands, the pyramidal system in the hierarchy had become distorted. There were an almost equal amount or even more scientific head co-operators than scientific co-workers. According to the Minister too many scientists had a position at the second level as scientific head co-operator and they cost too much money. A reduction in expenditure was necessary. The pyramidal hierarchy had to be reconstructed, including fewer higher positions.

When we differentiated between men and women, it became clear that this analysis of the hierarchical disorder was only correct for men, and not for women. More men held a position at the second level of scientific head co-operator (41%) than at the first level of scientific co-worker (39%). However, when we looked at the women, we saw an extremely pyramidal hierarchy, with very few women in the top positions of professors (4%), a few more women at the second level of scientific head co-operator (28%) and many more women at the lowest level of scientific co-worker (68%) (Noordenbos, 1994).

In this reorganisation everybody had to be involved in this new restricted hierarchical system of assistant professor, associate professor and full professor. The number of top positions was greatly decreased and the criteria to reach these senior positions were stricter and more demanding than in the former achievement system. Only one third of the former scientific head co-operators could become an associate professor! For two-thirds of the scientific head co-operators this reorganisation resulted in a demotion to the lower rank of assistant professor! To get a position at the second level, as associate professor, women had to compete with many men, who were older and had more experience. In the rat race to get a top position men are more often the winners and women the losers. “Reflection on gender bias within the criteria for “excellency” shows that a certain conception of science is dominant within the evaluation procedures. This conception is in fact a reflection of the hegemonic position privileging masculinity” (Brouns, 2001, 1). In Figure 2, we see the consequences of the new system for men and women in 1990.

Figure 2: Number and percentage of men and women in the three highest positions in 1990



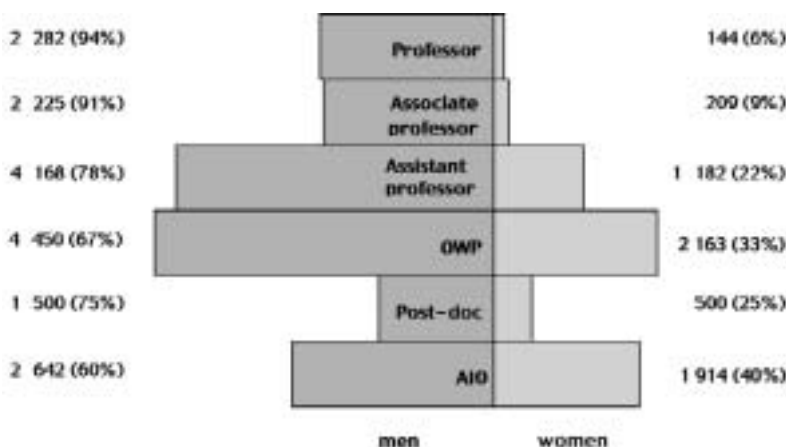
The consequence of this reorganisation was that there was a huge reduction in the number of higher positions in the pyramidal hierarchy. When we compare the university hierarchy with other countries, we can conclude that the Dutch pyramid has a very small top (Vianen, 1998, p. 101). It was approximately twenty years before we found again an equal number of women in the second position of the university (Noordenbos, 1998).

2. The fairness of the hierarchy

In The Netherlands, the opportunity for promotion depends first of all on the availability of such positions, which are very scarce, and, secondly, on the achievements of the many scientists who compete for one of these top positions. This promotional system is a competition model (Vianen, 1998, 1999).

An important question is how fair is the construction of the hierarchical positions of assistant professor, associate professor and full professor. I will here analyse each level of the hierarchy with regard to the criteria that are used for appointments at these levels and the number of men and women who were actually appointed to this position. Moreover, I will show that the titles of most positions in the hierarchy are not correct, and that they hide the scientific activities which are carried out by people in these positions. Let me start with the actual number of men and women in the three lowest non-tenure positions in January 2000 (see Figure 3).

Figure 3: Number and percentage of men and women at universities in 2000 – WOPI, VSNU, 2000



2.1. Ph.D. students

Ph.D. students carry out research that will result in a thesis. The official title of this function in The Netherlands is “Assistant in Opleiding” (AIOs) or “Onderzoeker in Opleiding” (OIOs). Translated into English this means “Assistant in Training” or “Researcher in Training”. It would clearly be more correct to speak of researchers who are in training to become scientists, while it is, in my opinion, not right to speak of assistants, since they are not assisting their professors. Most Ph.D. students carry out independent scientific research and sometimes develop new theories or discover new facts, which were not even suggested by the professor who supervises their thesis.

In 2000, the number of AIOs in The Netherlands was 4 556; 2 642 men (60%) and 1 914 women (40%). The three lowest university positions have 31% of the men and 42% of the women. Of all the positions at the universities, the highest percentage of women can be found in the lowest position. This could be interpreted as promising talent for the future. However, an important problem for AIOs and OIOs is finding a job as researcher after finishing their thesis. Until 1983, a thesis was written at the lowest position of scientific co-worker, which meant that, on completion of their thesis, Ph.D. students could get a tenured position at the university. Nowadays, however, very few AIOs and OIOs can get a job at the university after finishing their thesis, and are unable to continue to use their research expertise. This is not only unjust, but also very inefficient.

2.2. Post-docs

To retain Ph.D. students having completed their thesis in the universities, a special position of post-doc was created. Recently, we had approximately 2 000 post-docs in The Netherlands, 1 500 men (75%) and 500 women (25%) (Crum and Bal, 1997, i).

The post-doc position simply indicates what was done in the past, but does not guarantee a tenured position of assistant professor in the future. The title of this position says that you are a person who has finished a thesis. However, it might be more appropriate to call them “qualified researchers”. A position of post-doc is always temporary for two to four years. The mean duration of a post-doc position is three years. 85% of these post-docs have the ambition to get a tenured position within the university system. To stay in the pipeline, some post-docs apply for another post-doc position. Some of them have a career consisting of two or three different post-doc positions. Over 40% of the post-docs have more than two post-doc positions and 12% of them have already had three post-doc positions. Most of them, however, do not get a tenured position at the university, and finally decide to find a job outside the university (Crum and Bal, 1997, ii). For those who stay, as they become older, and want to buy a house or have children, it can become very de-motivating to stay in the pipeline with little opportunity to find a place as assistant professor. The career possibilities for these post-docs are quite poor. This is not fair, because they often contribute substantially to the publication output of a department. Recently, this problem was taken seriously in the research of Van Vught-Tijssen (2000), who developed better future scenarios for this category of qualified researchers.

2.3. Other researchers and associate professors

Finally, there is a category of researchers and associate professors who have a temporary job. They are the largest category: 4 450 men (67%) and 2 163 (33%) women. Some of them finally get a tenured position, but many have to leave the university after several years.

2.4. Assistant professors

In January 2000, there were 5 350 assistant professors (UDs) in The Netherlands: 4 168 men (78%) and 1 182 women (22%). Of all the men in the three highest positions, 48% are assistant professors, compared with 77% of the women.

The position of assistant professor is the first tenured position at the lowest rank of the university. But the name “assistant professor” is quite incorrect, because it suggests that scientists at this level assist their professors. But I really do not know of any assistant professor who “assists” his or her professor! Most of the assistant professors are quite independent in their scientific work and their teaching activities, although this is not reflected in the title of their function. It might be better to call them qualified scientists or scientific co-workers. In The Netherlands, we have the title of “University Docent” for this position. However, it does not reflect the part of the job that consists of carrying out scientific research.

The most important problem for assistant professors is their lack of career possibilities. Most members of staff start in this function when they are 24 to 30 years old. But thirty years later, 48% of the men and 77% of the women are still in this position. For most assistant professors this position is the end of their career! This is felt as unjust, when we realise that assistant professors, who are between 40 and 60 years old, often have much more scientific experience compared with those who are between 24 and 40 years old.

The scientific qualifications of assistant professors vary immensely. A large part of the senior assistant professors have a high number of scientific publications, are able to find grants for researchers, coach younger researchers, organise (inter)national conferences and develop their teaching programmes quite independently, etc. Some of the assistant professors operate at the level of associate professors, but are not able to gain a position as associate professor because these positions are very scarce and the competition is high. The rules to select the “best” are often not appropriate for the simple reason that there is more than one candidate who is the best, while only one person can be elected. For those assistant professors, who operate at the level of associate professor, the lack of career possibilities is not fair. Their scientific qualities are made invisible in being “just an assistant professor”, even after 50 or 100 publications or more!

It appears clearly that we should create more top positions in which scientific qualifications are better recognised. A possibility might be to differentiate between junior scientific co-worker and senior scientific co-worker. The argument against the construction of more top positions is often that the university does not have the money, but for assistant professors it is often not a question of money, but of recognition of their scientific qualities! Because of this lack of recognition, many assistant professors become de-motivated, as their scientific qualities do not appear to add to their position after twenty or forty years of working at a university.

2.5. Associate professors and full professors

Criteria for becoming an associate professor are success in being awarded research with Ph.D. students and the supervision of young scientists’ thesis to obtain their Ph.D., etc. However, on close inspection, some of the many assistant professors have met these criteria, although only very few of them can attain the position of associate professor. In January 2000, we had 2 434 associate professors (UHDs) in The Netherlands: 2 225 men (91%) and 209 women (9%). Clearly, the senior level at university top is male-dominated. Of all the men in the highest positions, 26% are at the second level, compared with only 14% of the women.

The percentage of female associate professors increased very slowly in the last decade, from 6% in 1990 to 9% in 1999. Because of the very low percentage of women who were promoted from assistant professor to associate professor, a special programme was organised for women in which they could apply for a position of associate professor. As a consequence of this Aspasia Programme, in 2000, 68 women were promoted from assistant to associate professor, which increased the total percentage of female associate professors from 9% in 1999 to 11% in 2001 (Bosch and Potting, 2001).

Although associate professors can be seen as the “lucky few” who got one of the higher places at a university, some of them have the ambition to become a full professor. Again, the problem arises that many associate professors are qualified for a full professorship, while only a few of them can be appointed to this position. As we continue up the ranks the competition becomes fiercer. Although it is suggested that only the “best” are selected, we know that criteria to define the “best” are variable and that more than one person can be qualified while only one person can be elected. In 2000, we had 2 426 full professors in The Netherlands: 2 282 men (94%) and 144 women (6%). Of all the men in the three higher positions, 26% are a full professor, compared with only 9% of the women.

In the last 10 years we saw a very slow increase in the percentage of female professors, from 2.6% in 1990 to 6% in 2000. After the increase of female associate professors to 11% the percentage of female professors may increase. However, due to strong competition with many men who aim to become professor, we cannot be too optimistic. Moreover, given the high diversity in the function of full professor, it might be useful to differentiate between research professors and management professors.

We can conclude that both the access to senior positions and the cultural environment in which scientists work are highly competitive. Only those who have most publications and receive most grants for research can reach the top position in science. In a climate where each publication counts, women (and men) who have had a part-time job during the period when they had small children, easily lose the rat race. As women have part-time jobs more often, they tend to produce fewer publications. However, when we take into consideration that they worked fewer hours, some women publish more than men do. Research of Noordenbos (1992), Vianen et al. (1997) and Portegijs (1998) shows that, under equal conditions, men and women produce an equal number of publications. But selection committees for higher positions often only look at the total number of publications and the total years of experience. Moreover, we can find a gender bias in the evaluation of women’s publications, as was shown in the research of Wennerås and Wold (1997) in Sweden and by Brouns and Scholten (1999) in The Netherlands.

3. Conclusions about the hierarchical system in science

This paper ends with the most important conclusions concerning the following topics:

- The unfair aspects in the hierarchical system of universities.
- The inadequate titles of functions in the university hierarchy.
- The lack of attention paid to women and men in the lower positions of the hierarchy.
- The competitive culture and rules of the science game.

3.1. The hierarchical system

We can conclude that the hierarchical system at university gives very few opportunities for career development from assistant in training, to post-doc, assistant professor, associate professor and full

professor. There are many more scientists – women and men – who operate at a more senior level than their position implies. However, there are very few top positions and the competition for them is fierce.

This restricted hierarchy is often legitimised by financial reasons: more people in higher positions would be more expensive. However, for scientists, their scientific recognition is as important as their salary. The existing system is inappropriate, because the real scientific qualities are not made visible. For AIOs and post-docs there are very few opportunities to get a tenured position at the university. For most of the assistant professors there are no further career possibilities, even when they carry out highly advanced scientific research and teaching. For nearly 50% of the men and 80% of the women who have a position as assistant professor this will be the final position at which they retire, although a substantial number of them operate at the level of associate professor.

The problem is that we have a hierarchical model based on a restricted creation of positions, instead of a career development model based on scientific achievements, which might be much fairer (Van Vianen, 1998). To introduce an achievement-based career development model, clearer and more transparent criteria would be necessary for promotion to a more senior level. An achievement model would make the scientific work of many women and men more visible, since they would not have to wait for promotion until one of the scarce positions gets free, mostly when another person leaves his or her position, or retires.

Recommendation 1: Change the restricted training model into an achievement-based career model.

3.2. The inadequate titles of the functions in the university hierarchy

A second problem, connected with the unfairness of the existing university system are the inadequate titles of the functions of the scientist. These titles often do not reflect the real scientific qualities. I would advise a re-labelling of functions and positions as listed below.

Recommendation 2: Change the names of the different positions at the university.

1. Assistant in training	→	1. Researcher in training
2. Post-doc	→	2. Qualified researcher
3. Assistant professor	→	3a. Junior scientific co-worker / 3b. Senior scientific co-worker
4. Associate professor	→	4. Head scientific co-worker
5. Professor	→	5a. Research professor / 5b. Management professor

3.3. The lack of attention for women in the lower positions of the university hierarchy

Thirdly, we can conclude that, in addition to the need to investigate why so few women attain the more senior positions in science, we need to look carefully at career opportunities for the younger generation of female scientists. We cannot risk the possibility that they become highly de-motivated because they have so few opportunities of getting a job at the university. To prevent the risk of losing highly talented women, we need a fairer promotion system in our universities, based on clear and transparent criteria and individual evaluations (Vianen, 1998; Brouns, 2001).

Recommendation 3: Pay more attention to the career possibilities of young scientists.

3.4. Change the restrictive rules of the game of science

Many women and men see a culture, in which science is like a top-sport model with few winners and many losers, as unsatisfying (Portegijs, 1998). Moreover, the system to evaluate publications is often felt as inappropriate, because part-time jobs are not taken into account. Also, gender bias is sometimes seen in the evaluation of publications to get grants for research (Wennerås & Wold, 1997; Brouns & Scholten, 1999).

Recommendation 4: Change the publication culture and make the working climate less competitive within the university. Fairer and more transparent criteria for scientific output are necessary. Part-time jobs have to be taken into account, as well as the different cultures of publication, within the humanities and social sciences, compared with the natural sciences and medicine.

References

- Bosch, M. & Potting, M., *Vrouwen moeten door dat plafond heen. Evaluatie van het Aspasia-programma, eerste ronde: ervaringen, resultaten, effecten* [Women have to go through the glass ceiling. Evaluation of the Aspasia-program, first period, results and effects], LOEKWO, Maastricht, 2001.
- Brouns, M. & Scholten, M., *De kwaliteit van het oordeel*, Nederlands Genootschap Vrouwenstudies [The quality of the judgment, Dutch Society of Women's Studies], Utrecht, 1999.
- Brouns, M., *Wetenschap tussen Olympus en Agora. De vele gezichten van gender in de wetenschappen* [Science between Olympus and Agora. The many faces of gender in science], Tijdschrift voor Genderstudies, 2001.
- Crum, B. & Bal, J., *Werk- en loopbaanpositie van post-docs* [Work and career development of post-docs], Research voor beleid b.v. [Research for policy], Leiden, 1997.
- Gier, E., Evers, J., De Jong, P. & Streckx, L., *Wetenschappen tussen roeping en beroep. Verslag van een verkennend onderzoek naar de (on)aantrekkelijkheid van een loopbaan in wetenschappelijk onderzoek*, OCenW, Ministry of Education, Culture and Science, Zoetermeer, 2001.
- Noordenbos, G., *Explanations for differences in publications rates between male and female academics and between productive and less productive women*, Bulletin de Méthodologie Sociologique 35, pp. 22-45, 1992.
- Noordenbos, G., "Women academics in The Netherlands: between exclusion and positive action" in Lie, S.S., Malik, L. & Harris, D. (eds.), *The Gender gap in higher education*, World Yearbook of Education, Kogan Page, London, Philadelphia, pp. 106-116, 1994.
- Noordenbos, G., "Sekse strijd om de ivoren toren. Verklaringen voor de marginale positie van vrouwen aan de universiteit" [Gender struggle about the Ivory Tower. Explanations for marginal positions of women in science] in van Balen, B. & Fisher, A. (eds.), *De universiteit als Modern Mannenklooster* [The university as a modern monastery], Het Spinhuis, Amsterdam, 1998, pp. 75-92.
- Portegijs, W., "Redenen voor het vrijwillig vertrek van vrouwelijke wetenschappers" [Reasons why female scientists leave university] in van Balen, B. & Fisher, A. (eds.), *De universiteit als Modern Mannenklooster* [The university as a modern monastery], Het Spinhuis, Amsterdam, 1998, pp. 62-74.
- Vianen, A.E.M., Ottens, M. & Schie, E.C.M., *van Wetenschappelijke productie van vrouwen en mannen in de psychologie. Deelname in de publicatierace* [Scientific production of men and women in Psychology], Nederlands Tijdschrift voor Psychologie [Dutch Journal for Psychology] 52, 1997, pp. 192-198.
- Vianen, A.E.M., "van Competitie om de schaarse functies: de publicatie-meetlat" [Competition for the scarce functions: the publication measure] in van Balen, B. & Fisher, A. (eds.), *De universiteit als Modern Mannenklooster* [The university as a modern monastery], Het Spinhuis, Amsterdam, 1998, pp. 93-104.
- Vught Tijssen, D.B., *van Talent voor de toekomst. Toekomst voor talent. Plan van aanpak voor het wetenschapsbeleid* [Talent for the future. Future for talent. Plan to approach the scientific policy], Ministry of Education, Culture and Science, Zoetermeer, 2000.
- VSNU/ WOPI en Inspectie in het Onderwijs, 1999.
- Wennerås, Ch. & Wold, A., *Nepotism and Sexism in Peer-review*, Nature 387, pp. 341-343, 1997.

Women in science – The Danish case¹

INGE HENNINGSEN

University of Copenhagen, Denmark

Denmark falls behind its Nordic and European neighbours in terms of the participation of women in science. A low participation of women in science is, however, a widespread phenomenon across the Western countries, sharing many common features, even if the general trend shifts according to disciplinary and cultural specificities. In this paper I shall explore some of these features within the context of Denmark, a country that normally scores highly in gender equality parameters.

In my suggestions for this discussion on methodology, I shall start out from my experience as a statistician, and it will be my contention that to investigate a complex field like gender in academia overall statistics will in most cases not be good enough. To get a fuller understanding of the field researchers must investigate the phenomenon of women's participation in the sciences more intensively by attending to specific disciplinary and regional sites. Hence, to grasp the intricacies of the workings of gender in academia it is important to have very fine-grained statistics in order to better identify the subtle differences between the trajectories of men and women. I will illustrate this by three examples. The first pertains to Ph.D. students in Denmark. The second discusses the construction of valid indicators for the participation of women in science at European level. The third touches on the temporal development of the number of women at Danish universities.

1. The case of Danish Ph.D. students

The gender composition of university graduates and of Danish Ph.D. students by academic field is shown in Table 1. Denmark has about 50% women graduating in the universities but only about 40% women among the Ph.D. students. It is enlightening to investigate this discrepancy between the number of female graduates and female Ph.D.s both on an individual and at an institutional level.

Table 1: Percentage of women as university graduates (1995) and as Ph.D.s (1997) by faculty, Denmark

Faculties	% Women graduates (1995)	% Women Ph.D.s (1997)	Difference
Humanities	66	49	17
Health sciences	64	50	14
Agriculture	58	46	12
Social science	45	34	11
Science	39	31	8
Technology	27	23	4
ALL	49	38	11

Source: Forskerakademiet, 1998

¹ Based on joint work with Professor Lis Højgaard, University of Copenhagen.

It can be seen that the percentage of graduates and Ph.D.s varies greatly between faculties. However, the percentage of graduate women always exceeds the percentage of Ph.D. women showing that, in every field, women have a smaller chance than men to be awarded a Ph.D. degree. Also, the higher the percentage of female graduates in a discipline, the greater is the gap. Men have relatively better chances to earn advanced degrees in disciplines in which male graduates are a minority. This does not apply to women. Even in engineering, with only 27% women, men have a better chance than women do to become Ph.D.s. This represents a picture of different possibilities for men and women on an individual level, and this pattern is repeated if the fields are broken down into sub-disciplines.

Another differentiating mechanism can be discerned in Table 2. It compares the number of Ph.D. students with the number of graduates for each faculty. It is readily seen that there are wide variations among fields, most notably the very few Ph.D. students in humanities². This is the field with the largest percentage of female graduates and also the field with the highest number of women in tenured positions (currently almost half of the tenured women in Danish universities are in humanities). Hence the low transition rate here hits women comparatively harder than men. The differences in transition rates might be explained in terms of national research policies placing more positions in traditionally male-dominated areas. It points, however, to a possible discrepancy between scientific potential and available positions and, whatever the reasons, this uneven distribution of recruitment positions over fields interacts strongly with gender. Hence, the traditional national and international science policies, because of the interactions between gender and research preferences, must be expected to lead to a higher representation of men in academia and a concurrent under-utilisation of female research potential.

