

LKC
Q
130
.A8
2000

IC



*Industrial Science and Technological Working Group
Ad Hoc Group on Gender and Science and Technology*

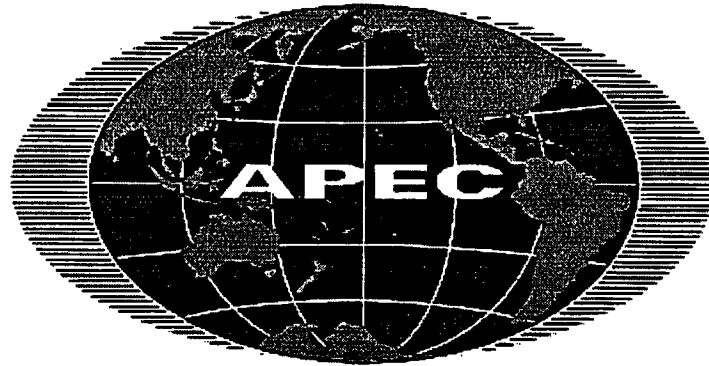
***Moving Gender
onto the
Science and Technology Agenda:
A Book of Good Practices***



Industry
Canada

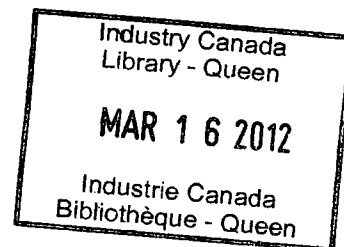
Industrie
Canada

Canada



**Industrial Science and Technological Working Group
Ad Hoc Group on Gender and Science and Technology**

***Moving Gender
onto the
Science and Technology Agenda:
A Book of Good Practices***



**Industry
Canada**

**Industrie
Canada**

Canada

**Moving Gender onto the Science and Technology Agenda:
A Book of Good Practices**

Asia-Pacific Economic Cooperation
Industrial Science and Technology Working Group
Ad Hoc Group on Gender and Science and Technology

© Her Majesty the Queen in Right of Canada (Industry Canada) 2000

This brochure can be reproduced for private use only. Readers or third parties are not allowed to reproduce this document for resale. Any copies made from this document must be accurate, properly credited, and clearly identified as copies of the original document.

The views expressed in this publication are not necessarily those of Industry Canada or the Government of Canada.

This publication is available in alternative formats on request.
Aussi disponible en français.

This publication is also available on the following web site:
<http://strategis.ic.gc.ca/SSG/ag00001e.html>

ISBN: C2-485/2000E
0-662-28731-2
53021E

Copies of this brochure can be ordered at:
Innovation Policy Branch
Industry Canada
235 Queen Street, 8th floor, West Tower
Ottawa, Ontario
K1A 0H5
fax: 613-996-7887
email: tremblay.marielyne@ic.gc.ca

Foreword

On November 1996, at the Second APEC Ministers' Conference on Science and Technology Regional Cooperation, the issue of women's participation in S&T was examined. It was recognized that for the Asia-Pacific to prosper, it was important to draw S&T personnel from the entire population, including women. As a result, the Ministers directed the Industrial Science and Technology Working Group (ISTWG) to address the issue of the under-representation of women in S&T. The Ad-Hoc Group on Gender and Science and Technology was created, and one of its activities, was the production of this book.

Chairing the Ad-Hoc group on Gender, and Science and Technology has been an interesting experience. It allowed me to glimpse a view of the status of women in engineering and science in Asia-Pacific. The role also allowed me to share Canada's models which have, in the last decade, succeeded in doubling the enrolments of women in engineering, from 12 percent in 1989 to 20 percent of the student population in 1999. The other rewarding aspect of this work was to discover good practices in several other economies, practices that we can all learn from.