Table 2: Percentage of women as graduates (1995) and percentage of graduates enrolled as Ph.D.s by faculty, Denmark, 1955-1997

Faculties	% Women graduates (1995)	% Women Ph.D.s (1997)
Humanities	66	10
Health sciences	64	35
Agriculture	58	20
Social science	45	6
Science	39	30
Technology	27	21
ALL	49	15

Source: Forskerakademiet, 1998

In Denmark the comparatively high number of female graduates and especially female Ph.D.s is often taken as a sign of an impending change in the gender composition in the Danish universities. This trend has, however, persisted for the last 10 to 15 years with no real consequence on the recruitment of women into university positions. Hence asymmetries persist and must be explained. One part of the explanation might be that, although all Ph.D. degrees, in principle, qualify for a university position, reality is different. A large number of degrees in health, sciences and technology are obtained in private companies or in research institutions outside of the universities, but university positions in most cases go to individuals with Ph.D. stipends provided by the universities

² The relative number of Ph.D. students in social sciences is even smaller. This reflects, however, the fact that most candidates in law and economics aim for the professions, and hence have no incentive to spend three years doing research.

or the research councils. The official statistics do not differentiate Ph.D. positions. Hence, the gender composition in the different categories of Ph.D.s is not known. An investigation at the faculty of science at the University of Copenhagen has shown that comparatively more men than women obtained university funded Ph.D. grants while women were more likely to have grants paid for by private companies or organisations. This has the effect of directing more women out of university research and into other research positions. This will be explored in the next section.

2. The leaky pipeline

Table 3 shows the percentage of women in publicly funded research in Denmark in the years 1967-1999. There is a marked increase in the percentage of women in research in all fields over this period. However, the numbers are somewhat deceptive. The increase in female researchers is, to a great extent, due to a changed composition of the scientific staff, corresponding to an increased reliance on temporary university positions and a growing number of positions in non-university research, especially in science and technology. Since the proportion of women is higher in this kind of position than in traditional university positions (Table 4), the increase in female employment is, to some extent, due to the growth in non-tenured external funding. To separate the effects of organisational changes from any real increase in the proportion of women in each employment category, it is necessary to get reliable and stable statistics with categories that are stable and homogeneous over time and between countries.

Table 3: Percentage of women in publicly funded research by faculty, Denmark, 1967-19990

Faculties	1967	1970	1973	1976	1979	1991	1993	1995	1997	1999
Humanities	25	24	24	26	26	31	33	35	36	37
Health	14	23	18	19	19	28	32	32	36	37
Agriculture	8	8	8	12	12	25	29	33	37	40
Social sciences	8	11	14	14	14	21	21	24	28	28
Science	11	12	12	3	13	15	18	20	22	23
Technology	4	7	4	4	4	7	12	13	15	15
ALL	11	16	14	16	16	23	25	27	29	30

Source: *Forskningsstatistik, 1967-1999* (from 1979 to 1992, research statistics were not broken down by sex)

Table 4 shows the proportion of women in Denmark (1999) in all publicly funded research, in externally and internally funded university research and in tenured positions. In all fields we see a decreasing proportion of women as we move from temporary, externally funded positions to proper university positions, signifying that the closer we get to the defining and prestigious positions, the lower the number of women. These numbers show that women have access to research positions but they do not advance at the same pace as men. The last column shows the ratio between the percentage of women in internally and externally funded university positions, demonstrating that in fields with comparatively more women (humanities, health) a bigger share of the women get tenured positions.

Table 4: Percentage of women in different categories of publicly funded research by faculty, Denmark, 1999

Faculties	Percentage of women				Ratio between percentage of women in internally and externally funded university research
	All publicly funded research	Externally funded university research	Internally funded university research	Tenured positions	
Humanities	37	43	34	30	0.79
Health	37	40	28	19	0.70
Agriculture	40	55	32	18	0.59
Social Science	28	39	22	14	0.56
Science	23	33	18	11	0.55
Technology	15	18	10	6	0.56
ALL	30	35	24	16	0.71

Source: *Forskningsstatistik, 1999; Analyseinstitut for forskning, 2000/2001*

3. Valid indicators

Comparisons over time and between countries are a potent tool, well suited to shed light on factors pertaining to the recruitment of women into research. There are, however, some pitfalls that should be avoided. These are well illustrated by Table 4, which points to the difficulties inherent in the creation of indicators. Scientific staff in European countries vary with respect to the distribution of positions over fields. Countries with relatively many positions in science and technology will on an overall basis tend to have fewer women in research compared with countries where more staff are found in health sciences and especially in humanities, even if these countries have the same proportion of women in all fields. Also, variations in the way research is organised might create apparent differences. An effort should be made to get comparable indicators for the different European countries taking these differences into account. One solution could be to create a European reference population and work with some kind of direct or indirect standardisation.

It is often contended that observations like those in Table 4 do not reflect real differences but merely changing temporal patterns with new generations of women entering university careers on a par with their male colleagues. This is, however, not borne out by the Danish experience. Table 5 shows the percentage of women in tenured positions in the science departments at the University of Copenhagen in the years 1970 and 2001. The University of Copenhagen is the oldest, biggest and most prestigious Danish university, and this table shows that the proportion of women in the tenured staff has not changed over those thirty years.

Table 5: Percentage of women in tenured positions in science departments, University of Copenhagen, 1970 and 2001

Department	1970	2001
Mathematics	7	5
Computer science	14	4
Physics	8	9
Chemistry	8	12
Molecular biology	25	17
Biology	20	17
Geology	21	12
Geography	11	17
ALL	14	14

Source: *Annual report, University of Copenhagen, 1970 and 2001*

It is interesting to note the big differences between departments. Mathematics, physics and computer science have few women while comparatively more women hold positions in the life sciences (molecular biology and biology) and those differences tend to be stable over time. The same pattern can be found in humanities and in health sciences at the University of Copenhagen. Although those two faculties have had a slight increase in the number of women in their staff over the 30 year period (health sciences from 16% to 22% and humanities from 28% to 31% women in tenured positions). It would be interesting to see if historical studies in other countries would yield similar results.

4. Concluding remarks

I have argued that sex-disaggregated statistics are paramount to get valid conclusions from numbers on men and women in Academia. It might well be, however, that traditional attempts to explain the low participation of women in research could turn out not to be very fruitful. Over the years, public debate and policy measures have been hampered by the false notion that participation in science is governed by merit alone. As the anthropologist Sharon Traweek has written concerning high energy physics, this is “an extreme culture of objectivity, a culture of no culture, which longs passionately for a world without loose ends, without temperament, gender, nationalism or other sources of disorder – for a world outside human space and time” (Traweek, 1988)³. It is, however, becoming ever more apparent, that this “culture of objectivity” masks a system that is markedly biased against the participation of women. A lot of people – myself included – have, over the years, spent time and energy trying to see if and how women differed from men in all kinds of “legitimate” aspects of scientific life. In most cases no big differences were found. Women achieved grades as good as men. Women in universities wanted to make scientific careers just as much as men did. In the Nordic countries, we have kindergartens, so lack of childcare facilities should not keep women out of research. This points research in different directions. To understand the continued under-representation of women in academia, we have to look into the “illegitimate” reasons, into the unspoken workings of the university system, to find the differences that may explain why men and women are shown their separate and gendered ways in and out of academia. I see a pressing need to integrate current quantitative research with culturally oriented analyses, in order to identify the gendered social patterns in the academic cultures, the symbolic places, attitudes or positions that are open for men, but not open for women.

References

- Analyseinstitut for Forskning, Report 2001/1, Århus, Denmark, 2001.
- Forskerakademiet, *Ph.d-uddannede. Udbud og efterspørgsel 1998-2006*, Copenhagen, Denmark, 1998.
- Forskningsministeriet, *Forskningsstatistik*, Copenhagen, Denmark, 1967-1999.
- Henningsen, Inge & Højgaard, Lis, *Science – a culture of no gender?* (Forthcoming).

³ Sharon Traweek, *Beamtimes and Lifetimes: The World of High Energy Physics*, Harvard University Press, 1988.

Researching gender and social science – The case of Greece

MARIA STRATIGAKI

Research Centre for Gender Equality (KETHI), Panteion University, Greece

Summary

This paper looks at some aspects of the three dimensions that characterise the relationship between the issues of gender and science according to the European Commission Communication on women and science⁴, namely, science *by*, *for* and *about* women. I will focus on social sciences and on the Greek case. A solid basis for reflecting on this issue is provided by the findings of Dr Mary Braithwaite's study⁵, in which valuable input is given on methodology for investigating a wide spectrum of issues related to gender in social research.

In order to promote “social science *by* women” we need to know more about the mechanisms of gender segregation in the management of research institutions, programmes and projects, professional associations and social scientists. Both horizontal segregation (across different social sciences) and vertical segregation (up different hierarchical positions) are relevant when studying gender segregation in social sciences. Within social sciences, distinctions between soft/feminine and hard/masculine sciences are reproduced through scientific practices in universities, research institutions and the general rhetoric on social sciences. For example, political science is more male-dominated than education sciences or psychology. Especially in Greece, where social sciences (and social welfare) are relatively recent and badly funded, female social scientists monopolise specific social research fields. Social research should focus on issues like the construction of gender composition of different social sciences and its impact on the authority and the institutional status of respective social researchers.

Increasing “social science *for* women” involves the implementation of tools for gender mainstreaming in social sciences and research, along the life cycle of research projects, from conception, design, methodology and theoretical background to the implementation and analysis of research findings. By considering gender as irrelevant, a large part of social science projects have an indirect negative impact on gender equality and consequently on women. Gender blindness characterises the largest part of social research in Greece, where gender mainstreaming has started to be applied recently, particularly in research projects in the field of labour market studies and psychology. Most of the other social sciences are usually considered gender neutral. Research should demonstrate distortions in the production of knowledge in social sciences due to male-biased concepts, tools and research methods. Feminist epistemology should be used to re-conceptualise research agendas, so that women become central in the structure of knowledge.

Promoting “social science *about* women” needs the development of research, which could enlarge, deepen and enrich knowledge on society and culture. The mechanisms of gender division of society, labour and science are some of the fields in which specific research should be launched. Women and gender aspects in the production of social theory, as well as research areas like sexual violence or women's use of space or feminine culture should be developed. Gender equality policy

⁴ COM (1999) 76.

⁵ *Gender in Research. Gender Impact Assessment of the specific programmes of the Fifth Framework Programme – Improving human research potential and the socio-economic knowledge base*, European Commission, Brussels, 2001.

objectives urge for more and better knowledge about women and gender in all aspects of economic, social, political and cultural life, in terms of either women's contribution to science, or issues related to women's interests. In Greece, where gender equality aspects have only recently been introduced on the public policies agenda, research *about* women and gender, as well as women and gender studies in universities, should be widely supported by public funding and the academic community⁶.

⁶ Ring-fenced funding for research on gender is provided for the first time in the Operational Programme 2000-2006 (Community Support Framework – European Social Fund) of the National Ministry of Education.

Defining a gender and science research agenda

NICKY LE FEUVRE

Equipe Simone-Sagesse, University of Toulouse-Le Mirail, France

I. Introduction

I would like to share some ideas with you about the kind of research agenda that may be developed in the light of the current gender mainstreaming policies in science⁷. There seems to be a fairly widespread consensus that the whole question of gender and science is worth pursuing because it makes sound political sense. Getting more women into science-based occupations, making the wider scientific community more gender literate, promoting women to decision-making positions within scientific institutions, these are all objectives that can and should be pursued, quite simply because they make for better science. The question I would like to raise focuses more on the other side of the gender and science equation. If we widely agree that gender is good for science, is science as equally good for gender? In other words, in research terms, what do we do with this amazingly ambiguous concept of “gender” and how do we think about the ways in which issues around gender and science may have potentially transformative effects on what we call gender, or the “gender contract” or our “gender systems”?

There is a wealth of feminist research on the multiple ways in which women’s exclusion from the production of scientific knowledge has acted as one of the pillars of contemporary gender systems. Considering this, we would expect to find as strong a consensus on the positive effects of science on gender as we find on the value of gender to science. Somewhat surprisingly, however, when we take a closer look at the available literature, the positions within the feminist academy are far more ambiguous. Indeed, the research conclusions about the potential effects of the gender mainstreaming policies in science, on gender relations as a whole are rather contradictory. I would argue that this ambiguity stems, at least in part, from the competing definitions of “gender” that abound in contemporary feminist research literature. The complexities of this concept represent a significant handicap when it comes to developing a coherent research agenda on “gender and science”. Not least because policy-makers generally, and quite understandably, tend to prefer neat, bite-sized, easily digestible bits of feminist theory; ideas that can be translated easily into policy objectives, policy tools or benchmarking criteria for measuring progress.

I propose to analyse the way in which the different theoretical perspectives – that underpin the different policy issues and objectives around the gender and science question – have dealt with the question of the potential transformation of gender relations in contemporary societies through gender mainstreaming in science. To begin with, I would argue that there is currently evidence of diverse (and often contradictory) uses of the term gender in much of the equal opportunities literature. There is a clear tendency to use this term as an analogy, a metaphor or even as a straightforward euphemism for “sex”. This serves to blur the conceptual cutting edge of gender as a concept and reinforces a dangerous “gender as attribute” consensus in many equal opportunities

⁷ This paper is based on chapters published in two recent edited volumes: Le Feuvre, “Gender, Occupational Feminisation and Reflexivity: A Cross-National Perspective” in Crompton, R. (ed.), *The Restructuring of Gender Relations and Employment*, Oxford University Press, 1999, pp. 150-178 and Le Feuvre, “La féminisation de la profession médicale: voie de recomposition ou de transformation du genre?” in Aiach, P., Cebe, D., Cresson, G. & Philippe, C. (eds.), *Femmes et hommes dans le champ de la santé: Approches sociologiques*, Editions de l’ENSF, Coll. “Recherche Santé Social”, Rennes, 2001, pp. 197-228.

policy documents. The ambiguities surrounding gender as a concept lead to confusion in the policy agenda, particularly when it comes to devising tools to increase women's participation in fields from which they have been historically excluded, as is undeniably the case in the sciences.

2. Researching gender and science

The first part of my paper is based on the analysis of the way in which the adoption of particular conceptual definitions of gender lead to a number of distinct policy options for promoting the feminisation of science-based occupations. At the risk of over-simplification, the different theoretical perspectives on the relationship between gender, occupational feminisation and equal opportunity policies that I have identified can be summarised as follows (see Figure 1).

Figure 1: Theoretical perspectives on occupational feminisation

Theoretical perspective Predicted changes	“Feminitude” or Feminine specificities	“Virilitude” or Surrogate maleness	Patriarchy	Gender erosion
Predicted change to the gender order	–	+	--	++
Predicted change to professional structures and practices	+	–	--	++
Preferred policy orientations	Defining specific career patterns and paths for women (e.g. “mommy tracks”, time flexibility, quotas, etc.)	Helping women to compete on a equal footing with men (e.g. childcare, eldercare, domestic services, etc.)	None Policy generally seen as powerless in the face of patriarchal forces	Widespread policy initiatives aimed at combating the binary divide in ALL areas of social life – Promoting diversity and possibility to inter-change men and women

Source: Based on Le Feuvre, “Gender, occupational feminisation and reflexivity” in Crompton, R. (ed.), *Restructuring Gender Relations and Employment*, Oxford University Press, p. 158, 1999.

2.1. The “feminine values” or “feminitude” perspective

Here it is argued that encouraging the influx of women into the former male bastions of power and prestige offers the opportunity for the diffusion of “feminine values” (altruism, sensitivity, empathy, etc.) throughout the scientific production process. In sufficient numbers, it is argued, women should be able to transform the inherently “masculine” value systems of scientific occupations. Notably, this should make them more receptive to the needs and requirements of other female scientists/clients/patients/citizens and less sensitive to the traditional criteria of scientific success (income maximisation, peer group recognition, linear career paths, destructive technologies, etc.). In this perspective, the promotion of women in science is also seen as an effective means of transforming the organisational principles of scientific research, notably, as far as work time sovereignty is concerned. However, the conceptualisation of gender used here would seem to suggest the continuation of a binary (masculinity/femininity) divide within scientific professions, even after fairly widespread occupational feminisation. Women are seen as having specific “feminine” characteristics and qualities (rarely defaults), based on their extra-professional experiences (particularly maternity), which largely determine the way they “do science”. Although few authors would today suggest that

these qualities are biologically determined, there is a clear tendency to “naturalise” gender relations and to defend policy measures that enable women to develop scientific careers in a specifically “feminine” way. This usually entails taking the objective constraints that women face in combining a career with “their” domestic and family commitments into account when devising non-discriminatory criteria for entry into scientific occupations and/or for promotion within them. In operational terms, this perspective seems to accept at face value the notion that “women are different” and evidently runs the risk of producing policies that reinforce this “difference” at both a material and symbolic level. In previous research (Le Feuvre, 1999), I have analysed the outcomes of occupational feminisation based on a feminitude perspective as a form of “normative integration” of women into former male bastions. Their presence does little to challenge the vertical and horizontal segregation within these occupations and leaves women with sole responsibility for the traditionally “feminine” domestic and family spheres. In short, the foundations of gender relations are left intact and specific “feminine” career paths are carved out for women, implying their virtual absence from the most senior and powerful positions, in the scientific professional hierarchy.

2.2. *The “surrogate maleness” or “viril提高” perspective*

The theoretical framework underlying this perspective is often a post-modern inspired analysis of the mechanisms through which professions and organisations are gendered. Here, the focus is usually on the few women who have achieved successful scientific careers and it generally serves to show that they lack the “feminine qualities” so loudly celebrated in the previous perspective. This is taken to indicate the inherent masculinity of scientific professions, which is in turn used to explain the difficulty women experience in gaining access to them. In order to succeed, women need to act as “surrogate men” (although their behaviour – usually remaining single and childless – is actually far-removed from the dominant family formation patterns of the men they are supposed to be modelling themselves on). It is generally recognised that these women have little opportunity to question the underlying “masculine” logic of science as a profession. Despite this, some authors argue that, by their mere – highly visible – presence, these women may be in a position to undermine the symbolic value systems that equate scientific competence with maleness. (Although it is often recognised that, for all their symbolic virility, these women still have less successful careers than their male counterparts). The policy initiatives that are most coherent with this perspective would thus entail improving women’s chances to “play the scientific career game with the existing (male) rules”. Rather than devising specific career paths for women, policy measures aim to put women on an equal footing with men, notably by providing low cost domestic and child-care services which are explicitly aimed at enabling women to adopt “male career patterns”. It should be noted that this is done without radically transforming men’s participation in the family or domestic sphere (since 98% of the providers of these services are also women...). In my previous research, I have called this pattern of occupational feminisation “transgressive”. The so-called “surrogate men” are only too aware of the social pressures on them to conform to the binary gender norms and of the price they have to pay for their atypical behaviour in the professional and personal spheres. They see themselves – and are generally seen by others – precisely as exceptions to the clearly defined binary norms.

2.3. *The patriarchy perspective*

This perspective is frequently used to explain why and how women have been and still are excluded from the production of scientific knowledge. However, given an objective increase in the number of women in scientific occupations, it has more recently been adapted. This adaptation is with a view to analysing the ways in which the global forces of patriarchy continue to operate in the face of rising levels of occupational feminisation in the sciences. Here, it is generally argued that the positive effects

of an increase in the number of women gaining access to science-based occupations are erased by the simultaneous redefinition of the prestige and earnings-related characteristics of these occupations, along gendered lines. Thus occupational feminisation, as a goal or as a reality, is alternatively seen as the cause or consequence of the de-qualification/de-professionalisation/pauperisation of the women scientists themselves. Thus, from a position that argued that women's exclusion from the production of scientific knowledge was one of the pillars of patriarchal social relations, the authors who adopt this perspective are often led to conclude that the "equality agenda" for scientific occupations is illusory. Patriarchy has infinite means of maintaining and recreating gender hierarchies. This perspective could be summarised with the famous French adage: "*plus ça change, plus c'est la même chose*". The material and symbolic supremacy of men over women, of the masculine over the feminine, is seen as a largely universal and unhistorical social force which serves to restrict the potentially positive effects of the so called "equality politics". This is both in terms of the way men and women "do science" and in terms of the overall pattern of gender relations. At the end of the day, the outcomes of occupational feminisation can be seen as the result of a process of "normative integration", similar to that identified under the feminitude perspective presented above.

2.4. The "gender erosion" perspective

This approach also requires a social constructivist framework whereby gender is no longer seen as an attribute (something we have), or as a role (something we do), but rather as a historically situated social process. Gender is not used to describe the way societies devise particular social attributes for men (masculinity) and women (femininity), but rather to capture the social processes that create the binary sexual divide as a socially significant division (Le Feuvre, 1999). Rather than insisting on ways of accommodating sexual "difference" into the equality agenda, this perspective insists on the fact that differentiation and hierarchy are the two social mechanisms that produce inequality between men and women in the first place. However, unlike the patriarchy perspective, which shares a similarly constructivist definition of gender, this approach attempts to analyse the precise historical conditions under which the gender process evolves and to identify the historical conditions under which it could cease to function as effectively as it has done in the past.

For example, according to some authors, the increasing complexity of advanced modernity serves to make the relationship between biological sex and individual life-chances increasingly tenuous. Within this perspective, "masculinity" is not what men are, have or do, but is rather the social marker of the socially constructed dominant group, just as "femininity" marks out the subordinate group. It is therefore as equally unrealistic to devise equality policies that accommodate women's "differences" or their "femininity", as it is to imagine that the answer lies in helping women to adopt the social characteristics of "masculinity". As Christine Delphy (1991) has stated: were women in a position to resemble men (*surrogate maleness*), men would no longer be what they are today (the dominant group), since, in order to dominate women as a group, men need to maintain the illusion of women's "difference" (feminitude), which simultaneously creates and justifies their domination (patriarchy). To avoid confusion, it should be stressed that the fourth perspective presented here does not cover the much rehearsed "androgyny thesis". It refuses to recognise "masculinity" and "femininity" as objective entities that individuals possess and that they could decide to combine in a strange sort of "pick'n'mix" construction of their individual or collective identities.

The policy agenda outlined under this approach is obviously more complex than that defined under the previous perspectives. In fact, this approach draws attention to one of the main paradoxes of the equal opportunities policy agenda in itself. The approach stresses the need to better understand the largely surreptitious, daily processes through which differentiation and hierarchy are created

and re-created. By doing this it soon becomes clear that these may well include the process through which, in an effort to combat discrimination and inequality, equal opportunity policies create a special category of beneficiaries (women) on the basis of their biological sex. This reinforces the social construction of the very same “differences” on which the original discrimination and inequalities, they sought to combat, are founded. Defining a policy agenda within this perspective requires recognition of the fact that, since what several authors have called the “taboo of similarity” is at the heart of the contemporary gender process, any attempt to promote equality, whilst recognising difference, is akin to walking blindfold along a tightrope. This is particularly true as long as women, and women alone, are defined by their “difference”, their “specificities” or their “special needs”.

Since our social and legal systems recognise only two, mutually exclusive, sexual categories (male/female), a closer examination of the multiple ways in which “men are different” constitutes a useful starting point for redefining future gender studies research programmes. However, it will not provide, in itself, a sufficiently operational policy agenda. In order to be truly effective, an equality policy agenda, based on this fourth conceptual framework, would need to promote a reflexively critical deconstruction of the binary sexual divide. Promoting the exchangeability of men and women in the professional and domestic spheres has emerged from my on-going research on women professionals in the UK and France, as one of the objectives that a “reflexive equality agenda” could aim to meet. Somewhat paradoxically, this objective would seem to be incompatible with both the “femintude” and the “virilitude” research perspectives that have undeniably inspired most of the national and EU equal opportunities legislation that exists to date.

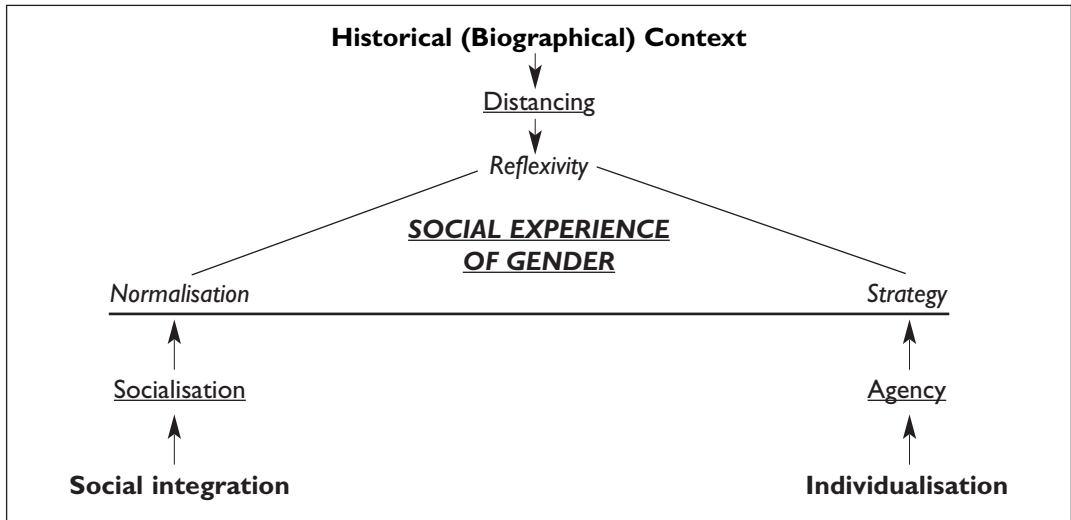
3. Gender, agency and reflexive modernity

In the second section of this paper, I will illustrate the analytical potential of a theoretical perspective based on what could be called “the social experience of gender”. As far as the transformation of gender relations is concerned, the consequences of the increase in the number of women entering the science professions, can be analysed in relation to the three dimensions of social experience, outlined by the French sociologist François Dubet (1994). These three dimensions of social experience are socialisation (social integration), individualisation (agency) and reflexivity (critical distancing). Although Dubet makes no specific reference to gender in his work, I believe that he provides a useful framework for the analysis of gender and occupational feminisation. He argues that the composite character of advanced modernity requires the definitive abandonment of any either/or explanatory frameworks (structure vs agency; objectivity vs subjectivity) and the adoption of theoretical plurality. Inspired by Simmel and Weber, he argues that the loss of social unity constitutes the fundamental characteristic of our societies: “Social roles, social positions and cultural background no longer provide a stable basis for actions because individuals are not programmed in advance. Rather, they attempt to build unity from the diverse elements of their social experiences and from the wide range of potential orientations they have open to them. Thus, social identity is not about “being”, but about working at who one is” (ibid. p. 16). Within increasingly diverse and heterogeneous situations, individuals are led to determine the meaning of their decisions and actions and to construct the overall coherence of their lives.

Dubet identifies three distinct, but interrelated, levels of social experience (see Figure 2) and proposes three different types of “causal explanation” (underlined), related to the nature of the three major components of the social system (bold) and to each of the specific underlying logic of action (italics). His analysis is based on the idea that the diverse and often contradictory elements that make up social experiences pre-exist the individual combinations observed in given circumstances. The individual experience of particular structural elements nevertheless carries the

potential to transform the impact of structure on individual life chances. The sociology of experience is therefore particularly sensitive to the tensions that characterise the relationship between the prescriptive (and potentially contradictory) social roles and constraints and the particular social experience combinations of individuals.

Figure 2: The components of the social experience of gender



Source: Based on Dubet, *Sociologie de l'expérience*, Seuil, Paris, p. 137, 1994. Adapted in Le Feuvre, "Gender, Occupational Feminisation and Reflexivity" in Crompton, R. (ed.), *Restructuring Gender Relations and Employment*, Oxford University Press, p. 158, 1999.

"Individual action conceived as an ability or a desire to "lead one's own life" implies both reference to a number of "values" and the identification of barriers or obstacles to their accomplishment. The historical past, various forms of domination and the general social order may act as barriers to the "self-realisation" of an individual who possesses the ability to place him/herself above society and to adopt a critical stance" (ibid., p. 148). However, this does not mean that all members of a given society, at a given moment in time, possess an identical ability to create unity and meaning from the diversity of their social experiences. "Individual or collective groups, subjected to a form of domination, tend to be deprived of their ability to unify their experience and to give it autonomous meaning. The investment they have to make in order to achieve this feat is much greater and arduous than for dominant individuals and groups, who have immediate access to the cultural and social resources that enable them to become actors of their own experiences" (ibid., p. 256).

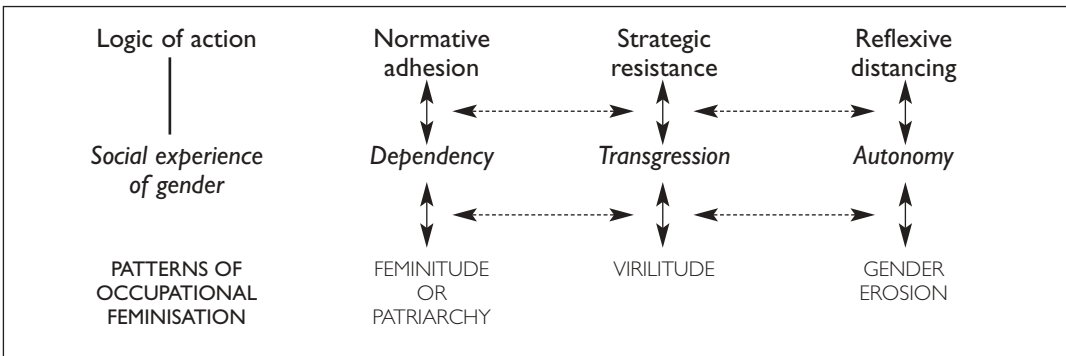
It could therefore be argued that women face more difficulties than men in becoming "actors of their own experiences" and that their ability to "lead their own lives" and their "self-realisation" would be the products of any successful equal opportunities programme. However, this approach implies caution in interpreting statistical data on women in the sciences. The meaning attributed to the entry of women into science-based occupations needs to be analysed within their wider "social experience of gender" and cannot simply be read off from the statistical measurements of their presence/absence or indeed from their relative position within the occupational hierarchy. Dubet's framework suggests that it is impossible to adopt *a priori* any single one of the competing explanatory models of occupational feminisation discussed above. Neither is it possible to conclude unambiguously as to the consequences for gender relations as a whole of a successful policy to increase the number of women in the sciences.

4. Women in science: a case of gender erosion?

In a recent cross-national comparative research project⁸, we collected statistical data and carried out a series of biographical interviews with female doctors and bank managers in the UK and France. The results from this study may help us to think about the issues surrounding women in science. The qualitative interview data proved particularly useful for analysing the manner in which the “integration/individualisation/historical context dimensions” of the “social experience of gender” combine to produce different consequences of occupational feminisation. This was both in terms of the potential change to professional practice and in terms of the potential transformation to gender relations more generally. The biographies demonstrate the processes through which gender is constructed, reproduced and potentially contested through the social experiences of women working in professional occupations. These processes are summarised in Figure 3, which links the women’s social experience of gender relations to their logic of action in the professional and family sphere and to the potential consequences of occupational feminisation for the gender order as a whole.

The solid lines in Figure 3 indicate the causal links between the biographies and the occupational outcomes. Thus, normativity and dependency are linked with gender reproduction, whilst reflexivity and autonomy are related to (potential) gender and occupational transformations. A transgressive strategy, in which a woman is said to have “behaved like a man” in professional terms, is unlikely to be associated with professional change, but may serve to modify the symbolic foundations of the gender process, as indicated in Figure 1 above. The arrows at either end of the solid lines show that the patterns of occupational feminisation will also have some bearing on the logic of action developed by future generations of women entering the professions. These will feed into the general historical context within which they live out their lives. The term “social experience of gender” refers to the degree to which women may identify with and act in accordance to or may contest and transgress the logic and legitimacy of the gender (differentiation) process and gender order. This experience is constructed through the search for coherence and unity in the face of the increasing complexity of women’s lives. There are contradictions between, on the one hand, the traditional socially ascribed gender norms and expectations (in accordance with the principles of the “male breadwinner model”) and, on the other hand, the growing individualisation of their trajectories, which create the potential for dissonance and discord.

Figure 3: The logic of action, social experience and potential outcomes of occupational feminisation



Source: Le Feuvre, “Gender, occupational feminisation and reflexivity” in Crompton, R. (ed.), *Restructuring Gender Relations and Employment*, Oxford University Press, p. 174, 1999.

⁸ The project “Gender Relations and Employment: a Cross-National Analysis” was co-ordinated by Rosemary Crompton and funded by the ESRC, the British Council and the Midi-Pyrénées Regional Council (CCRRDT). For further details, see Crompton (ed.), 1999.

Within the moving sands of such experiences, women's objective, cognitive and subjective resources may combine in such a way as to favour an integration model of action (*gender reproduction*) or to produce radically discordant forms of reflexivity, which may potentially threaten the founding principles of the gender process (*gender erosion*).

Let us accept that one of the consequences of the male breadwinner model was the denial of autonomy to women as a socially constructed group. In this case women's dependency on a breadwinning male (or on public services provided to cover for the unexpected and temporary loss or absence of such a person) is thus a constitutive element incorporated in this model of socialisation within the gender (differentiation) process. Women's relation to autonomy may therefore be taken as a decisive indicator of their "social experience of gender".

For the women who follow a normative logic of entry into the former male bastions, autonomy is not an issue. These women develop various strategies to make their professional activities fit in around the domestic and family calendar which remains the focal point of their social experiences and identity. They gravitate towards "family-friendly" niches within the profession or adopt flexible working arrangements that fit in with "their" domestic commitments. Whilst taking exclusive responsibility for domestic management, they effectively cultivate the "differences" that they claim to bring to their working environment. Their experiences of juggling with family and professional constraints make them sensitive to questions and issues that their male colleagues and partners do not share and confirm their belief that men and women do not work in the same ways. Women who follow this route into the former male bastions are therefore eager to stress the particular "feminine" qualities that distinguish them from their male counterparts. They are equally willing to recognise that their particular mode of professional practice depends on the presence of a partner whose life revolves around his job. This partner does almost nothing around the house and earns a great deal more than they do themselves (even when they share the same qualifications and profession). The discourse of women who follow this logic of action into the professions is thus relatively coherent with the "feminitude" theoretical perspective on occupational feminisation.

Autonomy is at the heart of what I have called the "strategic resistance" logic of action, which often seems to represent in some ways a less comfortable, a more painful route into the former male bastions. In this case, the "quest for autonomy" may be envisaged in different ways. On the one hand, women in exceptional historical or personal circumstances (major wars, enforced celibacy, a crisis of welfare state service provision) may be denied the opportunity to construct their lives around the prioritisation of maternity and domesticity. On the other hand, it may be possible for some women to avoid family ties in order to pursue a continuous and upwardly mobile career trajectory. In either case, these women will adopt what has traditionally been termed a "career woman" (or "Queen bee") profile, based on the belief that, for women and women alone, professional continuity and success is incompatible with any form of long-term emotional or family commitment. The financial and social autonomy gained under these circumstances is nevertheless experienced within the bounds of the gender process. Women who claim to have "acted like a man" in the professional sphere explicitly recognise, in the course of the interview, that they have had to pay the price for their transgression of the historically hegemonic gender norms. Whilst they recognise that the male counterparts they often identify with have not been constrained to choose between a successful career and a (more or less) satisfying family life, these women seem to accept that such an option was not open to them. This may either be because they felt that having children or a partner would have been too much of a burden on their career or because their successful career profile was enough to "frighten the men away". In either case, there is often a degree of pain and regret in their accounts, but not necessarily any trace of what could be termed a "feminist

conscience". By "choosing" to prioritise their professional career, these women are thus transgressing the gender norms that associate femaleness with maternity, domesticity and dependency, rather than contesting the legitimacy of the gender (differentiation) process in itself.

Within any given historical context, the tensions between the social integration and the individualisation dimensions of social experiences may be resolved within the binary principles of the gender (differentiation) process – leading to a logic of action focused on normative integration or on strategic resistance. However, the reflexivity or critical distance produced by the resolution of such tensions may lead to an experience that transcends (and therefore threatens) the logic and legitimacy of the differentiation process itself and which could perhaps be seen as the ultimate form of autonomy and "self-realisation". The women who adopt a reflexive logic of access to the professions are probably the most interesting, notably because they illustrate the limitations of using binary categories, like "masculine" and "feminine", for analysing complex social processes. These women could be seen as playing the most active role in transforming gender relations, despite the fact that they refuse to analyse their own professional and personal experiences in gendered terms. Unlike the women who are following a normative logic of action, they do not feel that they bring any particular "feminine" qualities to their jobs. On the contrary, they are eager to stress the complicity they experience with their male colleagues. However, unlike the strategic resisters, this feeling of shared experience spreads over into their private and family lives. The men they identify with are also involved in negotiating innovative ways of combining family and professional life. They too may well be exhausted after a sleepless night spent with a sick child, may rush off to the supermarket in their lunch-break, may know an excellent recipe for chocolate cake, etc. Thus, although they recognise that women have brought significant changes to their professional environment, they do not attribute these exclusively to any "feminine specificities". Rather they attribute these to the fact that women have forced the men they live and work with to modify their beliefs, practices and values in both the professional and the family sphere. In this sense, these women do not see themselves as "different", no more than they see themselves as "surrogate men" in the usual sense of the term. They do not believe that an individual's sex has any overriding influence on the way they organise their life-style and career patterns and practices. It could be argued that, rather than transgressing gender norms, these women are actively participating in eroding the socially constructed significance of biological "difference".

It should however be stressed that the individual women we interviewed cannot be classified neatly into a single logic of action. On the contrary, our biographical interview data suggest that elements of, or events in, the historical and/or biographical context of women's experiences can lead them to adopt different logic of action over the course of their adult lives. Thus, the dotted lines in Figure 3 indicate the processes that combine to produce shifts in the logic of action adopted by our interviewees over time. Thus, for example, specific patterns of differentiated gender socialisation mean that some of the women we interviewed had started out on their employment biographies with an explicitly *normative* logic of action that had been overtaken by events in their historical context (the upheaval of the 1970s women's movement, for example). In other biographies, however, the interviewee had carried through her initial logic of action, which was confirmed and consolidated at various points in her life.

Taken within a cross-national comparative perspective, these biographical accounts indicate the effects of nationally specific social policy decisions (which may be taken as elements of the historical context) on the nature and consequences of occupational feminisation. The banking sector provides an excellent example. Although there has been no history of the systematic exclusion of married women from banks in France as was the case in Britain (Crompton and Le Feuvre, 2000), there is no equivalent in the French banks we studied of the equal opportunities programmes widely

adopted by British clearing banks throughout the 1990s. In the absence of such policies, the French bank respondents generally experienced a higher degree of tension between the normative expectations made of them in the professional and private spheres than their British counterparts. However, because of the explicit and direct discrimination they experienced within their professional environment, those French women who had achieved management status were more likely to have adopted transgressive strategies or to have experienced some degree of reflexivity than the British bankers who had benefited from an equal opportunities scheme. This was because the UK banks' equal opportunity schemes were explicitly geared to make it possible for women to combine a career with a fairly traditional or normative pattern of the domestic division of labour (according to what may be termed a "feminitude" perspective).

In medicine, on the other hand, relatively high levels of time sovereignty experienced during medical studies and the lack of obligatory geographical mobility during specialist training in France generally combined to make a normative logic of action more tenable for female doctors in France than in the UK. A number of French medical respondents argued that, as women, with particular "feminine qualities", they were in a position to transform medical practice from within. However, this "feminitude" perspective was never expressed by any of the UK medical interviewees, who had no objective opportunity to carve out a "feminine niche" for themselves within their national medical profession.

5. Conclusions

In conclusion, I would argue that a rigorous definition of gender, in terms of differentiation rather than difference, provides a more dynamic and operational perspective on occupational feminisation than has been the case in much recent research on this theme. A conception of women's quest for "self-realisation" as the vital step in the transformation of the mid-20th century gender process sheds new light on the factors that could provide insightful analysis of the meaning and consequences of the entry of more women into science-based occupations. A radical break with the conceptual frameworks, that create a static and rarefied vision of "masculinity" and "femininity", opens up new avenues for further research. All the more so since the rapid numerical increase of female scientists remains, *in itself*, an unsatisfactory indicator of real or potential changes in the nature of the dominant gender order.

Future research needs to pay greater attention to the influence of the specific combinations of identity, values and practices of women (and men) in professional, personal and domestic spheres, as essential factors in their experience of gender. It must be recognised that not all equal opportunity policies are potentially as effective in eroding the differentiation process that underpins the gender order in contemporary European societies.

Bibliographical references

- Crompton, Rosemary (ed.), *Restructuring Gender Relations and Employment: The Decline of the Male Breadwinner*, Oxford University Press, 1999.
- Crompton, Rosemary & Le Feuvre, Nicky, "The realities and representations of equal opportunities in Britain and France", *European Journal of Social Policy*, Vol. 10, no 4, pp. 334-348, 2000.
- Delphy, Christine, "Penser le genre: quels problèmes?" in Hurtig, M.-C., Kail, M., Rouch, H. (eds.), *Sexe et genre: De la hiérarchie entre les sexes*, Editions du CNRS, Paris, pp. 89-101, 1991.
- Dubet, François, *Sociologie de l'expérience*, Seuil, Paris, 1994.
- Le Feuvre, Nicky, "Gender, occupational feminisation and reflexivity" in Crompton, R. (ed.), *Restructuring Gender Relations and Employment: The Decline of the Male Breadwinner*, Oxford University Press, pp. 150-178, 1999.
- Le Feuvre, Nicky, "La féminisation de la profession médicale: voie de recomposition ou de transformation du genre?" in Aiach, P., Cebe, D., Cresson, G. & Philippe, C. (eds.), *Femmes et hommes dans le champ de la santé: Approches sociologiques*, Editions de l'ENSP, Coll. "Recherche Santé Social", Rennes, pp. 197-228, 2001.

1. Stating the case

My paper is structured around three central points, which are an attempt to answer the main question of this conference: what direction should gender research take? I think there are three directions we should move towards. Firstly, we need more qualitative research on gender. Secondly, in order to reach a respectable scientific level of qualitative research on gender, we need to rely both methodologically and theoretically on the resources, which have been provided by gender, women's and feminist studies across a wide range of disciplines and countries over the last decades. I think feminist philosophy and science studies are particularly relevant. Thirdly, a satisfactory gender approach has to be interdisciplinary. Interdisciplinarity, however, is also problematic, particularly for people working in the hard sciences. To be effective, interdisciplinarity needs a good mix of philosophical and social concerns combined with socio-economic research on women. All of this needs to be channelled towards effective policy-making aimed at gender mainstreaming. In discussing "gender and research", in fact, we are looking at very different constituencies, very different groups of women and men and very different approaches. Indeed, and one of the great merits of the women and science actions of the European Commission is that they have been catering for these different groups and constituencies. The female scientists, the gender specialists and the feminist critics, the citizens of Europe, the students are all trying to learn to do science and technology differently.

My reasons for wanting specific research on gender are quite simply pragmatic. They are motivated by the political concern that, in spite of sustained efforts over a number of years and a number of countries for quantitative-oriented methods of research and for equal opportunities in science, patterns of marginalisation or exclusion of women in science persist at all levels. There is slowness, if you wish, in the rate of progress, which points to the need to go beyond quantitative methods in order to promote women in science. This does not mean that we disregard quantitative data collection, but that we supplement and complement it with other types of methods.

There are concrete examples of the persistence of discriminatory measures. From wage discrimination to the leaky pipeline, to all kinds of glass ceilings, enormous disparities exist between men and women. Not to speak of the absence of specific measures that would facilitate the career of women in science, like child-care facilities, but also age limits and mobility issues. There are specific and concrete problems that affect the lives of female scientists that simply cannot find an adequate dimension in the current policy-making. These problems point to power structures, which persist in invisible, but in highly effective, ways throughout the structure of making science. They consequently construct the power relations around gender and science.

Because of these persisting patterns of exclusion or marginalisation, the issue of the established practices and the dominant paradigms involved in the making of science need to be raised in a more systematic manner. A qualitative dimension thus emerges on the issue of researching gender in science. The shift to paradigmatic analysis opens up an epistemological dimension. This emerges quite pragmatically from a political evaluation of how the field of gender and science is moving or rather – I think – not moving.

I want to argue consequently that because the power structures have remained – if not unchanged, quite solidified – we need more gender-specific research. We need feminist theories and

epistemologists to devise more adequate strategies for change and for the advancement of women in science. Feminist philosophies of difference, of diversity, the critiques of universalism and androcentrism and of how both of them contribute to a deconstruction of a hegemonic vision of Eurocentrism are all central issues. These are only some of the key notions that we can borrow from feminist theory in order to make more adequate qualitative analysis of the issues of gender in itself, and especially in relation to science.