I am sure that each participant at our meetings in various parts of the world, Singapore; Manila; Chinese Taipei; Hong Kong, China; Seattle, and soon to be in Thailand, has learned as much as I have from each other. The discussions were rich and fruitful. The Ad Hoc Group has delivered on every tasks directed by the Ministers:

- ✓ to hold a conference on sex-disaggregated data on women in S&T and publish the results;
- ✓ to develop a web site to share information and provide useful links;
- ✓ to collect good gender practices in S&T to help increase women's participation in S&T.

Moreover, the activity of the Ad-Hoc Group stimulated other initiatives, not initially planned:

- ✓ the organization of a sensitization seminar in Chinese Taipei;
- ✓ a stocktaking exercise through a survey of women's participation in APEC-ISTWG projects;
- ✓ an internship program for women scientists at the National Research Council of Canada.

The next step will be to share our findings widely with all people responsible for APEC projects so that they will understand the benefits of having a diverse team when carrying-out their projects. The level of success of the projects will be enhanced, not only by enriched perspectives brought by people with diverse experiences and backgrounds, but also by understanding more deeply the impact of their projects on the population of women, children, and men. Many projects affect these groups differently and this must be taken into consideration in future efforts and endeavours.

Individuals and organizations who want to accelerate change will create programs and use good practices to succeed in attracting and particularly retaining more women in their scientific and technical environments. We must build the bridges that will lead to increase active participation of women in these fields. This will benefit our economies, our societies, and our world.

Monique Frize, Ph. D., P. Eng., O.C.,
Chair, Ad Hoc Group on Gender and Science and Technology
Professor and Chairholder,
Faculty of Engineering, Carleton University and University of Ottawa

Acknowledgements

The production of this brochure is a result of the commitment and work of many people who believe in the benefit for society of increased participation of women in science and technology. This brochure is also a tribute to all the women and men on the front line, whose creativity and resourcefulness have contributed to find innovative ways to identify and address systemic barriers to the full participation of the population into the scientific and technological fields.

This brochure is mostly indebted to the dedication and inspiration of Dr. Monique Frize, Holder of the Ontario NSERC/Nortel Chair on Women in Science and Engineering, and Chair of the Ad Hoc Group on Gender and Science and Technology established by the APEC Industrial Science and Technology Working Group. This publication was made possible by the numerous contributors from APEC economies, whose enthusiastic participation represented a source of energy to draw from. Vanessa Clive, from Industry Canada, collected the good practices from APEC economies and proofread the final draft. Penny Brady, from the Conference Board of Canada, provided thoughtful and appreciated comments on the draft version. Janice Yates generously offered knowledgeable assistance for the formatting of the document. Finally, Marie Lyne Tremblay, from Industry Canada, edited, formatted and coordinated the document.

Table of Contents

Education

Australia

Women in Computing - Web site	9
-------------------------------------	---

Canada

A Book: Portraits of Women Engineers	10
Teaching Tools for Secondary Level Science Teachers	11
Virtual Family: a Software Activity That Introduces Students to Computer Programming in Java	12
ARC: A Post Baccalaureate Diploma in Computer Science	13
Pathmakers	14
A Non-Traditional Visit to Nortel Networks	15
Youth Engineering and Science-Virtual Adventure Camps Canada: Targeted	16

Hong-Kong, China

Recruiting Female Students into Science and Technology	17
--	----

Korea

Study on the Development of an Educational Program for Women R&D Managers	18
Engineering College in Women's University	19

Malaysia

WATCH of the Science Commission of the National Council of Women Organizations	20
--	----

Philippines

Technical Education and Skills Development Authority (TESDA) Women's Center	21
---	----

United States

Support Programs of the National Science Foundation	22
---	----

Workplace

Canada

The National and International Programs: Women in Engineering and Science (WES)	25
---	----

Korea

Participation of Women in the Public Service	26
Financial Support for Information Promotion	27