In targeting a gender-specific research area, emphasis should be placed on the cultural diversity within Europe, but also to issues of actual ethnicity and racial diversities. This enormous question, which is growing by the day in the present international climate, is something that the women's movement and feminism have had to address most effectively. Whether you call it religious difference or simply enormous ethnic diversity, we need to build the issue of racism and xenophobia into our discussions of the making of science. Sandra Harding's work on gender, science and multiculturalism, can be a great inspiration to us on this issue⁹. Interdisciplinarity remains crucial and the advantages of networking need also to be stressed in keeping with previous work done by the European Commission.

As Nina Lykke argued (see chapter 4) the purpose of specific gender research, in fact, is not to create ghettos of self-referential thought. It is, on the contrary, to open up the field, to bridge the gap. It should therefore affect the alliances between feminist, gender and women's studies specialists, on the one hand, and the female scientists on the other, and also the experts in socio-economic research on women and the policy-makers for women in science. It's a question of bridging the differences, in order to create more effective alliances.

2. Arguing the case

In Commission documents and the *Gender in Research – Synthesis Report*¹⁰ there is a consensus notion of gender emerging. I find this a very welcoming and remarkable fact. Gender is a respectable term, which comes with serious bibliographies, footnotes and even glossaries. I think this is an enormous step forward in moving towards a standard definition of gender. This standard definition begins to emerge from the Commission papers, to which we have all contributed. It is not the case that the Commission is imposing this over our heads: it is actually part of our own work.

The consensus definition is that gender is the socio-economic and cultural construction of differences in roles, responsibilities, constraints, opportunities and the needs of men and women. These are set up in opposition to biological sex. Social constructivism is of great importance here. Gender is a process of allocation of differences, which is variable in time and space. It needs to be placed in a historical context and situated geo-politically, but also, in terms of other structural variables, such as social class, age, race, ethnicity, religion, sexuality, etc. So it is a historical positioning exercise, which I read with the feminist politics of location.

The idea of gender as marking certain social relations is crucial and, in gender studies, has been a kind of a dominant definition since the 1980s. It makes gender a very dynamic term, which I would define more as a verb than as a noun. The idea of using gender as a verb means we can start thinking about doing things with gender. I find this an extremely flexible and promising approach. Gender as a verb constructs personal identities, it influences social forms of behaviour and it functions as a

⁹ Harding, Sandra, *Is Science Multicultural? Post-colonialisms, Feminisms and Epistemologies*, Indiana University Press, Bloomington, 1998.

¹⁰ *Gender in Research. Gender Impact Assessment of the specific programmes of the Fifth Framework Programme. An overview. Synthesis Report*, European Commission, Brussels, 2001.

normative tool to allocate power, privileges and entitlements. It is a structural factor that indexes access to power. There is a welcome relief because it takes distance from more psychological, or autobiographical, or individual ways in which gender is often talked about. This is absolutely up-to-date in terms of the scholarship. Power is essential to gender. We need to look very seriously at the connection between gender/power and science, and make it one of the focal points of research. Power at the analytical level functions as a tool by which we can explore the relations that affect – usually negatively – the distribution and the use of resources that block women's access. There is often a tendency to look at power negatively, as something that prevents and constrains; which imposes rules of behaviour, norms, systems of symbolic and cultural representation of masculinity and femininity. Fortunately, this traditionally negative vision of power analysis is not all we have. There is also the idea of power as an enabling factor. Power being positive – I think we can do this with Michel Foucault – is also a fact. It is a form of empowerment, as we have put it in the women's movement, which argues that power issues need not be the negative kind of oppressive elements. Empowerment entails a social and legal side, but it also raises in-depth questions of identity, subjective agency and a sense of entitlement.

In her presentation, Inge Henningsen talked about the playfulness with which male scientists relate to technology and to their offices, by using their time to play. This feeling that you are at home in the technological environment, so that you can actually have fun, is important. The freedom, the sense of entitlement and the sheer pleasure are crucial. I think that if there is no pleasure involved, there can be no creativity and therefore no production of knowledge – scientific or of any kind. The kind of power that makes you feel at home in the world and fully entitled to a share of its riches is important: we must not forget that power is also about that, and that research on science, gender and power needs to include these issues.

I would also like to raise a point of criticism on this standard definition of gender and science, which I have drawn from the papers of the Commission. The dominance of gender and of the sex/gender distinction has been the object of a very broad discussion and analysis in European gender, women's and feminist studies, in particular within the SOCRATES Thematic Network ATHENA, to which sixty women's studies programmes in Europe belong. This Network deals with the making of women's studies in a European perspective and it has discussed the relevance of gender in the European context.

In the last three years, a team of Athena members have compared notes on the relative "untranslatability" of the sex/gender couple, and of gender in particular, in a variety of European languages and cultures. The preliminary findings of these comparative studies have been published in the annual joint publications of the network¹¹. One clear trend that emerges from this cross-European comparison of the "untranslatability" of gender is that gender is a very contested – albeit dominant – notion. It is contested within the English language: there are noticeable differences between Australia, Canada, Britain and North Carolina. It is already contested within its own tradition, and becomes even more so when you try to locate it in different European traditions. It is a dominant notion, which has been grafted into practically every emancipating or feminist praxis

¹¹ Braidotti, Rosi & Vonk, Esther (eds.), *The making of European Women's Studies. A working progress report on curriculum development and related issues*, ATHENA/Utrecht University, Utrecht, 2000;

Braidotti, Rosi, Vonk, Esther & van Wichelen, Sonja (eds.), "The making of European Women's Studies. Volume 2", *A work in progress report on curriculum development and related issues in gender education and research*, ATHENA/Utrecht University, Utrecht, 2000;

Braidotti, Rosi, Vonk, Esther & Lazaroms, Ilse (eds.), "The making of European Women's Studies. Volume 3", *A work in progress report on curriculum development and related issues in gender education and research*, ATHENA/Utrecht University, Utrecht, 2001;

Forthcoming: Griffin, Gabriele & Braidotti, Rosi (eds.), *Configuring European Women's Studies*, ZED Books.

or gender culture in Europe. From Slovenia to Scandinavia to Portugal, one has to do business with gender, but this is not an easy or even a harmonious kind of co-operation. It has caused enormous attrition and interesting problems of conceptual and cultural translations. Those problems are crucial to understand the construction of cultural identities and of gender issues in those countries. One can therefore take the issue of the adoption of gender into the different European traditions as an indicator of some very interesting local phenomena. This can be developed into the argument that gender can actually increase our understanding of diversity within Europe.

What was proposed in the ATHENA network, is a kind of cognitive mapping of gender traditions in the different European cultures. We discovered that we simply like basic data, which means we lack fundamental research about the history, the political foundations, the terminology, the philosophical roots and the cultural infrastructure of the different gender, feminist, emancipating women's traditions within Europe. As a matter of fact, anyone who engages with gender research enters automatically not only the English language and Anglo-American culture, but also a social and cultural imagery that is fundamentally North American. There is something very wrong when, in 2002, a Europe-based feminist ends up knowing a lot more about Californian feminism than about Greek or Danish feminism. Although there are many reasons for this situation, and very understandable ones, the problem is quite serious.

Good research is being carried out in European women's, gender and feminist studies about this de facto domination of an Anglo-American concept. Suffice to say that in order to do justice to the cultural diversity of the different European traditions of gender, we need to take this multi-layered and complex notion seriously as an object of study in itself. Specific gender research is needed, in order to bring to the surface, the diversities within Europe, and to carry out a kind of cognitive mapping of alternative gender traditions, within this large complex continent. Just think of what needs to be done in former Eastern Europe in terms of mapping out different traditions of thinking about emancipation, the status of women and equality.

Special priority needs to be given, therefore, to Southern and Eastern European regions, which are grossly under-researched in this area. In order to achieve this, we need to recognise the linguistic variety and also the issue of ethnicity within Europe, that is, the category of differences among women in a European perspective. The advantage of the situated or grounded approach is that, it connects the issue of gender research directly to the social and cultural aspects of women's status in different regions. It would allow us to work more concretely towards socio-economic integration of gender issues and thus work towards achieving a more effective representation of the changes that women have already achieved in social status in their respective countries. In the south of Europe for example, much has been happening concerning women and science, that is still under-mapped and under-known. Gender issues are powerful indicators of European diversity.

This is the point to which Maria Stratigaki cross-referred, namely, that gender issues tend to be both local and global, that is, "glocal". They occur in a very local and cultural specific manner, but they occur with distressing regularity across a wide range of locations and places. Gender issues are consequently both very localised and very over-arching and their meaning can vary a great deal depending on location. A very clear example of this, suggested by Gabriele Griffin, is the case of the single woman. If you take the social case of the single woman as an indicator, it can acquire diametrically opposite social connotations depending on the region where it occurs. It can mean complete emancipation but it can also indicate destitution, depending on the country. As a consequence, gender is an absolute indicator of significant regional differences within Europe. This is one of the arguments in favour of treating gender as an object of study in itself. If it is indeed an

indicator of difference, by extension, gender can also become a vehicle for the construction of more effective forms of inter-connection, new ways of looking at commonalities and differences within the European perspective. Commonalities and differences can be equally balanced and they can be beneficial at both ends: by paying more attention to specific gender issues, regional diversity can be respected and enhanced, while it is being put to the task of improving European co-operation.

Moreover, the development of a larger capital of knowledge, of our European traditions of gender cultures, could also result in Europeans becoming more interesting interlocutors for our American colleagues, in the tradition of the “robust objectivity” that Sandra Harding has helped us to theorise. It is important to stress that my emphasis on differences is neither divisive nor is it supposed to be a praise of fragmentation for its own sake. I think materially embedded, situated, historical differences are there to make dialogues possible. You have to be situated, to be somewhere specific and to be accountable in order to engage in constructive dialogues across borders.

The final step of my argument is the implication of this for the practice of science. If gender is the kind of process that I’ve outlined: a verb, a dynamic entity, an indicator of diversity and a vehicle for the equal goal of commonalities, then it follows that gender also invests the construction of scientific concepts and practices. Again, the last wave of publications of the Commission has expressed this with far greater clarity than we could. Concepts are gendered, as the ETAN report argues¹².

The processes of engendering are structural and very variable, and as such, they make effective objects of study. They can be studied in the negative sense of power, but also positively. The ETAN report speaks up quite eloquently against what they call the unjustifiable advantages that men currently receive through the social organisation of science. The *Gender in Research – Synthesis Report*, on the other hand, puts on the agenda something very positive and very empowering, namely, the transformative aspect that gender carries. Gender specific analysis is defended as something that can bring into the mainstream qualitative transformations of the paradigms, of the received ideas and the practices of doing science in a gender-sensitive or a gender-equitable manner. I think this is the first time I have seen the terms: “transformative” or “transformations” in a Commission document and I salute this as an absolutely crucial and productive moment. What is involved in the transformative part of introducing a gender dimension into science? How far can we go towards putting the transformative edge of this into practice? We can look at this in many different ways. We can look at it in a pragmatic way, as a way of improving science.

For instance, we all know that feminist standpoint theory, deconstruction and post-modernism offer different theoretical and methodological ways in which we could have a different approach to science¹³. To be a little bit provocative, I would also look at transformative practice in an era where moral dilemmas have questioned the value of our scientific system. I would dare to say that the political, moral and spiritual infrastructure of what we are doing and when we are doing science is being questioned. I am thinking of the lessons of eco-feminism and feminist environmentalists who ask: how far can we go? How far can our planet take it? Are there limits that we could set ourselves on what we need to study and why? Or are we going to let this abstract entity, called the market economy of capitalism, dictate how far we go into destroying our habitat through our voracious minds?

¹² *Science Policies in the European Union. Promoting excellence through mainstreaming gender equality. A report from the ETAN Expert Working group on Women and Science*, European Communities, Brussels, 2000.

¹³ Let me refer to my “The relevance of gender for the issue of women and science” in Braidotti, Rosi & Vonk, Esther (eds.), *The making of European Women’s Studies. A working progress report on curriculum development and related issues*, ATHENA/Utrecht University, Utrecht, pp. 153-164, 2000.

I could also state the same point in epistemological terms, by introducing the idea of “transformation” as a shift of paradigms in relation to scientific practice. This is a more methodological approach, which I see as central to feminist theory and feminist science studies. Starting from the critical analysis of the dominant concepts, key-ideas and uses of language, it offers a qualitative critique of how research questions get defined, formulated and then implemented in concrete research projects. Through epistemological research on gender and science, therefore, the dual aim is pursued of achieving gender equity and of maintaining and, even enhancing research quality.

We could think of this transformative level as an ethical political alliance among different groups of men and women to look at the aims and the purposes of the making of science. To do that, we could look at the different categories of women involved in this activity together trying to look at gender mainstreaming as a process that needs to continue. If the transformative exercise is the aim, then I think it is important and that we keep it open, that we keep it going until an alternative interdisciplinary, multi-sectional, European framework, for the making of gender and science, can emerge, and even more importantly, can be implemented at national levels.

This is my hope. But it is also a hope that it is reflected, it seems to me, in the latest Commission publications. I want to conclude by thanking the Commission for introducing that word of hope in the landscape of gender and science.

SESSION DEBATE

With regard to the career structure found in academic institutions, the new category of “managerial positions”, and the consequences for women, were discussed. While in some countries these tasks are taken up within the existing associate professor/professor positions, in other countries this seems to be a well paid area where too few women are involved. Again, looking at women’s academic careers, it was noted that while the percentage of women taking degrees may be increasing, the number of women in the faculties is not. For example, in the US, one story behind a drop-off in the number of women employed at the higher levels of academia, was the impact of the retirement of the first women appointed as a result of the “women’s movement”. However, in some European countries, the first influx of women in the system occurred at a different time, due to different factors, such as the launch of the Sputnik. A particular sector of interest was computer science. It was noted that, despite the low percentage of women in this field, the numbers are often increasing; it is just that the numbers of men are increasing even more. Finally, it was noted that in many disciplines women tend to be found more on the applied side of the subject than the theoretical side. It was stressed that it is important to look at areas where women are, not just where they are not.

A second area of concern centred on whom sets the research agenda. Does the research agenda change if there are more women involved? Or do women go where the research agenda fits them? Do the “funders”, in fact, determine the research agenda?

Looking at the different theoretical models for how women participate in, or achieve scientific careers, led to the conclusion that different women within the same profession can fit different models, simultaneously. While the development of a model using a large element of individuality was appreciated, it was asked how policy could be built on such a model.

There was considerable debate on the European Commission’s Gender and Research Synthesis Report, a collective report based on individual gender impact assessment studies carried out in the different (sub)programmes of the 5th Framework Programme. What approach should be taken to the 6th Framework Programme, it was asked, when the speakers had raised both the need for funding specific gender studies and the need to mainstream gender issues in all areas of research? Should gender studies focus on one area, or should gender be mainstreamed, with a smaller budget earmarked for small specific gender studies? The panel felt that the two issues were interconnected. It was not possible to have one or the other: specific studies were needed to support the general principle of gender mainstreaming. One example of the success of the “double strategy” was the introduction of the cross-cutting dimension in the “Improving Human Potential” programme. When the cross-cutting references to gender were removed in the second call for proposals, and “mainstreamed”, there were fewer applications from women and there was less gender research funded. The possible need for a “triple strategy” to ensure that women’s needs were fully addressed, was also mentioned.

Finally, there was a request for the European Commission to stimulate gender mainstreaming at a national level, although it was recognised that the 6th Framework Programme could assist in this through co-ordinated actions and networks of excellence.

HILDA RØMER CHRISTENSEN

University of Copenhagen, Denmark

The central question of the “Researching gender and science” session was does the research agenda for the coming years allow female scientists and policy-makers to produce gender equality in science? The question mirrors the growing acknowledgement of gender studies as an indispensable element in the efforts made to close the gender gap in the scientific community and as the basis for the innovation of the scientific paradigms. The session, as a whole, took the opportunity to widen the scope and the implications of the topic, and made it comply with the demand for an interdisciplinary approach, such as, policy assessment, sociology, history/philosophy on science, as well as indicator developments.

I will take the liberty to stretch the issue by making a small excursion into the current discourses in play when dealing with power structures, gender and science. Under the headline “modern and post-modern”¹⁴, I have constructed two discourses which framed the papers of the session, and which include what I would label as frozen snapshots of transformative movements that are under way or taking place. Let me, quite briefly, summarise some – but definitely not all – of the important transformative movements, outlined in concepts and keywords. Please note that all these transformations are gendered, both at literal and symbolic levels.

- The movement from emancipation politics to life politics as motivation for women’s rights and the feminist project. The early generations of gender research were motivated by a political project, a project “for others”, in which equality of opportunity and fairness occupied a central position. The new generation of gender researchers today is characterised by what has been called, by the English sociologist Anthony Giddens, *life politics*, a politics of self-realisation, to which the identity, the body and ethical choices are central¹⁵.
- The movement from delimited women’s rights movements to today’s looser feminist networks, which operate both at local and global levels.
- The movement from a nation-State to supra-national regions, including the change from Welfare to Workfare, as the guiding principle for the infrastructure of the State.
- The movement from *Bildungsuniversität* to more subtle institutions of mass higher education attended by commercial and global features and, in principle, also by ethnic, social and gender diversity¹⁶.
- The movement from modernist in-depth sciences, Marxism, structuralism, psychoanalysis to different post-paradigms such as post-structuralism and post-positivism.
- The movement from women’s to gender studies, which epitomises this current trend. From a focus on studies by, for and about women, in women’s studies of the 1970s and 1980s, to present gender research, where gender is seen, not as a fixed parameter, but as constructed in discursive systems, not least, in relation to science.

¹⁴ Some prefer the headline modern and late modern, but that is not the crux of the matter here.

¹⁵ Giddens, Anthony, *The Consequences of Modernity*, Policy Press, chap.V, 1991. I agree with Giddens on the point that feminist movements are complex and that they cross-cut the institutional dimensions of modernity, and that feminism – also embodied in feminist research movements – may provide sources of counterfactual thinking which contribute to post-modernity both in a perceived and in an analysed way.

¹⁶ Smith, Anthony & Webste, Frank, *The Post-modern University? Contested Visions of Higher Education in Society*, Open University Press, 1997.

Several papers, and the debate that followed, aimed at exploring and envisaging new configurations of the gender/power/science relationships in the space between modern and post-modern discourses, and to spell out future or, as it was phrased, up-front strategies.

A strong point of the session was to stress that several discourses are in play, both in the culture of science, as well as in society at large. Consequently, the outcome was not to say that the post-modern discourse has outdated the modern one. What is interesting here and what the session focused on, was how to deal with the relationship between the different levels and outlooks. How do we translate the current levels and discourses, and how can we make the different speeches understandable and instrumental in terms of politics?

Elisabeth Guldbrandsen, from Norway, claimed that a silent contract exists between policy-makers and gender researchers, especially in the Nordic context, where State feminism has been at stake. This contract is made up from expectations on both sides: researchers work out the knowledge base for delivery to policy-makers, who in turn, work out the policies for equality. In exchange, the researchers expect policy for science. This type of contract needs to be opened to the new and pressing challenges that confront the present research systems, that is, the questions on governance, science and citizenship. The current techno-science approach, she argued, plays a kind of vanguard role in the reinterpretation of basic assumptions regarding gender, research and politics, and consequently, for the renegotiation of the contract between politics and research. Several speakers applauded that areas such as biotechnology and new information technology invite gender sensitive dialogue and interventions.

Inge Henningsen presented results from a Danish research programme on gender in the academic organisation that has been running for the last five years. The programme has dismissed old models of explanations of the gender gap, labelled as the time myth, the child myth, the myth of nature, etc. She pointed to another area to find more adequate explanations and to trace what are regarded as illegitimate reasons in the old (modern) understanding, such as, subtle discriminatory measures, at both institutional and individual levels, and the working up of comparative knowledge.

Cultural analysis of certain areas might be an approach by which one could deconstruct and reconstruct worldviews and key concepts, that can both reveal the functioning of the current power structure as well as opening it up for new images. Here, the image of the male “nerd” came to the fore. Rosi Braidotti pointed to the nerd, both as an explanation for the powerful, celebrated and playful masculinity, and as a starting point for the creation of the woman or female nerd. This included the pleasure and freedom of feeling at home and the pleasure of playing around in the world of science. This also needs to be an option for women.

Among the prominent issues, was the stress on differences in European gender discourses and the need to strengthen the European knowledge base on gender – both conceptually, as well as in history, culture and society, etc. Maria Stratigaki offered striking examples of the diversity of the European agenda, by pointing to the Greek situation, where women’s and gender studies, along with the development of a political discourse on equality, are now coming to fore. Her paper aimed at spelling out the research by, for and about women phrased by the European Commission in a national and conceptual context, as well as underlining the connections between science and equality politics. Greta Noordenbos offered an illuminating Dutch example of how the structural changes of academy in The Netherlands resulted in a re-mapping of the academic hierarchy that disadvantaged women. Also, she reflected critically the current competitive culture of academia, the literal use of war-rhetoric, etc. Are hierarchical positions fair in academia? Do we need them,

or can we change them in such a way that more women can use their talent at all hierarchical levels at the university? What are the needs and focuses of future knowledge production that would enable political interventions in relation to research agenda and gender equality?

In order to sum up the session, I have constructed a patchwork of all the suggestions made and the papers presented. This points to the following three levels that, in reality, are often transgressed and interwoven in research processes:

- An empirical level, where the inequalities and barriers of current university structures and current research communities and organisations are in focus, for example, the identification of specific gender issues, inside and outside academia, wage, advancement, glass ceiling issues, sexual harassment and violence, child care, mobility measures, etc. Infrastructures such as organisation and networking among women and gender researchers should also be considered.
- A symbolic and cultural level, aimed at engendering neutral categories (welfare, work ethics, science) and placing gender issues in their general as well as historical contexts. This also implies a stress on geo-political differences and comparative elements, for example, to put into context and explain the significance of statistical differences, in order to assess the cultural meanings on women's status, the single woman, parenting, etc.
- A conceptual level, where the basis of knowledge is considered. This level implies reconsidering ways of knowing and the critical consideration of central ideological figures in Western civilisation: the dualistic and hierarchical construction of power relations that influences basic understanding. This approach implies a focus on concepts and constructions of science, gender and society. This accentuates the matter of renegotiating or rethinking the contract between research and society as well as the dialogue with other discourses and arenas in the worlds of science and academy.

A strong message from this session was that gender studies/feminist critique need to be developed and adopted at several levels in the approaching 6th Framework Programme. At a vertical level, gender studies should be made a priority area and, at a horizontal level, gender studies need to be integrated as a perspective of all the priorities of the 6th Framework Programme.

	Modern	Post-modern
Political culture	Emancipatory politics Politics of equality/politics "for others"	Life politics Politics of self-actualisation, identity, body, ethics
Women's political culture	Women's movements	Feminism in local and global (cyber) networks
State formation	Nation-State Making of the Welfare State	Supra-national unions Making of the Workfare State
University and research	Bildungsuniversität/modern university Legitimizing the Nation-State/ create national unity Mono-culture	Institutions of mass higher education/ knowledge production Economic growth, global outlook Multicultural, gender, ethnicity
Scientific paradigms	Objective knowledge Positivism Marxism Psychoanalysis Structuralism Surface/depth	Situated knowledge Post-structuralism post-positivism etc. Surfaces/simulacra
Women's and gender studies	Women's studies Equality and difference	Gender studies Diversity Construction and deconstruction Change of meaning

© Hilda Rømer Christensen, University of Copenhagen, Denmark – Session Report

The background of the page features a series of thick, light gray wavy lines that sweep across the upper half. Scattered throughout the lower half are several light gray five-pointed stars of varying sizes, some overlapping the wavy lines.

CHAPTER 9

BEYOND FACTS AND FIGURES: PHILOSOPHICAL PERSPECTIVES

The conference speakers and general debate covered a wide range of issues – new and old, national and international, common themes and provocative issues. There is a difficult relationship between “sex” and “gender”, particularly as “gender” does not translate easily into other languages. In the closing session, the two philosophers, Genevieve Fraisse and Sandra Harding, focused on a few common issues paramount to the overall “gender and research” debate. In fact, gender mainstreaming must be considered and understood in the context of general knowledge.

GENEVIÈVE FRAISSE¹

Member of the European Parliament, Philosopher, National Centre for Scientific Research (CNRS), France

I have been working in philosophy and looking at gender and sex issues, and their political dimension, for more than thirty years. I have also been involved in politics in the Movement for Liberation of Women (MLF) and, more recently, I have been in charge of women's rights issues at inter-ministerial level in France. I am a member of the Women's Rights Committee in the European Parliament. The points I want to make flow from my hybrid experience, both practical and theoretical.

The gender (or sex) issue in science and research is manifold, and I particularly appreciate the wide scope given to the issue by the Commission, through its "by, for, about" approach. "About" is the question I want to raise here and I propose not to close the debate *about* women, sex and gender. I will address the following two issues: the difficult relationship between "gender" knowledge and general knowledge, and the distinction between sex and gender.

1. The difficult relationship between gender knowledge and general knowledge

None of us want gender knowledge to be forgotten or just adding a bit to science. We want it to be *mainstreamed* into general knowledge, and this mainstreaming, or, in other words, the integration of this knowledge is problematic. This problem is specific and does not occur elsewhere in research. It is twofold: (i) gender knowledge keeps a "foreign" status, it is considered as particular knowledge to one side of general knowledge; (ii) attitudes, such as misogyny, are analysed on personal or biographical grounds, and not interpreted generally. Misogyny is circumscribed into private spheres of analysis. I will illustrate this problem, on the basis of two examples: the *French Revolution and Strindberg's misogyny*.

1.1. The French Revolution and the exclusion of women from the res publica

From the point of view of women, the Revolution was not necessarily all good. Women did not gain citizenship during the Revolution. I tried to demonstrate that this is part of the whole question of the French Revolution and the birth of democracy. But I could lose out on both fronts if I'm not careful. Everyone might be singing the praises of the Revolution, but I'm pointing out that it wasn't that easy. It wasn't easy for women to gain access to citizenship. Then, there's the question of how to establish democracy. Maybe the feminine side will not be incorporated into the general debate on democracy. So how can you get specific research into the general debate? That's the first difficulty. We are coming up against the specific within the general. That's what we're trying to do. Our purpose is not just to look at the way in which women were treated in the 18th century. We have got to look at how they have been integrated into the democratic process. You can talk about democracy without being involved. You can stay on the sidelines all the time. You're rubbing shoulders with the discussion but you're not part of it. The quality of your work is not being challenged. When it comes to the global discussion on democracy, your research remains specific to the mainstream, but not a part of it. That's the challenge.

¹ This contribution is based on the tape transcription of the simultaneous interpretation of the presentation given in French during the conference.

1.2. Strindberg's misogyny

The second challenge is the opposite: you have to make sure that the general infuses the particular. During my research work, I was involved with a theatre group working on Strindberg. They wanted me to help the female actresses with Strindberg's text, which they found very hard to digest. I interpreted the misogyny of an author on the basis of his personal history and psychological structure. Having read the three thousand pages of Strindberg's autobiography, I found it interesting to look at how he stands vis-à-vis the feminist debate at the time, and what his role was in politics in the 19th century. Regarding 19th century philosophy, the slow establishment of metaphysical deconstruction, in other words the challenge of metaphysics, encounters the way in which the other, the big Other (le grand Autre) and the other, the woman, the feminine, were mixed together. All that runs through Strindberg's work and demonstrates his misogyny. This means bringing the general into the particular. The political and the philosophical debates are involved in the women's rights field. The other major philosophical issue of the time was "what is the role of women once God is challenged?" This means that the general debate is at work in the particular. What seems to be a particular text on sex and gender is a larger question. It's not a matter of how to get women's citizenship as part of general political debate on democracy. It is the contrary: it is debating on sex and gender, the overall panorama or climate to illustrate the particular. So, you're infusing the particular within the general. And that makes misogyny readable, if you like.

If you look at the way literary criticism looks at misogyny, the concepts are often very meagre. There's not much philosophical discussion about it. Throughout my research work, these are the two major challenges that I have come up against: the particular at stake in the general and the general at stake in the particular. There is indeed a two-fold approach. Sex or gender dimension must be considered in the general debate and a general context must be given to a gendered discussion. You've got to take the complexity apart. This research is going to be complex. Obviously, the utopian vision is to reach a point where gender will contaminate mainstreaming. This horizontal contamination of the philosophical, historical, sociological and anthropological must be debated.

2. The distinction between sex and gender

It's quite clear that two things are really annoying us: sex and gender. Because "research by women" means you're talking about gender, but also about sex. I can use the expression "the sexed beings", but everything people say now has to do with the word "gender". My first point is thus to acknowledge the two words "sex" and "gender".

In the glossary called *One hundred words for equality*² we learn that the word "gender" is not really translatable. You've got gender and sex in French, and sex in Spanish, but gender and "Geschlecht" in German. There's a lot of variety in the words used and we have to think about this.

Will everything be qualified under gender or not? Let me give you an example that is a political illustration. We've just been working on a report in the European Parliament on the 1976 Directive³. It is one of the most important Women's Rights Directives in Europe on equal opportunities and equal treatment. We really had to fight hard to take forward the Commission's proposals and get them

² *One hundred words for equality – A glossary of terms on equality between women and men*, European Commission, Directorate-General for Employment & social affairs, OPOCE 1998 (CE-10-97-162-EN-C). Available in 11 languages.

³ Council Directive 76/207/EEC of 9 February 1976 on the implementation of the principle of equal treatment for men and women as regards access to employment, vocational training and promotion, and working conditions.

through because of the terminology used. Firstly, because the legal service did not agree with “gender” being put in everywhere by our Finnish “rapporteur”. We had to use the word “sex” in the case of discrimination during pregnancy. Then, we were confronted with an amendment about paternal leave and discrimination. Nobody wanted to acknowledge that a man could be discriminated against at work if he had taken time off to look after his child. It was very interesting: the argument of “sex” (it was a man) was used to prevent the recognition of a gendered situation (a parental leave taken by a man). When discussing the directive, we had two examples of what can happen when there’s confusion between sex and gender. And what have I learned from this? As a French woman and as a female researcher, I would like to ensure the distinction between sex and gender. I know that I’m asking for something quite radical; “when are we going to use sex and when are we going to use gender?” A lot of arguments have been constructed, criticising sex, favouring gender.

I would like to refer to another area, namely epistemology, because some are seeing an opposition between sex and gender, although, in my view at least, you should be using both. You have to know when to use which term and at what level. I would draw your attention to the fact that, on the one hand, you’ve got biology (sex) and, on the other hand, you’ve got culture (gender). Either you’re essentialist or constructivist. You are repeating an epistemological construction that we depend on, when making such an opposition, such as a dichotomy between sex and gender. It’s nature versus culture. For those who, like me, grew up with structuralism, it’s quite clear that structuralism was all about nature versus culture. I’m not convinced that, by sticking the fight between nature and culture, we’re not strengthening it and thus reproducing more nature. Maybe we need something else to escape, maybe something else is at stake, maybe we could get something else going if we used all the terms available. I use all the terms available myself.

When I say “difference of the sexes”, I don’t mean sexual difference, I don’t give a definition and if I say “man/woman”, I’m not saying “masculine/feminine”. If people think “sex” covers “difference of sex” and “sexual difference” and if they say “man/woman” and “masculine/feminine” is the same, they’re mixing beings and qualities. I’m a being, because of my social identity. I’m of female sex. But who says that I’m not masculine? Beings and qualities are not the same. They have to be distinguished. My favourite example before September 11th, but it’s now a bit awkward, was: “if I go to Kabul, regardless of my mixture of masculine and feminine... I’m a feminine sexed person”. Where gender comes in would be interesting to identify. But if you take the gender, you have to fill out a concept, which I suggest we keep as an empty concept. I suggest “difference in the sexes (or between the sexes)” to be an empty category. It’s an empty conceptualisation. It contains nothing. There are no presuppositions, no philosophical assertions, no political assertions contained in it. “Sexual difference” (in French, we get “différence des sexes” and “différence sexuelle”) allows you to define “masculine/feminine”, which is different. Gender, culture and social can be defined, which means, when you’re on the epistemological level, you need to say “as far as all this is concerned, it doesn’t really matter”. Similarity and difference have to be produced. You don’t have to decide to be similar or different. We are similar and different thanks to the fact that we are working within an empty category, “difference des sexes”, we can let the aporia stand up. There are two concepts, similarity and difference, which are at an ontological level. At a political level, there are also two concepts: equality and liberty. Now you’ve got four concepts: similarity, difference, equality and liberty. I suggest that, via these different concepts, we should follow the thread of “historicity”, though sex was never a category inscribed in history. It is why it’s not just a nature versus culture thing. I suggest we drop that dichotomy.

⁴ For further developments on this subject, it is recommended to read *Les deux gouvernements: la famille et la Cité* (Gallimard, Folio essais, 2000) and *La controverse des sexes* (Presses universitaires de France, 2001).

How can women's standpoint advance the growth of scientific knowledge?

SANDRA HARDING

UCLA, United States

1. Does equal only mean “the same”?

For more than a century feminists have argued that women should have equality with their brothers in sciences, mathematics and engineering. “We can do the same good science that they do” we have said. Women should be added to the sciences, mathematics and engineering professions.

Such claims have encountered strong resistance. It has been immensely difficult for women to achieve formal equality – that is, equal access and treatment in scientific training, degrees, jobs, publication in scientific journals, and membership in scientific societies. And it has been even more difficult to achieve actual equality; often the climate and daily practices of knowledge production institutions fail to encourage and support girls and women as they do their brothers⁽¹⁾ (Rossiter, 1982, 1995; Schiebinger, 1989). The recent report on the status of female faculty members in the sciences at MIT revealed how the women who had earned their formal equality at that prestigious institution, and who denied that they had been discriminated against in any obvious ways, nevertheless testified to the greater difficulties they encountered in maintaining their careers compared to their male colleagues. And this was still the case for the youngest generation of female scientists, though the forms of informal discrimination varied at different stages in women's life cycles and careers (Massachusetts Institute of Technology, 1999).

Yet I want to focus on a different set of issues here. Can “add women and stir” strategies actually achieve equality for women in the production of knowledge? To put the question another way, should the demand for equal treatment require only the same treatment? Under what conditions does real equality require different goals and strategies? Can women have a distinctive standpoint on nature and social relations? How does the growth of knowledge suffer when we understand equality as only sameness?

Such questions make women and their male defenders nervous – and for good reasons. For one thing, will asking for anything different from our brothers be regarded as claiming that women have “special interests”? Will we be perceived to be demanding the right to replace male or sexist biases with female and feminist biases, and thus not really advancing the objectivity of research? Won't the growth of knowledge suffer from such projects in ways similar to how it has suffered from sexist biases? A second concern focuses on why women always have to define their concerns in terms of their differences from the masculine norm; why should this be so? Furthermore, what effect do the answers to such questions have on how we think about recruiting and retaining women in the sciences? Finally, how might such issues influence the direction and design of research projects?

My intent here is to help us think about these difficult issues. But let me return first to remind us that a fair representation of women in scientific institutions brings benefits to society and to science itself, not only to women.

2. Who benefits from women's presence in the sciences?⁽²⁾

Of course, fairness to women requires that they receive the same opportunities and resources as their brothers. The production of knowledge can be pleasant and sometimes exciting work. It is frequently well paid, so that women can support themselves and their dependants and achieve the upward mobility that is often characteristic of their brothers' careers in science, mathematics and engineering. Moreover, science, mathematics and engineering are high-status professions. Professional expertise is admired and respected. Modern science and engineering are models of enlightened progress. Thus, careers in such fields permit women, too, to contribute to widely recognised human achievements, and to have the chance to improve the natural and social conditions under which we live.

Society benefits, too, from women's presence in science, mathematics and engineering institutions. For one thing, women's skills and talents at the production of knowledge are valuable social resources that enlarge the "human resources" pool on which the continued advance of science depends. Moreover, scientific forms of rationality, abstract and critical thought, have persistently been claimed as the significant marks of the fully human. Such traits are said (rightly or wrongly) to distinguish adults from children, and humans from members of other species. When women, too, are seen as rational, objective, careful observers and critical thinkers, membership doubles in the category of those who can get counted as fully human. Thus Marie Curie's achievements were immensely inspiring to women who had no intention of becoming chemists. If women can achieve in science, mathematics and engineering, they can achieve in other fields that have been unfairly closed to them.

Finally, these days, after three decades of a highly visible feminist "revolution", the reputation, the perceived legitimacy, of scientific and technological institutions, requires that women have equal status in scientific, mathematical and engineering work. Science is supposed to be the paradigm of objective, rational and critical thought. For many people it is still the ideal model of modernity, social progress and even of enlightened civilisation itself insofar as it confronts customary biases and superstitions. So its continued refusal to examine critically its own gender prejudices, where this occurs, damages that reputation these days. In the case of the social and life sciences these concerns are possibly even more critical. We are long past the day when it was regarded as appropriate for expertise about women's bodies, the health and welfare of children, and violence against women, for example, to be the possession only of men.

Important as these issues are, they are not the only important ones when the topic is women and science. Another one is the issue of women's differences from men that could be used to advance the growth of scientific knowledge. We have all learned to value biological diversity. But what about cognitive diversity? What is it, and how do sciences benefit from it? How can women's differences from men provide an undervalued source of cognitive diversity?

3. How can the sciences benefit from women's "difference"?⁽³⁾

According to modern sciences (as well as common sense), how we interact with the world around us both enables and limits what we can know about it. Different research designs offer the opportunity for different patterns of knowledge (and, we should remember, different patterns of ignorance). Moreover, not just how we study phenomena, but which ones we choose to study – or neglect to study – shapes both systematic patterns of knowledge and of ignorance. So we can ask:

do women and men in any particular society tend to have characteristically different interactions with nature and social relations which might enable them to bring different concerns and sensitivities to research?

Mostly we do not. Men's and women's interactions with natural and social environments are more similar to each other than either are, say, to the interactions of horses or monkeys with their environments! Mostly, men and women are found in the same places in nature – on deserts or mountains, islands or prairies, in the tropics or the Arctic. Moreover, in any particular environment, men and women tend to have mostly the same or similar interests in the world around them. For example, they have similar interests in survival, shelter from hostile climates, sustainable food supplies, safety from dangerous plants and animals, and the pleasures of family, friends, and participation in their culture's distinctive activities. Men and women tend to share the same or similar cultural discourses: Christian or Islamic, Latino/a or Chinese religious narratives, models and conceptual frameworks. And we mostly share the same or similar ways of organising the production of knowledge: learning from sacred books or tribal elders, from daily agricultural and health care practices, from work in laboratories and field sites, classrooms, libraries and historical archives. So the life experiences and knowledge practices that men and women bring to their research are largely the same.

Moreover, whatever women may bring to their education as researchers, in scientific and scholarly disciplines they are trained to do the same things as men. We are all socialised into our disciplines. Moreover, the first “strangers” to be welcomed, or at least tolerated, in a disciplinary group – whether these be racial, ethnic, religious or sexual minorities, or people of other classes – are those who already most fit the profile of the prevailing group. They are the most easily socialised, the most willing, docile and not resistant to giving up their “difference” from the dominant group in order to share its activities⁽⁴⁾. Women are often isolated as these strangers in our departments and labs, and punished in more or less subtle ways for challenging on gender grounds the standard ways of conducting research.

However, paradoxically, this insistence on “becoming men” institutionalises an important difference between women and men in educational and research institutions. Unlike our brothers, we must “leave our gender behind” when we open the lab or department door. The demand that women enter and engage in the production of knowledge only in the same ways as men do, ensures that, in important respects, women are thereby forbidden from achieving that goal. To do “the same science” as men do, women must restrict their subjectivity in ways their brothers do not. We must limit our observations, reasoning strategies, intuitions and critical thinking to ways that match such activities as they are performed by a socially distinctive group – namely, men.

This is significant because there are at least some respects in which women's interactions with nature and social relations differ from men's⁽⁵⁾. To the extent that women and men are assigned or choose different kinds of activities within a culture, they will tend to bring different resources to the production of knowledge. This is so even for the professional middle-classes in which women and men's life styles tend to be more similar than is the case in other classes. In both the North and the South these gender-differing patterns of scientific subjectivity have been noted. Thus there are distinctive resources women can bring to research that have the effect of expanding the comprehensiveness of patterns of knowledge and of correcting the errors that have infested research from which women's resources were excluded. Women's “cognitive difference” from men provides undervalued resources for the growth of scientific knowledge. We are all familiar with such cases. Here I briefly describe just a few.

4. Examples on women's health

It took the Women's Health Movement a lot (and possibly the appointment of a woman to head the National Institute of Health: Bernadine Healy) to get federal funding for women's health issues up to the level assigned to men's issues. Of course, both women and men have heart attacks and suffer other bodily failures. But studies such as the one on the effects of aspirin on the incidence of strokes had been conducted only on men, so no one knew if or how its effects might differ for women. Yet doctors were recommending aspirin as a way of preventing strokes to women, too. Here we have the Women's Health Movement raising additional research questions and calling for the study of additional phenomena, and insisting upon greater rigor in the procedures and reporting of drug trials.

4.1. Evolutionary theory

Have only men evolved? Ruth Hubbard (1979) pointed out, two decades ago, that standard interpretations of evolutionary theory treated females as making no contributions to human evolution. As Hubbard humorously put the point, mainstream theorists acted as if it were not for the lucky fact that girls inherit their father's genes as well as their mother's, contemporary men would have to be mating with apes! (Of course that is absurd, but that is the logic of then standard readings of evolutionary theory.) Hubbard and other biologists and anthropologists showed that women were hunters as well as gatherers, most likely providing more than half of such groups annual supplies of protein. Moreover, they developed tools for their hunting of small game, gathering and food preparation activities also. Here we have women asking questions about prevailing hypotheses and about how the data was gathered and interpreted. Interpretations of evolutionary theory have persistently been used to argue for the legitimacy in today's world of the superior social status of one gender over another and of one race over others. So it should not be surprising that members of the purportedly inferior gender (and races) should raise critical questions about such naturalisations of social hierarchy and the way data was collected to support them.

4.2. Moral development

Psychologist Carol Gilligan (1982) showed that Lawrence Kohlberg's influential stage theory of moral development gained its plausibility only through its failure to interrogate the androcentric assumptions guiding the research design. Women's responses to the study's set of moral dilemmas seemed to Kohlberg to support conventional views that women's morality was diffuse and less developed: a much higher proportion of women's than men's responses had to be set aside because they didn't fit the moral categories Kohlberg had prepared. Gilligan showed how women's moral reasoning was simply different, not inferior to men's, and that it was entirely appropriate for the kinds of decisions that women encountered in their assigned work of raising children and maintaining family relations. Women tended to develop and retain an "ethic of care" and responsibility. Men – at first comfortable with this ethic – gave it up for the "ethic of fairness" and of rights that are expected of moral decisions in the public realms of work and government. Did Gilligan's experience as a woman, a daughter and a mother suggest insights to her that were less available to men? Whether or not this was the actual origin of her insights, her project started off from the standpoint of women's typical life activities in order to focus on widely accepted standards for what counts as moral development.

4.3. Human social relations

In the introduction to their early collection of feminist challenges to androcentric sociology, Millman and Kanter (1975) argued that this discipline's androcentric assumptions and practices prevented sociology from providing reliable accounts not only of women's lives, but also of men's lives and social relations in general. For example, sociology focused on "public, official, visible and/or dramatic role payers and definitions of the situation; yet unofficial, supportive, less dramatic, private and invisible spheres of social life and organisation may be equally important". Moreover, the discipline frequently assumed a single society inhabited by men and women in which generalisations can be made about all participants. Yet men and women in many respects inhabit different social worlds which must be taken into account when making generalisations.

Social researchers concerned with racial and ethnic stratification have been making similar claims. For example, African American sociologist Patricia Hill Collins (1991/1999) has argued that sociology cannot understand white people's social worlds, let alone Black life, because of its assumptions about how white men are the unique exemplars of humanity. Collins and other social researchers have demonstrated the importance of thinking of social relations in terms of the "intersectionality" of gender with class, race and ethnicity rather than in the binary terms that feminist and other new social movements first favoured. Learning to analyse how intersectional social relations affect the social structures and contents of the natural sciences too can only improve both. In these cases, political struggles have become part of research processes, enabling researchers to "start off research" from the daily lives of people in oppressed groups in order to reveal more accurately their lives, the lives of the oppressing groups as well as the institutional and discursive practices that tend to block such observation and understanding. In the language of standpoint theorists such as Dorothy Smith (1987, 1990a), we can take oppressed groups' experiences of the everyday world as the starting point for understanding the "conceptual practices of power". It takes both empirical research – science – and political struggles to gain such understanding since, first, we are all forced to live in, and socialised to see as natural, the social institutions that are in fact designed to serve members of the dominant groups and, second, the latter resist attempts to legitimize any public presentations of ways of understanding nature and social relations that are not their own.