Philippines

A Sourcebook of Gender Cases in Agriculture, Forestry and Fisheries	28
---	----

United States

Two Government Programs to Support Women in Technical Careers	29
---	----

Research

Canada

NSERC- Participation of Women in Science and Engineering Research	33
Seminar for Potential Women Engineering Graduate Students	34
Women Graduate Engineering Student Network	35

Malaysia

Women in Management in Higher Education	36
---	----

United States

NSF Standing Committee on Equal Opportunity in Science and Engineering	37
--	----

Statistics

Canada

Sex-disaggregated data Related to Science and Technology	41
--	----

United States

Statistical Reports with Gender Disaggregated Data	42
--	----

**Good Practices in
Education**

Education

Workplace

Research

Statistics

**Women in
Computing
@uts****Economy**
Australia**Location**
Sydney**Contact**

Women in Computing
Project
School of Computing
Sciences
University of Technology,
Sydney
P.O. Box 123
Sydney NSW 2007
Ph: 61 02 9514 1873

Program's Main Goals and Objectives

- ✓ To increase the enrollment of women in computing sciences
- ✓ To provide information on the types of careers available in the field of computing
- ✓ To help young women understand more about computers and what computing scientists can do

Overview

While the University of Technology (UTS) has a sizable proportion of female students, one of their objectives is to increase their enrollment. The School of Computing Sciences at UTS wants to encourage women to take advantage of new opportunities offered by this field. In response, the Women in Computing website was launched in 1999. The Web site provides information on careers, computer terminology; interactive project management exercises; historical role models; a shadowing program; and, links to other web sites.

This website is just one of the strategies: in 1999, UTS also announced the Women in Computing Program for Year 10, 11 and 12 school students, and a Women in Computing Careers and Information Package.

<http://www.socs.uts.edu.au/wic/index.html>

Results

- ✓ An attractive and interactive tool used by young women both on their own and in schools

Education

Workplace
Research
Statistics

A Book: Portrait of Women Engineers

Economy Canada

Location
Quebec City

Contact

Dr. Claire Deschênes and
Martine Foisy
Dept. of Mechanical
Engineering
Laval University
Quebec City, Quebec
Canada, G1K 7P4

chaire-crsng
@gmc.ulaval.ca

Program's Main Goals and Objectives

- ✓ To provide role models of dynamic women engineers

Overview

Many young women have limited knowledge regarding careers in science and engineering. It is important to offer them information with associated role models of women who have elected to work in this non-traditional sector of employment.

The NSERC/ALCAN Chair of women in science and engineering for Quebec worked in collaboration with a publishing company to develop a book presenting several portraits of women engineers: their work, their interests, and their challenges. A wide array of potential careers are included in the book. This publication is inexpensive and distributed widely to teenage girls.

Some of the portraits included in the book can be found on the following web site:

www.fsg.ulaval.ca/chaire-crsng-alcan/portraits/portrait.html

Results

- ✓ The book has been on sale since October 1999.
- ✓ It is selling successfully, responding to a need in the schools.

Education

Workplace

Research

Statistics

**Teaching Tools
for Secondary
Level Science
Teachers****Economy
Canada****Location
Quebec City****Contact**

Claire Deschênes and
Martine Foisy
Department of Mechanical
Engineering
Université Laval
Quebec City
Canada, G1K 7P4
chaire-crsng
@gmc.ulaval.ca

Program's Main Goals and Objectives

- ✓ To develop secondary-level teaching tools that emphasize the practical and human dimensions of the physical sciences and engineering.

Overview

A number of Canadian and US studies have shown that while women have a negative response to physics, the practicality of a field of science is significant to them.

Teaching tools were developed on the basis of physics programs currently used in the province's secondary schools. For each program, the final objectives to be achieved and related key concepts are listed, as well as descriptions of some activities teachers can use to stimulate greater interest among their students, particularly the girls, in the concepts being taught. Also suggested are review activity for a module or a year. They are presented under a specific theme and are also related to the program objectives. Thus far, the themes of minerals and telescopes are available.