4.4. Third World "development"

Yet one more example of how using women's lives as a starting-off point can reveal aspects of the "conceptual practices of power;" in this case, the way Northern-directed international agencies think about Third World development, is available in the illuminating studies of women, the environment and sustainable development. Researchers such as Rosi Braidotti et al. (1994) have started off their research projects from the lives of the most politically and economically vulnerable of the world's women – the 60-80% of the world's poor women living "at the periphery of the Enlightenment". Thinking about development from such a standpoint, these researchers show how development policies in fact have increased the gap between the world's "haves" and "have-nots" through their reliance on economist notions of what counts as development, narrow and counter-productive conceptions of what counts as "real science", androcentric and Eurocentric assumptions about sustainable environments and persistent systematic blindness to the effects such concepts and policies have on the lives of women, their dependants, their communities and the environments upon which their lives depend. Only policies, designed from the standpoint of the daily interactions with nature and social relations of the most vulnerable citizens of the planet, can stand a chance of actually providing access to development for them.

5. Conclusion: gender and cognitive diversity

I have been arguing that women bring important resources to scientific research “as women”, and as women of diverse classes, ethnicities, races, religions, sexualities and cultures. Whether or not individual women, in fact, identify themselves as feminist, we can see that the last three decades of feminist research, scholarship, and politics have enabled all of us to see gender around us in ways that were invisible earlier. Feminisms have provided us with “gender lenses”, by which I mean analytical frameworks and directions for identifying distorting gender assumptions that lurk in our sciences as in our social relations. Of course this means that men, too, could and should be looking at the world through “gender lenses”; these frameworks are analytical resources available for everyone who does the political and research work necessary to understand how they work. (Men have been using them increasingly, and in innovative ways. But this is a topic for another time and place.)

Let us summarise here some of the contributions to the growth of scientific knowledge that these “gender lenses” provide.

- (1) They identify important understudied social and natural phenomena, and what is problematic about them.
- (2) They propose new hypotheses and concepts that direct attention to unnoticed aspects of nature and social relations.
- (3) They create innovative research designs, enabling the collection of additional or different kinds of evidence, and insist on more rigorous deployment of existing research designs and their methods.
- (4) They interpret differently familiar data, enabling new patterns of nature and social relations to emerge into visibility.
- (5) They bring systematic critical scrutiny to bear on familiar conceptual frameworks, including the ones that have shaped their own training and research. Thus they insist that the observer’s assumptions and practices be treated the same way as are the assumptions and practices of the observed. They develop a kind of “robust reflexivity” that counters the familiar insistence on treating observer and observed as different in kind.
- (6) They use ethical and political commitments to expand the growth of knowledge through all of the above processes. They understand that political struggle can expand our knowledge of nature and social relations. Thus, while rejecting the possibility and desirability of the requirement to achieve value-neutral research, at the same time, they develop stronger standards for maximising objectivity⁽⁶⁾.

Note that the arguments for the value of the standpoint of women or feminist standpoints focus on the importance of women’s experiences and of feminist political movements as potential origins of scientific processes and as a check on their adequacy. While individual women have indeed used their experience to open up new lines of scientific research and illuminate familiar ones, pro-democratic political movements make possible the emergence of new kinds of group consciousness. Thus it is certainly true that some kinds of politics retard the growth of knowledge; but it is also clear that other kinds of politics have advanced it. (See Harding, forthcoming.)

I have been arguing that asking women to do research in only the same ways that men have done it in fact does not grant women equality in science, and additionally restricts the growth of knowledge. Instead, women will achieve equality, like their brothers, when they are permitted to do research that takes advantage of the distinctive interactions with nature and social relations characteristic of their gender – never forgetting how diverse gender relations are from class to class, race to race, and culture to culture. At the same time that women and men are mostly like

each other within the same cultural context, it is also true that women tend to have distinctive locations in nature and social relations. They have distinctive interests in the world around them, distinctive discursive strategies – narratives, models, and metaphors – and distinctive ways of organising the production of knowledge. Women’s distinctive culturally located subjectivities can provide rich resources for our sciences and our societies. Importantly, women can use our social disadvantage as an epistemological lever to pry open dominant theories and research practices so to observe the conceptual practices of power, and to strategize about how to create more democratic societies and more accomplished sciences.

Bibliography

- Braidotti, Rosi et al., *Women, the Environment and Sustainable Development*, Zed, Atlantic Highlands, NJ., 1994.
- Cockburn, Cynthia, *Machinery of Dominance: Women, Men and Technical Know-how*, Pluto Press, London, 1985.
- Collins, Patricia Hill, *Black Feminist Thought: Knowledge, Consciousness and the Politics of Empowerment*, Routledge, New York, 1991/1999.
- Gender Working Group, U.N. Commission on Science and Technology for Development, *Missing Links: Gender Equity in Science and Technology for Development*, International Development Research Centre, Ottawa, 1995.
- Gilligan, Carol, *In a Different Voice: Psychological Theory and Women’s Development*, Harvard University Press, Cambridge, Mass., 1982.
- Haraway, Donna, *Primate Visions: Gender, Race and Nature in the World of Modern Science*, Routledge, New York, 1989.
- Haraway, Donna, “Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspectives” in *Simians, Cyborgs and Women*, Routledge, New York, 1991.
- Harding, Sandra, *The Science Question in Feminism*, Cornell University Press, Ithaca, 1986.
- Harding, Sandra (ed.), *Feminism and Methodology: Social Science Issues*, Indiana University Press, Bloomington, 1987.
- Harding, Sandra, *Whose Science? Whose Knowledge? Thinking From Women’s Lives*, Indiana University Press, Bloomington, 1991.
- Harding, Sandra (ed.), *The “Racial” Economy of Science: Toward a Democratic Future*, Indiana University Press, Bloomington, 1993.
- Harding, Sandra, *Is Science Multicultural? Post-colonialisms, Feminisms and Epistemologies*, Indiana University Press, Bloomington, 1998.
- Harding, Sandra, *Women, Science and Society*, *Science* 281, pp. 1599-1600, 1998.
- Harding, Sandra (ed.), *The Standpoint Reader*, [forthcoming].
- Harding, Sandra & McGregor, Elizabeth, “The Gender Dimension of Science and Technology” in Moore, Howard J. (ed.), *UNESCO World Science Report*, UNESCO, Paris, 1996.
- Hartssock, Nancy, “The Feminist Standpoint: Developing the Ground for a Specifically Feminist Historical Materialism”, in Harding, Sandra & Hintikka, Merrill (eds.), *Discovering Reality: Feminist Perspectives on Epistemology, Metaphysics, Methodology and Philosophy of Science*, Reidel/Kluwer, Dordrecht, 1983.
- Heymann, S. Jody, *Patients in Research: Not Just Subjects, but Partners*, *Science* 269, pp. 797-798, 1995.
- Hubbard, Ruth, “Have Only Men Evolved?” in Hubbard, R., Henifin, M. & Fried, B. (eds.), *Biological Woman: The Convenient Myth*, Schenkman, Cambridge, Mass., 1979.
- Keller, Evelyn Fox, *Reflections on Gender and Science*, Yale University Press, New Haven, 1984.
- Massachusetts Institute of Technology, *A Study on the Status of Women Faculty in Science at MIT*, Available online at <http://web.mit.edu/fnl/women/women.html>, 1999.
- Mayberry, Maralee, Subramaniam, Banu & Weasel, Lisa (eds.), *A New Generation of Feminist Science Studies*, Routledge, New York, 2001.
- Meinert, Curtis, *The Inclusion of Women in Clinical Trials*, *Science* 269, pp. 795-96, 1995.
- Millman, Marcia & Moss Kanter, Rosabeth (eds.), *Another Voice: Feminist Perspectives on Social Life and Social Science*, Anchor Books, New York, 1975.
- Rooney, Phyllis, *Recent Work in Feminist Discussions of Reason*, *American Philosophical Quarterly* 31:1, pp. 1-21, 1994.
- Rose, Hilary, *Love, Power and Knowledge*, Indiana University Press, Bloomington, 1984.
- Rossiter, Margaret, *Women Scientists in America: Struggles and Strategies to 1940*, *Women Scientists in America: Before Affirmative Action*, Johns Hopkins University Press, Baltimore, 1982.
- Rouse, Joseph, “Feminism and the Social Construction of Scientific Knowledge” in Hankinson Nelson, Lynn & Nelson, Jack (eds.), *Feminism, Science, and the Philosophy of Science*, Kluwer, Dordrecht, 1996.
- Schiebinger, Londa, *The Mind Has No Sex? Women in the Origins of Modern Science*, Harvard, Cambridge, 1989.
- Schiebinger, Londa, *Nature’s Body: Gender in the Making of Modern Science*, Beacon, Boston, 1993.
- Schiebinger, Londa, *Has Feminism Changed Science?*, Harvard University Press, Cambridge, MA.
- Sherman, Ann, Temple, Robert & Merkatz, Ruth B., *Women in Clinical Trials: An FDA Perspective*, *Science* 269, pp. 793-94, 1999.
- Shiva, Vandana, *Staying Alive: Women, Ecology and Development*, Zed, London, 1989.
- Smith, Dorothy E., *The Everyday World as Problematic: A Sociology for Women*, Northeastern University Press, Boston, 1987.
- Smith, Dorothy E., *The Conceptual Practices of Power: A Feminist Sociology of Knowledge*, Northeastern University Press, Boston, 1990a.
- Smith, Dorothy E., *Texts, Facts and Femininity: Exploring the Relations of Ruling*, Routledge, New York, 1990b.
- Wajcman, Judy, *Feminism Confronts Technology*, Pennsylvania State University, University Park, 1991.
- Wyer, Mary et al., *Women, Science and Technology: A Feminist Reader*, Routledge, New York, 2000.



ANNEX
BIOGRAPHIC DETAILS

MARIA AGUIRRE [maguirre@socintec.es]

Maria Aguirre holds a Ph.D. in Science from the University of Reading (England) and a Masters in Business Administration (MBA) from the University of Deusto (Bilbao, Spain). She began her professional career as a Research Scientist at the former AFRC Institute of Food Research, in England, from where she joined a French biotechnology company participating in the European BIOTECH programme, and then moved to a Hispano-Portuguese pharmaceutical company. Throughout her career, she has managed the technical/scientific aspects, logistics and human resources involved in R&D projects, and she is co-author of 12 scientific papers published in international peer-reviewed journals. In the field of gender and equal opportunities, she has been involved in the implementation of initiatives at company level and awareness campaigns. At present, she is a Senior Consultant at SOCINTEC, working in the Innovation Management and Product Development Area, specialising in the health, pharmaceutical, agri-food and biotechnological fields. Her work also includes collaboration with public administrations in activities related to the definition of strategic or promotion programmes.

MURIEL ANDRIOCCI [muriel.andriocci@wanadoo.fr]

After several years spent working as a free-lance journalist in Paris, Muriel Andriocci obtained her BA, Masters and DEA degrees in sociology as a mature student at Toulouse-Le Mirail University. She is currently preparing her doctoral thesis on the relationship between academic women's studies and feminist conscience-raising in France. She is the French researcher of the Fifth Framework research project entitled "Employment and Women's Studies: The Impact of Women's Studies Training on Women's Employment in Europe" (EWSI) (conducted by Nicky Le Feuvre for France). She is an associate member of the Equipe Simone-SAGESSE feminist research centre.

GISELA ARGENTI [gargenti@segecyt.org.uy]

Gisela Argenti is a Sociology Professor of the Economics Faculty at the Major University of the Republic of Uruguay, Director of the Gender, Science and Technology Secretariat for Latin America (SEGECYT), sponsored by the United Nations Commission on Science and Technology for Development (UNCSTD), Member of the Advisory Board of the Inter-American Network of Science and Technology Indicators (RICYT) and consultant of UNESCO, the World Bank, IADB, OAS, IDRC (Canada) and ORSTOM (IRD). She is co-ordinating the Regional Project on "Gender, Innovation and SMEs in MERCOSUR countries" and was a speaker at the regional forum "Women, Science and Technology" (Bariloche, Argentina, 1998). Between 1992 and 1996, she was Director of the Human Resources Department of the National Council of Scientific and Technical Research (CONICYT) of the Ministry of Education and Culture of Uruguay. In 1996, she was the Executive Director of the Centre for Information and Studies of Uruguay (CIESU) and principal researcher of more than 10 projects on science and technology, technology assessment, technical change and women's employment. In the last ten years, she has written more than 20 publications.

THOMAS ARNOLD [Thomas.Arnold@cec.eu.int]

Thomas Arnold was born in 1957 in Düsseldorf. He has studied Political and Social Sciences in Cologne, Paris and Bonn. After the completion of internships at UNESCO and the Council of Europe, he started his professional career at the University of Kassel where he was in charge of international relations. He then moved to the European Cultural Foundation before joining the Directorate-General for Research at the European Commission. There he was initially responsible for administration and financial management of international scientific co-operation activities. He currently holds the post of Head of Unit for International Scientific Co-operation projects. The main missions of the unit are the implementation of specific activities for international scientific co-operation and co-ordination of international co-operation activities across the Framework Programme.

HARRIET AURELL [harriet.aurell@telia.com] [harriet.aurell@lanab.amv.se]

Harriet Aurell studied Psychology at the University of Stockholm; Vocational education in Instrument mechanisms and technology at The Polhem school in Stockholm; and Literature, Philosophy and History of Art at the University of Lund. She has been a member of The Labour Market Board of Sweden since 1983, where she helps develop new technological education and co-ordinates national projects for developing new gender-based teaching methods in IT/technology. She lectures at Universities, high schools and schools of Gender, Technology and Information Technology, and is a further training consultant for vocational guides, teachers and purchasers of technical education. She co-ordinates gender-based technical guidance programmes and has developed methods for gender-based vocational guidance and training. She presented a lecture on Gender and Technology at a Workshop in Brussels in January 1999 – "Success Factors for Retraining Women in Restrictive Jobs". She was project leader of a transnational EU-project, in EMPLOYMENT, NOW, EQUALITY. Her main areas of expertise include pedagogy to make technology and IT inspiring for women, and gender-based technology for female inventors.

SELMA BELLAL [sebellal@ulb.ac.be]

Selma Bellal is a political scientist and a Ph.D. researcher in the framework of a fundamental collective research project (FRFC) of the FNRS, "Institut de Sociologie" at the Université Libre de Bruxelles (ULB) in Belgium. She graduated in political sciences at the ULB in 1999; after one year spent in Manchester Victoria University (UK) in order to follow courses in gender studies and where she carried out her final thesis on *Economical dependence of women and compatibility between professional and family life*. She obtained a Masters degree in political sciences (DEA) from the ULB in 2001, with a thesis on *The transformation of*

relations between public and private spheres, with regard to the shift from a notion of equality to a notion of equal opportunity between women and men. Since January 2000, she has been a full-time Ph.D. researcher at the "Institut de Sociologie" of ULB inside the GRAID (Research group on international actors and their discourses). The preparation of her Ph.D. is carried out in co-direction between the ULB and the Institut d'Études Européennes de Paris 8, and deals with *The analysis of European Union policies in the field of equality, highlighted by the implementation of equal opportunities policies between women and men in Belgium and in the UK.*

AGNETA BLADH [agneta.bladh@education.ministry.se]

Agneta Bladh has been State Secretary in the Swedish Ministry of Education and Science since 1998. She is a Doctor of Philosophy in Political Science. She has been working with questions regarding higher education and research, both in governmental agencies and politically. During 1971-1987, she worked at Stockholm University in the Department of Political Science and the University Administration. She then worked at the Swedish Agency for Administrative Development (1987-1989). Between 1989 and 1990, she was Research Adviser in the Prime Minister's Office, and then became Head of the Secretariat for the faculties of Social Science and Law at Stockholm University (1990-1992). She was Head of Department for Analysis and Statistics (1992-1995) and then became the Director-General at the National Agency for Higher Education (1995)

MINEKE BOSCH [m.bosch@genderdiversiteit.unimaas.nl]

Mineke Bosch is Associate Professor at the Centre for Gender and Diversity at Maastricht University. Originally, she was trained as a historian and she specialised in questions relating to women, gender and science. Her dissertation concerned the history of women and science in The Netherlands, but she also published extensively on other historical subjects, as well as contemporary issues relating to gender and science. In 1999, she wrote and edited a background study on gender and diversity in science for the National Advisory Council for Science and Technology Policy, which served as the basis for advice to the Dutch government. As part of the ETAN Women and Science Expert Group she contributed to the ETAN Report *Science policies in the European Union – Promoting excellence through mainstreaming gender equality*. Recently, she conducted an evaluation of the Aspasia Programme, a national positive action plan co-ordinated by The Netherlands' Organisation for Research for assistant professors to "get on".

SARAH BRACKE [sarah.bracke@let.uu.nl]

Sarah Bracke (Gent, 1971) holds a Bachelor's degree in Philosophy (Leuven), a Masters degree in Sociology of Religion and Culture (Leuven), and postgraduate training in Development Studies (Louvain-la-Neuve), Cultural Studies (Birmingham), and Women's Studies (Antwerpen). She is currently working on her doctoral thesis *Women fighting Secularisation in an age of Globalisation* in Women's Studies at the University of Utrecht, on the subject of women's engagement in so-called fundamentalist movements within contemporary Europe. She has published in *Lover. Tijdschrift voor feminisme, cultuur en wetenschap*, *Tijdschrift voor Genderstudies* and the *European Journal for Women's Studies*. She is a member of the Belgian Women's Studies network Sophia and is active in a number of feminist/political groups.

ROSI BRAIDOTTI [rosi.braidotti@let.uu.nl]

Rosi Braidotti is Professor of Women's Studies at the Arts Faculty of Utrecht University and scientific director of The Netherlands Research School of Women's Studies. She co-ordinates ATHENA, the European Thematic Network of Women's Studies for the European Commission's SOCRATES programme, as well as the NOISE inter-European University exchange programme. In the academic year 1994/1995, she was a fellow in the School of Social Science at the Institute for Advanced Study in Princeton. In 2001, she was awarded a Jean Monet fellowship from the Robert Schuman Centre of the European University Institute, Florence. Her publications include: *Metamorphoses – Toward a Materialistic Theory of Becoming*, Polity Press, Cambridge, 2002; *Nomadic Subjects: Embodiment and Sexual Difference*, Columbia University Press, New York, 1994; *Women, the Environment and Sustainable Development: Towards a Theoretical Synthesis* (together with Sabine Hausler, Ewa Pluta and Saskia Wieringa); and *Patterns of Dissonance: A Study of Women in Contemporary Philosophy*, Polity Press/Routledge, 1991. Her work has been translated into several languages.

MARY BRAITHWAITE [MaryBraithwaite@compuserve.com]

Mary Braithwaite is an independent researcher and consultant specialising in local and regional development and gender mainstreaming at European and international levels. For a number of years, she has worked as an external expert with the European Commission on the integration of gender into policies and programmes, including the European Structural Funds. She has been involved in the development of policy regulations, in the assessment of programmes from a gender perspective and has produced technical guides and run training seminars. During 2000-2001, she co-ordinated the gender impact assessment study on the Human Potential specific programme for the Research DG of the European Commission. She manages her own small company, Tacitus, and is a founding member of Engender, a European non-profit association.

ANNE-MARIE BRUYAS [bruyas@cittadellascienza.it]

Anne-Marie Bruyas is currently in charge of International Programmes and Partnership at City of Science in Naples, Italy. Born in France, she graduated in Environmental Sciences and then specialised in Science Communication at the University of Paris VII. She developed and co-ordinated several European projects in the field of science communication, education and culture. She has conducted actions, at both national and European level, to integrate the gender dimension in the public understanding of science. In 1995, she co-ordinated the exhibition "The other half of science" for the European Week of Scientific and Technological Culture, and in 2000, she developed the WEEST web site in the context of the CONNECT Initiative.

FRANCESCA CANTÙ [cantu@uniroma3.it]

Francesca Cantù is full Professor of Modern History at the "Roma Tre" University. She is co-ordinator of the "Women and Science" working group for the Ministry of University and Scientific Research. She was Counsellor of the Minister for Equal Opportunities (1999-2001), and she is now co-ordinator of the Conference of the Rectors' Delegates for Gender Studies and Equal Opportunities and a member of the National Steering Committee to support the EU Helsinki Group on Women and Science.

HILDA RØMER CHRISTENSEN [Hilda.Roemer.Christensen@sociology.ku.dk]

Hilda Rømer Christensen is Associate Research Professor and National Research Co-ordinator of Gender Studies in Denmark. She has been a member of the executive of NIKK, the Nordic Institute of Women's and Gender Research and member of Danish and Nordic research committees on equality and gender research. She is editor-in-chief of the scientific Danish journal *Kvinder, Køn og Forskning* (Women, Gender and Research). Hilda Rømer Christensen holds a Ph.D. degree from the University of Aarhus (Denmark) and has been a visiting fellow at Columbia University, University of London and at J.W. Goethe University in Frankfurt. She has research specialisation in social, cultural and gender history as well as theory and methodology in gender analysis. She has published extensively in Danish and English on topics such as women's movements, gender, religion, modernity, gender and the making of the welfare state, etc. She is co-supervisor of Women's Movements and Internationalisation the Nordic Research network: funded by the Nordic Academy of Advanced Study (1998-2002).

JOY S. CLANCY [J.S.Clancy@tdg.utwente.nl]

Dr Joy Clancy is a senior lecturer in technology transfer with the Technology and Development Group and was the team leader for the gender impact assessment study on the Energy sub-programme. Her first degree is in Chemistry from the University of London and her Ph.D. is in Engineering from the University of Reading. She began her professional career as a research chemist using radioactive isotopes to trace the course of chemical reactions, and then moved into research on biomass energy systems and their transfer to, and dissemination within, developing countries. Since moving to her present post at the University of Twente in 1989, Dr Clancy's research has focused on small-scale energy systems for developing countries, including the technology transfer process and the role that energy plays as an input for small businesses. Gender and energy has been an important factor addressed in this research. Dr Clancy is a founder member and a director of ENERGIA, the International Network on Gender and Sustainable Energy. She has developed training courses on gender and energy, which focus on gender analytical tools for use in the energy sector, both at policy and project level.

ANNETTE B. CUTLER [cutlerab@t-i.co.uk]

Annette Cutler, FGS, B.Sc., is a Chartered Geologist with 29 years' extensive experience in the petroleum industry and heads a European consultancy, managing innovation in the energy, global environmental and allied sectors. Its core services include research and new technology project development and management as well as emerging and new technology evaluations, including state-of-the-art reviews. It specialises in new technologies for the emerging hydrogen economy, including carbon sequestration, gas hydrates and gas to liquids. The company manages the worldwide gas hydrates network and is leading the development and establishment of Europe's CO2 Thematic Network. Annette Cutler is the SME representative on the petroleum industry's technology advisory committee.

HANNA DAVID [hannadav@post.tau.ac.il]

Hanna David studied Physics, Mathematics and Hebrew Literature at the Hebrew University in Jerusalem; Jewish Literature at the Jewish Theological Seminary in New York (MA) and is a Ph.D. Student in Psychology at the Ludwig Maximilians University in Munich. She is a Research Worker and Editor at the Katz Research Institute for Hebrew Literature of Tel Aviv University and, since 2000, has been an adviser to The Excellence Project, Ort – Colleges and Schools for Advanced Technology and Science. She has been a Lecturer of Giftedness at the Talpiyot college and a Lecturer of Giftedness and Literature at Washington Hill College. Hanna's two last publications in the area of gender and science are the book *There is another way: Girls and Women – Achievements and challenges* (co-authored with R. Zorman), and a series of two articles in *Aleh – The Journal for mathematics Teachers*, "Gender gaps in Mathematics in Israel: An international comparison" and "Mathematics gender gaps in the matriculation exams and in the psychometrics in Israel". Hanna has given many conference papers and lectures; the latest two are: "Mathematical giftedness: The mathematics acceleration program at the Tel Aviv University", 8. Internationale Konferenz über Schulmathematik, Vienna, December 17-19, 2001 and "Geometry in the Israeli kindergarten", Klagenfurt, February 26-March 1, 2002.

FRANÇOIS-XAVIER DE DONNEA [info.dedonnea@dedonnea.irisnet.be]

Mr de Donnea is Minister-President of the Brussels-Capital Region and Minister of State. His university, post-graduate and doctoral studies focused on Economic Sciences. He has held various positions in the Belgian public service (Parliament, Government and City of Brussels) and has been administrator in the private sector on several occasions as well. He has been politically engaged in the Liberal Reform Party (PRL) and was a Member of the European Parliament between July 1989 and December 1991.

NICOLE DEWANDRE [Nicole.Dewandre@cec.eu.int]

After graduating as a Physics engineer at the University of Louvain (Belgium) in 1981, Nicole Dewandre completed a Masters in Operations Research at the University of California, Berkeley in 1982 and later, in 1999, a License of Philosophy at the Free University of Brussels. She entered the Directorate-General for Research of the European Commission in 1983 as scientific officer, dealing mainly with strategic issues for technology policy. From 1986 to 1992, she was a member of the Central Advisory Group and then the Forward Study Unit of the Commission. From 1994 to 1997, Nicole Dewandre was scientific officer in social sciences research. In 1997, she began developing "women and science" at European Union level, and in 2001, she was appointed Head of the newly created "Women and Science" Unit in the Directorate-General for Research.

KNUT FÆGRI [knut.fagri@kjemi.uio.no]

Knut Fægri is Professor at the University of Oslo and a member of the Norwegian Academy of Sciences. He was pro-Rector of the University of Oslo during 1996-1998. He is chairing the European Commission expert group "Benchmarking Human Resources" and is a member of the COST Chemistry Technical Committee and the management committee for COST D9 action. He was a member of the Steering group for the European Science Foundation REHE programme from 1992 to 1998. He has been a member of many international evaluation panels including: evaluation panels for Chemistry within the Marie Curie programme; evaluation of CSCS (Swiss Center for Scientific Computing); evaluation of Dutch HPCN foundation (NCF) and Chair of the management committee for COST D26 action. He is author or co-author of a number of papers on quantum chemistry in international scientific journals.

HILARY FARNWORTH [hfarnworth@aol.com]

Hilary Farnworth is a senior freelance consultant with PlanIT Consultants, and is currently also the project manager of NEWTIME, an EC-funded project based at the Open University, Milton Keynes, UK. In 2001 she worked on the WomenCraft project for AWISE (Association of Women in Science and Engineering). WomenCraft was a project funded by the Fifth Framework Programme to support SMEs run by women to apply for Community funding. She also gives individual computer training to private clients. She studied languages (Keele University) and library studies (Loughborough University), qualifying as a Chartered Librarian in 1974. She also completed a Masters in Information Studies in 1977 (Loughborough University). Her early career was as a librarian. Later, she worked for British Telecom, her last post being Education Programmes Manager. She then worked for the University of North London on WEEN (Women's Enterprises Electronic Networks), an Internet training project funded by the Enterprise DG.

GENEVIÈVE FRAISSE [gfraisse@europarl.eu.int]

Geneviève Fraisse is a philosopher and Director for Research at the National Centre for Scientific Research (CNRS) in France and also a visiting Professor at Rutgers University, United States. She has been a Member of the European Parliament since June 1999 and was an inter-ministerial delegate for women's rights from November 1997 to November 1998. Her work deals with the history of the representations of gender differences and the political question of gender equality. She is the author of numerous publications, notably, *Les deux gouvernements: la famille et la cité* (Folio Gallimard), *La controverse des sexes* (PUF), *Muse de la raison, démocratie et exclusion des femmes en France* (Folio Gallimard), *La différence des sexes* (PUF), *Les femmes et leur histoire* (Folio Gallimard). She is also co-editing the Fourth Volume (19th century) of *Histoire des femmes en Occident*, directed by Georges Duby and Michelle Perrot (Plon).

ELISABETH GULBRANDSEN [egu@forskningsradet.no]

Elisabeth Gulbrandsen is special adviser in the Research Policy Department at the Research Council of Norway. During 1998-2001 she also headed the Section for Feminist Research Policy. She has a licentiate (1995) from Luleå University of Technology in Sweden, where she later worked as a research engineer in the Division of Gender and Technology. The title of her thesis was *The Reality of Our Fictions – Notes towards accountability in techno-science*. In the late 1980s, she was research assistant at the Centre for Feminist Research at the University of Oslo. In the early 1990s, she had different engagements at the Centre for Technology and Culture at the same university.

SANDRA HARDING [sharding@gseis.ucla.edu]

Sandra Harding is Professor of Philosophy in the Graduate School of Education and Information Studies at the University of California, Los Angeles. She is the author or editor of ten books on issues in epistemology, methodology, philosophy of science, feminist theory, and multicultural and post-colonial science studies. She has consulted to a number of United Nations agencies,

including UNESCO, PAHO, UNIFEM and the United Nations Commission on Science and Technology for Development. She is co-editor of the international, interdisciplinary journal "Signs: Journal of Women in Culture and Society".

BARBARA HARTUNG [Barbara.Hartung@mwk.niedersachsen.de]

Barbara Hartung studied Law. Since 1982, she has worked as an administrative lawyer in different functions in the administration of Lower Saxony, Germany. Since 1994, she has been a head of unit for "gender equality" in the Ministry for Science and Culture of Lower Saxony. She is co-chairwoman of the working group "women in science" of the Bund-Länder-Commission for Educational Planning and Research Promotion, which has prepared several national reports on women and science. She has been appointed as one of the two German delegates of the Helsinki Group on Women and Science.

ADRIAN HEALY [adrian_healy@ecotec.co.uk]

Adrian Healy is a Director of ECOTEC Research and Consulting Ltd. He is an economist and was previously employed as a Research Officer at the University of Strathclyde. He has wide-ranging experience in issues relating to policy analysis and evaluation including the appraisal, monitoring and evaluation of projects and programmes. Adrian's expertise covers socio-economic implications of the Information Society, the Structural Funds and urban and rural development initiatives.

ERNA HENNICOT-SCHOEPGES [recherche@mcesr.lu]

Mrs Hennicot-Schoepges is the Minister for Culture, Higher Education and Research as well as Minister for Public Works in Luxembourg (since 1999). Previous to that, she was Minister for National Education and Vocational Training, Minister for Culture and Minister for Religions in the Government of Prime Minister Jean-Claude Juncker. She entered Parliament in 1979 when elected as a Deputy on the Christian Democrat Party lists (Centre constituency) and was the President of the Education and Culture Commission from 1979 to 1984. Mrs Hennicot-Schoepges was President of the Chamber of Deputies from 1989 continuously until her appointment as Minister in 1995. Mrs Hennicot-Schoepges has been President of the Christian Democrat Party since 4th February 1995. She has also been a member of the Council of Europe during its 1984-1989 session. On 19th November 2001, Mrs Hennicot-Schoepges was awarded the "doctor honoris causa" by the Sacred Heart University in Luxembourg.

INGE HENNINGSEN [inge@math.ku.dk]

Inge Henningsen is Associate Professor in Statistics at the University of Copenhagen in Denmark, having graduated in Statistics in 1996. She has been a member of both the University Senate and the Faculty Senate. She has carried out work on epidemics in AIDS and in birth complications. She is presently active in the project "Gender Barriers in Research and Higher Education" sponsored by the Danish Research Councils. She has published articles on Gender and Choice of Education, Gender and Research Subject and Gender in Academic Medicine.

DIANA HUMMEL [hummel@isoe.de]

Dr Diana Hummel holds a Ph.D. in Political Science. She presented her dissertation on *Population Discourse – Demographic knowledge and political power* in 1999. Since 1999, she has held a Post-Doc position at the Johann Wolfgang Goethe University in Frankfurt as the Chair for Science Research and Higher Education in the Faculty of Educational Sciences. Her research topics include international relations, demography, environmental and development processes and gender issues. Since January 2001, she has been working on a new research project entitled "Interlinkages between demographic developments, needs and supply systems".

LIISA HUSU [liisa.husu@helsinki.fi]

Dr Liisa Husu is a sociologist and expert on gender equality. Her special interests include gender inequalities and the promotion of gender equality in academia, higher education and science policies. She was the National Co-ordinator of Women's Studies and Senior Adviser in the Finnish Council for Equality between Women and Men, 1981-1996. Since 1997, she has been a researcher in the Department of Social Psychology at the University of Helsinki. Recent publications include *Hard Work in the Academy* (co-edited, 1999), a special issue on gender and academia for the journal *Higher Education in Europe* (co-edited, UNESCO/CEPES, 2000), and *Sexism, Support and Survival in Academia* (2001). She moderates the electronic discussion list EQ-UNI, the European Network for Gender Equality in Higher Education, and is the Vice Chair of the Equality Committee at the University of Helsinki.

DAVID KING [mpst.king@dti.gsi.gov.uk]

Professor King, Sc.D., FRS., FRSC., FinstP., was appointed as the Government's Chief Scientific Adviser and Head of the Office of Science and Technology in October 2000. Born in South Africa in 1939, and after an early career at the University of Witwatersrand, Imperial College and the University of East Anglia, he became the Brunner Professor of Physical Chemistry at the University of Liverpool in 1974. In 1998, he was appointed 1920 Professor of Physical Chemistry at the University of Cambridge and subsequently became Master of Downing College (1995-2000) and Head of the University Chemistry Department (1993-2000). He retains his position at Cambridge as 1920 Professor of Chemistry. The Chief Scientific Adviser (CSA) advises the Prime Minister, Cabinet, the Secretary of State for Trade and Industry, and the Minister for Science on science,

engineering and technology (SET) matters. The CSA is supported by the Transdepartmental Science and Technology Group (TDSTG) within the Office of Science and Technology.

INEKE KLINGE [i.klinge@zw.unimaas.nl]

Ineke Klinge is a biologist specialising in immunology. Her second specialisation is in Gender Studies in Science. She is an Assistant Professor in Gender Studies in Health Sciences at Maastricht University. After graduation, she received a KWF fellowship to conduct research at the Dutch Cancer Institute. As a lecturer at the University of Utrecht (1988-1997), she developed and co-ordinated an interdisciplinary research programme *Health and Gender: the medicalisation of the female body with a focus on ageing*. She has taught (inter)national courses on gender and science, and organised a number of national and international workshops on the climacteric, sex/gender in science and predictive medicine. In 1992, she conducted research for the European Commission *Women's views of the Human Genome Project* and participated in the first EC workshop *Women in Science and Technology Research* in 1993. Her Ph.D. thesis *Gender and Bones: the Production of Osteoporosis, 1941-1996* was published in 1998.

RAOUL KNEUCKER [raoul.kneucker@bmbwk.gv.at]

Dr Raoul Kneucker is Director-General of the Federal Ministry for Education, Science and Culture in Austria as well as Head of the "Scientific Research and International Affairs" Division and Co-ordinator of the Austrian research and technological development policies at the European level. He graduated in Law, Political Science and Public Administration. Thereafter, he held several positions in both the legal area (law clerk and lecturer) and the scientific area (Secretary General of the Austrian National Science Foundation and Senior Official in the Federal Ministry for Science and Research). Currently, he also teaches assignments in Austrian constitutional and administrative law and in various areas of public law, he carries out consulting activities for research organisations and is a reviewer of Science and Technology policies for the OECD.

SYBILLE KRUMMACHER [s.krummacher@fz-juelich.de]

Dr Sybille Krummacher is a scientific staff member at the Jülich Research Centre (FZJ), Germany and also a guest scientist at the Centre of Excellence for Women and Science (CEWS) in Bonn, Germany. After more than 20 years of basic research in international and interdisciplinary surroundings, she is now active in the promotion of women in science, with a special focus on women in publicly funded research centres. She has established working groups on equal opportunities at the national (HGF) and international level (EARMA). At the Jülich Research Centre (FZJ) she has established an equal opportunities bureau and developed its initial action programme. This included the development of concept and procedure as well as the supervision of the implementation of special programmes, for example a special "tenure-track-programme" offered exclusively to female scientists.

NICKY LE FEUVRE [lefeuvre@univ-tlse2.fr]

Nicky Le Feuvre was born in Croydon (UK). She has a first class B.Sc. honours degree in sociology, political science and French from Aston University, Birmingham (1985), a Diploma of advanced studies (DEA) in labour economics and sociology from LEST-CNRS in Aix-en-Provence (1987) and a Ph.D. on leisure practices and representations amongst mothers in France (1990). Currently, she is senior lecturer in sociology and feminist studies at the University of Toulouse-Le Mirail and director of the Simone-SAGESSE centre for doctoral research on knowledge, gender and gender relations. Her research centres on the feminisation of professional occupations in Europe, gender theory and gender relations, and the institutionalisation of feminist studies in France. She is responsible (with Daniel Welzer-Lang) for the "Féminin & Masculin" series published by Presses Universitaires du Mirail (PUM). In particular, she directed the publication of *Les femmes et l'université dans les pays de la Méditerranée* (PUM, 1999) and co-ordinated a special issue of the magazine UTINAM on gender and categorisation of the sexes (2001).

TANYA LEIGH [Tanya.Leigh@cec.eu.int]

Tanya Leigh graduated from the University of Sussex in 1987, with a B.Sc. (Hons) in Experimental Psychology. Since then, she has been working in Brussels as a project manager, specialising in equality issues, on various European programmes, including the Youth for Europe Programme, the European Year Against Racism and the Fourth Medium-Term Action Programme to Promote Equality between Women and Men. She joined the Women and Science Unit of the European Commission's Research DG in February 2001, where, among other things, she has been responsible for co-ordinating the gender impact assessment studies operation, and will now be in charge of setting up the European Platform of Women Scientists.

STELLA LEIGH-WILLIAMS [swilliam@oauife.edu.ng] [star1143_2000@yahoo.com] [aquabola@hotmail.com]

Stella Leigh-Williams is currently the President of the Third World Organisation on Women and Science (TWOWS), Ile-Ife, Nigeria Branch. Born in Nigeria, she obtained her Ph.D. at Auburn University, Department of Fisheries and Allied Aquaculture in 1983. Her B.Sc. degree in Zoology was from Fourah Bay College, Freetown, Sierra Leone (University of Durham Degree, UK) in 1968. Between 1968 and 1975, she taught Science at two all-girls secondary schools in Freetown, Sierra Leone and Lagos, Nigeria. She is an advocate for the promotion of the teaching of Science as well as the training of Science Teachers in Sierra Leone and Nigeria since the 1960s. She participated in the development of a curricula for the training of Primary School Teachers in Lagos State Ministry of Education for a month course entitled: "Science and Maths" in the 1970s as well as in the

writing of the "Blue Print for Women Education in Nigeria". She served on the Executive Board of the Nigerian Association for Women and Science, Technology, Engineering and Mathematics (NAWSTEM) in the 1980s. She also served as a member of the International Executive Board of Gender and Science and Technology (GASAT) in the 1990s, representing the African Region. As Vice Dean, Faculty of Agriculture, she continued to advocate for Gender Research that will improve science knowledge for Fisheries and Agricultural productivity and improve food security in Nigeria and in Africa as a whole.

NINA LYKKE [ninly@tema.liu.se]

Nina Lykke, Professor, Dr Phil., has been head of the Ph.D. programme on Gender and Culture in the Department of Gender Studies at Linköping University, Sweden, since 1999. During 1984-1999, she was Head of Department of Feminist Studies, University of Southern Denmark. For 1999-2002 she has also been Director of Research of the collaborative research project "Cyborgs and Cyberspace – Between Narration and Socio-technical Reality" at the Centre for Cultural Studies, University of Southern Denmark (funded by the FREJA-programme: Female Researchers in Joint Action). She has published books and articles, in several languages, on feminism and psychoanalysis, feminist theory and cultural studies of techno-science. She is associate editor of *The European Journal of Women's studies* and a member of the council of AOIFE (Association of Institutions of Feminist Education and Research in Europe).

BRIGITTE SYLVIA MABANDLA [adm01@dacst3.wcape.gov.za] [adm04@dacst5.pwv.gov.za]

Ms Mabandla has been Deputy Minister of Arts, Culture, Science and Technology in the South African Government since 1995. After a Law degree at the University of Zambia, she held various related positions both as teacher and as adviser. Her career has been mainly focused on human rights, particularly on those of children and women. She has worked closely with renowned organisations such as the ANC and the UN. She has also contributed several articles to local and international publications on human rights (1989-1993).

ANNE J. MACLACHLAN [maclach@uclink4.berkeley.edu]

Anne J. MacLachlan is a senior researcher at the Centre for Studies in Higher Education, University of California, Berkeley. Her work focuses on women and minorities in graduate school and professional life. She is currently directing a Spencer Foundation funded research project on the recruitment, retention and career outcomes of minority and female Ph.D. recipients in science and engineering. She holds a Ph.D. from U.C. Irvine in German economic history and has taught at UC Berkeley, UC Santa Barbara and the University of Maryland. For the past 14 years she has developed and presented extensive programmes for graduate students and post-docs to assist them in the transition to professional careers. In May 2001, she organised a conference at UC Berkeley titled *Careers of Women in Science: Issues of Power and Control*. Selected papers from this conference are to be published in 2002 in the *Bulletin of Science Technology and Society*, co-edited by Lorna Erwin, Barbara Lazarus and Sheila Tobias.

PEGGY MAGUIRE [peg@eurohealth.ie]

Peggy Maguire is a Director-General of the European Institute of Women & Family Health. She is a member of the steering group of the European Advisory Group on mid-life and older women's health. In 1997, she was appointed to the National Women's Health Council in Ireland, which acts as an expert advisory group to the Minister of Health. She initiated and oversaw the research and publication of *Women in Europe Towards Healthy Ageing: Dementia Care Challenges for an Ageing Europe*; *Promoting Gender Equity in Public Health in Europe*. She also participated in the UN Expert Committee on Women's Health in 1998, which produced the framework document *Women's Health, Mainstreaming the Gender Perspective into the Health Sector*. In 2001, she was asked by the WHO to take part in an expert advisory panel on Gender Mainstreaming. She is also a member of the Expert Advisory Group on Ageing for the European Commission's Research DG .

BARBARA MAPELLI [barbaramapelli@libero.it]

Barbara Mapelli is Professor of the Pedagogy of Gender Differences at the University of Milan II, Faculty of Educational Sciences. For a number of years, she has been engaged in socio-pedagogical research, concentrating in particular on gender issues, on which she has written many books as well as essays and articles that have appeared in specialised publications. She has worked with the Ministry for Education and the Ministry for Equal Opportunities on Italian and European projects concerned with guidance, education for citizenship, care education, sex education, school textbooks and women and science. She has published (in collaboration with Luisella Erlicher) a research-based work entitled *Immagini di cristallo. Desideri femminili e immaginario scientifico*, Milan, 1991. As for relations between women and new technologies, she has recently completed work on the co-ordination of research activities under the *Connecting Women and New Technology* project involving seven European Union countries (project leader: Italy, Associazione IRENE) and 18 different entities.

CHARLOTTE MARTIN [c.martin@kit.n]l

Charlotte Martin works as a gender adviser in KIT Gender. She is a qualified teacher in the UK with twenty years experience in education and training. Before joining KIT, she worked as the M.Sc. Course Tutor at the Gender Institute, London School of Economics, for five years and as an Associate Lecturer in Third World Studies and Social Science for the Open University for ten years. Her specialist interests lie in gender theory and research methodology. She is also interested in post-colonial

perspectives on development, and in particular, gender perspectives on development policy and practice. Her area of particular interest is Sub-Saharan and North Africa. More recently, she organised a workshop in ESRC series, "Masculinities in Development" on conflict and violence (Jan. 2000) and also wrote a course on "Post-colonial Perspectives on Development" in the LSE. Her current research work is about the health sector and Non-Governmental Organisations in the South of Sudan. Publications include: Bernstein, H., Crow, B., Macintosh, M. and Martin, C. (eds.) *The Food Question Earthscan* (1991) and Fleming, S., Martin, C. et al. *Gender and International Dimension: Background and State of the Art, Working Paper I*, (KIT, 2000).