The theme activities and the information capsules were designed so that teachers could relate them to specific scientific professions. Where feasible and relevant, the relevant trades are included with the concepts taught. From this a bank of occupations was derived, describing a number of people in their working environment, and an overview of their abilities, skills and main areas of interest, as well as their training and career path. The bank of occupations contains several profiles of women in order to counter the prejudices some students or teachers may have regarding women's occupations.

<http://www.fsg.ulaval.ca/chaire-crsng-alcan/>

Results

- ✓ These teaching tools will be implemented in the Year 2000.

Education

Workplace
Research
Statistics

Virtual Family: a Software Activity that Introduces Students to Computer Programming in Java

Economy
Canada

Location
Vancouver

Contact
Dr. Maria Klawe
Dept. of Computer
Science
Univ. of British Columbia
Vancouver
British Columbia
Canada, V6T 1Z4
swift@interchange.ubc.ca

Program's Main Goals and Objectives

- ✓ To create a software activity that can be used to interest girls in learning to program

Overview

Research on children's interests in computers as well as discussions with high school teachers and career counselors have indicated that while many boys are strongly motivated to learn to program by the desire to create their own computer games, there are very few software activities that interest girls in learning to program. This lack of interest in programming results in low participation by females in high school and university computer science courses. Virtual Family, a web-based application written in Java, was created by the SWIFT (Supporting Women in Information Technology) project under the auspices of the NSERC/IBM Chair for Women in Science and Engineering in BC and the Yukon, Dr. Maria Klawe. Virtual Family presents four cartoon characters (Mom, Dad, Sis -teenage daughter-, Junior -bratty younger brother-) and a few sequences of preprogrammed actions and dialogue. After students have had a chance to play with the preprogrammed action sequences, we ask them to design their own new sequence and then teach them how to add the Java code for their sequence to the program. The ideal setting for a Virtual Family workshop is a computer lab with a pair of students sharing each machine. The display from the workshop leader's computer should be projected on a screen so students can follow along. The total time needed for a workshop is 45 to 60 minutes.

Some teachers are also using Virtual Family in their Information Technology classes. The current goal is to extend Virtual Family to facilitate students' addition of new characters and animations, and expose students to a broader range of programming concepts.

Results

- ✓ Girls and boys aged 13 – 18 with no programming experience have found the Virtual Family workshops very enjoyable.
- ✓ By the end of the workshop almost all participants have learned some programming concepts.

Education

Workplace
Research
Statistics

ARC: a Post-Baccalaureate Diploma in Computer Science

Economy
Canada

Location
Vancouver

Contact

Sharan Kaur Sarang
Dept. of Computing Science
Simon Fraser University
Burnaby, British Columbia
Canada, V5A 1S6
arcp@cs.sfu.ca

Ian Cavers
Dept. of Computer Science
Univ. of British Columbia
Vancouver, British Columbia
Canada, V6T 1Z4
cavers@cs.ubc.ca

Maria Klawe
Dept. of Computer Science
Univ. of British Columbia
Vancouver, British Columbia
Canada, V6T 1Z4
swift@interchange.ubc.ca

Program's Main Goals and Objectives

- ✓ To create a fast-track university program in computer science attractive to women, and opened to anyone with any bachelor's degree but no programming experience.

Overview

Universities, the private sector (IBM, and Sierra System Consultants Inc.) and the Natural Science and engineering Research Council - IBM Chair for Women in Science and Engineering in British Columbia and the Yukon joined hands to establish ARC, a two year full time program combining computer science courses and information technology work experience. ARC students are enrolled in courses in the regular university computer science curriculum but are provided with additional support in the form of special sections for some courses, teaching assistants, tutors and mentoring. Eight months of academic study are followed by an eight-month paid work-term in industry, which is completed by a further eight months of academic courses. The ARC design includes several elements aimed at attracting women, such as the expectation that applicants have no programming experience, the clear statement that all disciplines are equally desirable in terms of prior academic qualifications, the promise of extra support in the form of special sections and tutoring, and the commitment to admit 50% female into the program. Finally, the tuition fee for ARC was set at the usual university tuition levels, under CAN\$2500/ year, despite the additional costs needed to provide the extra support.