LINDA MAXWELL [Linda.Maxwell@cec.eu.int]

Linda Maxwell (Sweden) graduated in 1995 as an 'Ingénieur commercial au grade scientifique' with mention 'grande distinction' from the Solvay Business School within the 'Université Libre de Bruxelles', Belgium. In 1994, she was selected to participate in the ERASMUS exchange programme and study for one semester at the 'Facultad de Ciencias Económicas y Empresariales' at the Complutense University in Madrid, Spain. She is an experienced Project Manager who has worked in marketing and communication and in health care. Linda joined the Interinstitutional Relations Unit at the Research DG in April 2000, dealing in particular with the European Parliament. She then joined the Women and Science Unit, in March 2001, in order to co-ordinate its horizontal activities. This has essentially consisted of preparing, organising and following-up the "Gender and Research" conference. She is also co-ordinating the Women and Science Unit's participation in the forthcoming conference "European Research 2002" to launch the Sixth Framework Programme for Research in November 2002.

ERYL MARGARETH MCNALLY [emcnally@europarl.eu.int]

Ms McNally has been a Labour member of the European Parliament since 1994, representing the East of England. She is a member (and former vice-president) of the Industry, External Trade, Research and Energy committee and spokesperson for the PES on the committee. She is very involved, as PES co-ordinator, in the negotiations for the 5th and 6th Framework Programmes. She is author of the Parliament's report on Women and Science and also a member of the Women's Rights and Equal Opportunities committee. She is responsible for the monitoring of several specific research programmes in the fields of health and energy, and is President of the European Forum for Renewable Energy Sources and a Director and Trustee of the National Energy Foundation, UK. She is also delegate to the WTO conference in Seattle. A former teacher, local authority adviser and school inspector in modern languages, Ms McNally was elected as Councillor at Parish, District and County levels, specialising in education, and is a former Deputy Leader of Hertfordshire County Council. In November 2000, she was awarded an honorary doctorate from the University of Hertfordshire, for services to politics and the community.

HAGIT MESSER-YARON [hagit@most.gov.il] [messer@eng.tau.ac.il]

Hagit Messer-Yaron is Professor of Electrical Engineering. Since February 1, 2000 she has served as the Chief Scientist and Head of the Directorate of Science at the Ministry for Science, Culture and Sports in Israel, on leave from Tel Aviv University. She received her Ph.D. in Electrical Engineering in 1985 and after a Post-Doc at Yale University, she joined Tel Aviv University. Her academic activities include research, teaching, and administration at different levels – national and international. Parallel to her academic activities, she has been a consultant to several Israeli high-tech companies. She is currently the Israeli delegate to the Helsinki Group on Women and Science.

GABRIELE MOHSLER [Gabriele.Mohsler@eed.ericsson.se]

Gabriele Mohsler is Intellectual Property Rights Manager and Head of the Patent Department in Ericsson in Germany. After her studies in electrical engineering at the RWTH in Aachen, Germany, she started as a patent engineer in a telecommunications company and graduated after four years as a European patent attorney. She then went on to build up a patent department at Ericsson in Germany and later to become Intellectual Property Rights Manager with responsibility for Germany and Head of the Patent Department. With her further degree as a German patent attorney, she took over responsibility for an international patent unit within Ericsson, operating worldwide.

SYLVIE MOREAU [sylvie.moreau@dr1.cnrs.fr]

Holding an Arts Degree and a DEUG (General University Studies Diploma) in Law, Sylvie Moreau studied at the National Treasury College. After becoming a member of the body of Treasury Inspectors in 1982, she took on responsibility for general affairs in the Public Service Accounting Directorate of the Finance Ministry. In 1986, she was seconded to the financial and accounting departments of the CNRS (National Centre for Scientific Research). In January 1995, she became Secretary General of the Department of Physical Sciences and Mathematics at the CNRS and, since February 1999, she has been a Regional Delegate of the CNRS. In 2001, she was appointed deputy chair of the Steering Committee "Disciplines, trades, careers and gender: the place of women in the CNRS". She directs the Task force on the place of women at the CNRS. She is a Chevalier of the Order of Academic Palms and a Chevalier of the National Order of Merit.

GRETA NOORDENBOS [Noordenbos@FSW.LeidenUniv.nl]

Dr Greta Noordenbos started her appointment at Leiden University in 1980 after her study in Groningen. In 1985, she became Assistant Professor at the Department of Women's Studies. She specialised in two topics: the position of women in science, and the development, treatment and prevention of eating disorders. She has written several (inter)national publications and books about these topics. Her most recent books were *The position of women in Academies of Science*, Walburg Press, Zutphen, 2001 and *The Prevention of Eating Disorders*, Athlone Press, London, New York, 1997. In 1990, she was appointed to the Department of Gender and Health of Maastricht University, where she specialised in the position of women in the medical profession.

LAURETTE ONKELINX [lauretteonkelinx@win.be]

Ms Onkelinx is the Federal Deputy Prime Minister, the Minister for Employment and the Minister for Equal Opportunities Policies in Belgium. She holds a Law degree from Université de Liège and has been a lawyer of the Bar of Liège since 1981. She was also a lecturer in Administrative Sciences from 1982 to 1985. Since then, she has been engaged politically within the Socialist Party and has held various ministerial positions in the French Community and now at a Federal level.

ROSSELLA PALOMBA [palomba@irp.rm.cnr.it]

Rossella Palomba is a social demographer. She is Director of research at the National Research Council and Head of the Department on Family and Society at the National Institute for Population Research in Rome. Her main fields of interest are related to the analysis of the changes in the family structure and behaviour, couple formation and dissolution, fertility and gender roles. She has chaired two European networks: one on Population Policies, under the auspices of UN-ECE; and one on Population Education, under the auspices of UNESCO. She was a member of the Italian National Committee on Economics, Statistics and Sociology and of the Italian National Committee on Environment. She is chairing the Commission for the Improvement of Women in Science at the National Research Council. She has written books and articles on the situation of women in the Italian research system. Her most recent publications are *Population, Family and Welfare*, Oxford University Press (2 volumes) and *Figlie di Minerva*, Franco Angeli-Milano. She also co-authored the ETAN Report *Science policies in the European Union – Promoting excellence through mainstreaming gender equality*.

TERESA PATRICIO [teresa.patricio@iccti.mct.pt]

Teresa Patricio is currently vice-president of the Instituto de Cooperação Científica e Tecnológica Internacional (ICCTI) at the Ministry for Science and Technology in Portugal. She studied in the United Kingdom, where she obtained a B.Sc. in Social Sciences and Administration at the University of London. She completed her studies at Rutgers University in the United States as a Fulbright scholar where she obtained a Masters and a Ph.D. in Sociology in 1989. She is Associate Professor of Sociology at Instituto Superior de Ciências do Trabalho e da Empresa (ISCTE) in Lisbon, where she has worked in the field of sociology of science and sociology of development. From 1993 to 1994, she was President of Centro de Investigação e Estudos de Sociologia, the research centre associated with ISCTE.

JOANNA PININSKA [joannap@geo.uw.edu.pl]

Joanna Pininska is Professor of Geology at Warsaw University where she heads the department of Geo-mechanics. The main scope of her scientific activity is: geology engineering and environment protection; devastated land reclamation and utilisation; geo-technical evaluation of underground waste deposition and rock properties. She was the Dean and Deputy Dean of the Faculty of Geology at Warsaw University from 1981 to 1996. She is a member of the State Scientific Committee; the Commission on Geological-Engineering Documentation (KDGI) and the Council of Geology, both at the Ministry of Environment, where she also was Vice-Chairwoman between 1990 and 1993. She is a member of the Board of Directors of various scientific and professional associations such as the Polish Soil Mechanics and Foundation Engineering Society; Polish Rock Mechanics Society; the Polish Geological Institute and the Research & Development Unit "Hydrobudowa", of which she is chairwoman. She is the author of over 150 publications, 6 monographs and over 50 experiments and projects. She is currently the Polish delegate to the Helsinki Group on Women and Science.

LUISA PRISTA [Luisa.Prista@cec.eu.int]

Luisa Prista has a background in engineering, and has also completed post-graduate studies in economics, energy and the environment. She began her career as a researcher on combustion and fluid mechanics, following which she became a lecturer at the University of Materials and Engineering. Later, she worked as project engineer across different industrial sectors. Before joining the Commission, she was Head of Office within the Swiss Government dealing with rational use of energy. Luisa Prista joined the Commission in 1994 as a research Project Officer within the Research DG and is now heading the Materials Unit in the Growth Programme.

JOSEPH PRUSA [prusa@msmt.cz]

Mr Prusa has been Deputy Minister of Science and Higher Education in the Ministry for Education, Youth and Sports of the Czech Republic since 1998. Previously, he worked as registrar at the University of West Bohemia (former Inst.) Plzeň and as Senior Lecturer at the Institute of Mechanical and Electrical Engineering in Plzeň. His Ph.D. is in Cybernetics. He is a Member of the Union of the Czech Mathematicians and Physicians and the Czech Society for Cybernetics and Informatics.

MARIA PUIG DE LA BELLACASA [maria.puig@ulb.ac.be]

María Puig is a Ph.D. student at the Université Libre de Bruxelles in the framework of a research programme (ARC) of the French Community of Belgium called *For a philosophy of the university (Pour une philosophie de l'université)*. Her Ph.D. in philosophy concentrates on feminist knowledge, especially feminist science studies and epistemologies. She participates in ATHENA (Socrates Advanced Thematic Network in Activities in Women's Studies in Europe). She has edited, together with Nina Lykke and Christine Michel, the report from the ATHENA panel of experts I.a: Women's Studies – *From institutional innovations to new job qualifications*. She is also co-editor of a collective volume called *L'université en questions. Marché des savoirs, nouvel agora, tour d'ivoire?* She collaborates with SOPHIA, the Belgian women's studies network and the Université des Femmes. She is also a member of the NextGENDERation network and Gaf'elles (Groupe d'Action Féministe), a feminist activist group against sexism.

TERESA REES [reestl@cardiff.ac.uk]

Teresa Rees is a Professor in the School of Social Sciences at Cardiff University, Wales, United Kingdom. She specialises in education, training and labour market policy analysis with a focus on gender mainstreaming. She is a long-term consultant to the European Commission and has been the Equal Opportunities Commissioner for Wales since 1996. She has presented papers on women and science in the US and China as well as in many European countries. Publications include *Mainstreaming Equality in the European Union* (Routledge, 1998). She was the "rapporteur" for the ETAN report on women and science: Osborn, M., Rees, T., et al. *Science Policies in the European Union – Promoting excellence through mainstreaming gender equality* (Office for Official Publications of the European Communities, Luxembourg, 2000). She is currently the "rapporteur" for an EC project on women and science in the private sector.

NICOLE RIVEILL-BOUNAGA [nicole.Riveill-Bounaga@cec.eu.int]

Doctor Es Sciences in Biology, after a career of 29 years as Researcher, Professor and Director of a research centre in Algeria, Nicole Riveill has been working as principal scientific officer for the European Commission's Research DG since 1994 and joined the Unit dealing with international co-operation in 1998. Her scientific expertise lies in the following areas: sustainable development of arid regions, drylands, oases; plant bio-diversity; tropical and Mediterranean forestry; plant and animal biology in arid lands; evolutionary botany; phytopathology, soil microbiology, cryptogamy. She has participated in the conceptualisation, setting up, implementation and follow-up of research programmes in Algeria and at European level; in the monitoring and evaluation of research and development programmes; in the creation of thematic networks in developing countries; and in promoting the training and mobility of researchers. Within the international co-operation programme (INCO), she is currently responsible for Mediterranean and developing countries, and for Forestry and Biodiversity matters. She was also responsible for overseeing the gender impact assessment of the INCO programme.

IRMGARD SCHULTZ [schultz@isoe.de]

Dr Irmgard Schultz is a senior scientist and co-founder of the Institute for Social-Ecological Research (ISOE) in Frankfurt/Main, where she is responsible for the research area "Ecology of everyday life and material flows". ISOE is an independent institute that focuses on interdisciplinary and transdisciplinary research. She developed, together with colleagues, research focusing on "Gender & Environment". She studied political science, Russian language and philosophy at the Johann Wolfgang Goethe University, Frankfurt/Main. She holds a Ph.D. in political science. Her dissertation is published under the title *The exciting myth of money – time, money and gender in the age of ecology*. In the seventies, she worked in the field of political education in a youth organisation. She carried out empirical pilot studies in the field of "Gender and Sustainability" (waste, sustainable consumption and lifestyles, sustainable building construction and home living). Her theoretical work is dedicated to questions of conceptualising gender perspectives in a globalised world and within interdisciplinary environmental research. In her latest publication, she co-edited an overview of feminist perspectives in the field of environmental sociology in Germany.

KETTY SCHWARTZ [kettyschwartz@recherche.gouv.fr]

Ms Schwartz, Director of Research, exceptional class, CNRS, has been Director of INSERM Unit 523 since 1999 and Director of Research in France since 2001. Her professional honours include Knight of the French Legion of Honour; Silver Medal of CNRS (1992); Peter Debye Prize on Molecular Biology of Cardiovascular Systems – Fundamental and Clinical Aspects, Maastricht, 1994; Citizen of Honour of the city of Winnipeg, Canada; Officer of the French National Order of Merit and the Cardiology Prize of the French Academy of Sciences, 2000. She is an active participant on 25 national or international Scientific Committees and a member of several Editorial Boards of international journals. She has had 300 publications in peer-review journals and been invited as speaker at more than 250 national and international meetings. Ms Schwartz' major research interests concern the understanding of the molecular mechanisms that regulate mammalian striated muscle function in health and disease. The team greatly contributed to the discovery of the re-expression of foetal proteins in the adult hypertrophied cardiac tissue and to the development of genetic cardiology. The team is presently involved in the first human trial of gene therapy in Duchenne de Boulogne muscular dystrophy and in the first human trial of intra-myocardial myoblast transplantation for heart failure.

KOSTADINKA IVANOVA SIMEONOVA [ksimeonova@sofianet.net]

Kostadinka Ivanova Simeonova is Director of the Centre of Science Studies and History of Science at the Bulgarian Academy of Science in Sofia. She graduated in Philosophy at Sofia University and she is a Ph.D. student on Logic at the Academy of Sciences. She specialised in Sociology and Philosophy of Science. Her main areas of research interest are science studies, science policy studies, management of human resources in science and methodology of research. She is a member of the editorial board of the *Strategies of Education and Science Journal* and chief editor of the *Theory and History of Science Review*, issued by the Association for Theory and History of Science, Bulgaria. She is a member of several national bodies including the Supreme Attestation Commission at the Government, General Assembly of the Academy of Science and international organisations such as the European Association for Science and Technology Studies and the International Academy of Informatisation. She was elected to the Board of the national Association of the *Women in Science Clubs*.

KAREN SLAVIN [Karen.Slavin@cec.eu.int]

Karen Slavin has a M.Sc. in Computer Science, from Brunel University, where she specialised in data compression. She joined the European Commission in 1983. She spent fifteen years working at the Joint European Torus (JET) project in Oxfordshire, in the UK; a project established by EURATOM, to advance research into controlled thermonuclear fusion. Her speciality at JET was writing control and analysis software for diagnostics. She joined the Women and Science Unit in the Research DG in 2000. Her main task within the unit is to collect gender statistics on female participation in the Framework Programmes.

RUTH SPRINGHAM [ruth.springham@eurogramme.lu]

Ruth Springham holds an MA. Honours Degree in French and German Language and Literature from Glasgow University, Scotland. She is currently project manager at Eurogramme, Luxembourg, responsible for the Women in Science project *Design and collection of statistical indicators on women in science*. This project is run in conjunction with the Research DG, with Eurostat providing technical assistance. She is also responsible for the Statistical Co-operation project with the Candidate Countries and Newly Independent States (NIS), on behalf of Eurostat. Previous work for Eurostat includes the publication of three volumes of the "Portrait of the Regions" series for Estonia, Latvia, Lithuania, Bulgaria and Slovenia. In 1997-1998, she was a consultant to the PRODCOM project, Eurostat, relating to the classification of industrial production in the EU.

MARIA STRATIGAKI [mstrati@kethi.gr] [mstrati@panteion.gr]

Maria Stratigaki is Director of the Research Centre on Gender Equality (KETHI) and a lecturer at Panteion University, Athens, on Gender and Social Policy. She studied economics, sociology and women's studies in Athens, Paris and New York. She holds a Ph.D. in sociology of work. She worked in the Equal Opportunities Unit (DG V) of the European Commission from 1991 to 1999. Her tasks included actions promoting women in the decision-making and the development of gender mainstreaming strategy. She worked in a women's research centre (Diotima) from 1988 to 1991 and in private business between 1974 and 1987. She has participated in research on women's work, gender and technology, gender in the labour market and the banking sector. Her focus is on European social policy; policies for gender equality (gender mainstreaming and positive actions); women's participation in decision-making; gender segregation in the labour market; and employment and unemployment.

BOTLHALE TEMA [busi@dacst5.pwv.gov.za]

Bothale Tema is Chief Director at the Department of Arts, Culture, Science and Technology (DACST) of the South African Government. As such, she is responsible for the following programmes: International relations, Public understanding of science, and Indigenous Knowledge systems. Previously she was Secretary-General for the South African National Commission for UNESCO. She has a Ph.D. in Science Education from the University of Reading, United Kingdom.

LENA TROJER [Lena.Trojer@bth.se]

Lena Trojer is Professor of Information and Gender Research at the division of Techno-science Studies, Blekinge Institute of Technology, Sweden, where she is the head of the department of Human Work Science and Media Technology and Vice-dean of the Technical Faculty. She was president of the Committee for Co-operation of Eight Swedish Research Councils between 1997 and 2000.

SILVANA VALLERGA [vallerga@ge.cnr.it]

Silvana Vallerga, physicist, is Director of Research at Consiglio Nazionale delle Ricerche (CNR) and Scientific Director of the International Marine Centre (IMC), Oristano. She is chairperson of the Intergovernmental Committee for the Global Ocean Observing System (I-GOOS), auxiliary body of the Intergovernmental Oceanographic Commission (IOC) of UNESCO. Silvana Vallerga chairs the MedGOOS, consortium of 16 national agencies established to implement ocean forecasting in the Mediterranean. She is General Officer and Treasurer of the EuroGOOS, consortium of 30 research and operational agencies of 17 European countries. She is a national delegate for the EC programme on Energy, Environment and Sustainable Development, and one of the two Italian delegates in the Helsinki Group on Women and Science. She played a leading role in the establishment of the IMC, international research association for the study of the Mediterranean ecosystem. During the last fifteen years, she has devoted her activity to developing and training activities in international co-operation. She presently co-ordinates the EC

project MAMA – Mediterranean network to Assess and upgrade the Monitoring and forecasting Activity in the basin. Her personal research is focused on the adaptation of fish vision to the changing marine environment. For her achievements in research she has received the Award of Helsinki University and the Minerva Award in Italy.

MIEKE VAN HAEGENDOREN [mieke.vanhaegendoren@luc.ac.be]

Mieke Van Haegendoren is full Professor at the Faculty of Applied Economic Sciences at Limburg University where she teaches Industrial Relations and Economic Sociology. She is director of the Social-Economic Institute of the University and co-ordinator of the equal opportunities policy within the University. Her fields of research are: labour market policy, especially women on the labour market; women in ICT and in leading positions and gender statistics.

KOEN VERLAECKT [koen.verlaeckt@wim.vlaanderen.be]

Koen Verlaeckt (Dendermonde, June 13, 1966) has been a senior researcher in the Science and Innovation administration of the Ministry of Flanders, Belgium, since 1997. He has a degree in history and a Ph.D. in archaeology from the University of Gent. He is responsible for co-ordinating international bilateral co-operation, with a special interest in mobility issues. He is also responsible for the monitoring of academic research in Flanders, with special interests in the issues of quality assessment, socio-economic policy-oriented research and research infrastructures. He is the Flemish delegate in the Human Potential Programme Committee of the Fifth Framework Programme and also acted as the Flemish delegate to the Helsinki Group on Women and Science (until January 2002).

UTE WANZEK [ute.wanzek@g-i-s-a.de]

Ute Wanzek has been Manageress of the G//S/A, Gender Institute Saxony-Anhalt, responsible for gender education, international contacts, and projects since March 2001. She has been the German co-ordinator for the General Secretary of the European Association for Women in Science, Engineering and Technology-WiTEC, for five years and is a member of the board of the association Political Education for Women in Saxony-Anhalt. She studied Civil Engineering at the Technical University Dresden (graduate 1977) and has spent four years as a civil engineer and eight years in the field of youth and sports in regional government. During her 12 years in further education, she has worked in several areas, including as a project leader (construction and management of a network of information centres for further education with an integrated information system, aimed at companies, training institutes and individuals in Saxony-Anhalt). Ute has five years' experience of European project work (for example, Leonardo, Employment, 4th and 5th Framework Programme, ESF, 4. Programme for equal opportunities) as the head of an UETP at the Otto-von Guericke University Magdeburg, ComEAST.

KERRY YOUNG [ky@bradleydunbar.com]

Kerry Young is a Director of Bradley Dunbar Associates, a consultancy specialising in European development issues. She graduated from the University of Durham with a first class B.Sc. honours degree in Natural Science in 1986. She is co-author of the European Commission Synthesis Report on the Gender Impact Assessment Studies of the Fifth Framework Programme. She has been a key member of the UK National Contact Point for the Energy sub-programme since 1999 and is carrying out an evaluation of UK performance to date. She works as a consultant on a number of Commission projects, particularly project management in Central Europe and evaluation of Commission programmes in the EU. She has wide-ranging experience relating to policy development, programme development and evaluation, and project management. She previously worked in the UK government and in the European Commission (External Relations DG, 1994-1998).

European Commission

Gender & Research, Conference Proceedings

Luxembourg: Office for Official Publications of the European Communities

ISBN : 92-894-3743

2002 — 17,6 x 25 cm



OFFICE FOR OFFICIAL PUBLICATIONS
OF THE EUROPEAN COMMUNITIES

L-2985 Luxembourg

ISBN 92-894-3743-X



9 789289 437431 >