<http://taz.cs.ubc.ca/swift/internship/>

Results

- ✓ 200 applications for 30 positions of which 62% came from women. Students admitted included 70% female.
- ✓ ARC students achieved higher marks on average than the regular computer science students.

Future Plans

- ✓ For the next round of the ARC program, 60 new students are expected to start in January 2000.

Education

Workplace

Research

Statistics

Pathmakers**Economy**

Canada

Location

Ottawa

Contact

Dr. Monique Frize
 Faculty of Engineering
 Carleton University
 1125 Colonel By Drive
 Ottawa, Ontario
 Canada, K0A 2W0
 Monique_Frize@carleton.ca

Faculty of Engineering
 University of Ottawa
 161 Louis-Pasteur
 Ottawa, Ontario
 Canada, K1N 6N5
 frize@site.uottawa.ca

Program's Main Goals and Objectives

- ✓ To provide information and role models to female high school students well before they consider a program at a university or college.

Overview

"Pathmakers" is a free program for schools, where volunteers make demonstrations of science and engineering concepts. The presentations, which are discussed with the teacher prior to the visit, are adapted to all levels, for female and male students from kindergarten to grade 12. Volunteers are recruited by sending a letter to all female university and college students in science, engineering, and technology. Volunteers fill in a profile and schedule which is entered into a database.

To request a visit, teachers fax a request form to a contact person. A part-time student is hired to match the request with volunteers whose schedule fits the requested time and day. A two-hour training session is provided to all volunteers in September. At the end of the year, a recognition luncheon is held for the volunteers. The expanded program cost approximately CAN\$6000 per year, funded through universities, colleges, government and professional association of engineers.

<http://www.carleton.ca/wise/pathmaker.htm>

<http://www.genie.uottawa.ca/wise/pathmaker.htm>

Results

- ✓ The number of women applicants to one of the local engineering undergraduate programs increased by 80 % in one year, reaching an overall enrolment of 25 %.
- ✓ Teachers are very pleased with the program and many take advantage of its existence.

Future Plans

- ✓ Production of a manual describing how to run Pathmakers, and suggestions of demonstrations for class presentations. Distribution will be free, with the requirement to respect the name and the manner in which the program should operate.

Education

Workplace
Research
Statistics

A Non-Traditional Educational Visit to Nortel Networks

Economy
Canada

Location
Ottawa

Contact
Monique Frize
Faculty of Engineering,
Carleton University
1125 Colonel By Drive,
Ottawa, Ontario
Canada, K0A 2W0
Monique_Frize@carleton.ca

Faculty of Engineering,
University of Ottawa, 161
Louis-Pasteur, Ottawa,
ON, Canada, K1N 6N5. :
frize@site.uottawa.ca

Sylvie Chadwick
Nortel Networks
P.O. Box 3511, Station C
Ottawa Ontario
Canada K1Y 4H7

Program's Main Goals and Objectives

- ✓ To inform and present science and engineering choices to students in an industry setting well before they consider post-secondary studies.

Overview

Approximately 100 female high school students, grades 9 to 11, are brought to Nortel (a Canadian global telecommunications company) for a half-day of fun and informative activities. The day begins with a presentation on the opportunities that can be found in science and engineering fields encouraging students to keep all their options open by selecting the appropriate courses. Then, the students are divided into groups of ten and each group is accompanied by a university student and a female Nortel Networks employee, both involved in a science or engineering fields. Each group is rotated through the following activities: a fun, team-oriented engineering design project (currently a Pinocchio nose- piles of newspapers, a 2 meter string, and a roll of tape to build the Pinocchio nose), a team-building game, and a visit to some of the Nortel Networks laboratories. The half-day closes with a lunch for the full group, including the industry and university mentors.

<http://www.carleton.ca/wise/c2e298.pap.htm>
<http://www.genie.uottawa.ca/wise/c2e298.pap.htm>
<http://www.carleton.ca/wise/teamgame.htm>
<http://www.genie.uottawa.ca/wise/teamgame.htm>

Results

- ✓ Pilot program: A majority of the students acknowledged having gained a lot of new information and understanding of the opportunities in these fields, and more than half changed their previous career choice as a direct result of the visit. As a result of the event, an unprecedented 88% of the attendees registered for senior science and mathematics courses.
- ✓ The event has since been successfully repeated with students from rural areas, and the proportion of students reporting a positive impact is even higher.

Education

Workplace

Research

Statistics

**Youth
Engineering
and Science -
Virtual
Adventures
Camps
Canada
(YES-VACC):
Targeted
Strategies**

**Economy
Canada**

**Location
Ottawa**

Contact

Jennifer Flanagan
National Coordinator
YES-VACC
200 Elgin St, Suite 601
Ottawa, Ontario
Canada, K2P 1L5
jflanagan@internaut.org
<http://www.internaut.org>

Program's Main Goals and Objectives

- ✓ To increase involvement and interest in science courses
- ✓ To increase the participation rate of girls at YES-VACC summer science day camp programs.

Overview

YES-VACC supports a national network of 26 programs located at universities and colleges that are ran by undergraduate students in science, engineering, computer science and education. The activities include in-school workshops, summer day camps, teacher training and community outreach. The camps reach over 200,000 Canadian youth yearly, and since 1988 almost 1,000,000 Canadian youth have participated. As a value-based organization, YES-VACC makes special efforts to reach audiences that are traditionally under-represented in the science fields, such as native students, remote communities and girls.

The national average participation rate of girls in YES-VACC camps dropped from 38.5% in 1993 to 33.3% in 1997. This decrease established a critical need for YES-VACC to take action to attract more girls to its programs. The following actions were taken:

- ✓ Training for Directors, through special activities at two conferences/year;
- ✓ National Office staff travels to camp sites to deliver a training session entitled "Bridging the Gap: Gender Issues 101", which outlines research and strategies that should be taken by each member program.
- ✓ Development of on-line gender training resources.

Results

- ✓ Ten member-sites will be offering all-girls weeks;
- ✓ Three are running Science clubs for girls;
- ✓ Two are running residential camps for girls;
- ✓ Two have developed equal participation policies;
- ✓ Five are offering special discounts for girls and boys who come to camp together.
- ✓ Key in the success of the program is an outreach activity designed with equity, and increasing the awareness of parents, teachers and sponsors to decrease resistance towards programs that emphasize girls' participation.

Education

Workplace
Research
Statistics

Recruiting Female Students into Science and Technology

Economy
Hong-Kong, China

Location
Hong-Kong

Contact
Dr. Priscilla Chung,
Director (Gender)
Equal Opportunities
Commission (Hong Kong)

Dr. Helen Shen
Associate Dean, School of
Engineering
The Hong Kong University
of Science and Technology

Ms. Miranda Chan
Office of Admissions
The Hong Kong University
of Science and Technology

Program's Main Goals and Objectives

- ✓ To increase the enrolment of female students in the university

Overview

The Hong Kong University of Science and Technology (UST) opened in 1991 as a research university specialising in Science, Engineering, and Business & Management. As a new university, it had no alumni support and had few friends in the secondary schools. Therefore, it marketed itself aggressively and decided to make a special appeal to attract superior female students.

Before the opening of the University, the President of the University met with all the principals of single sex girls schools advising them to encourage their best female students to go into the science stream and to apply for undergraduate studies in science and engineering at UST.

The faculty has, since its opening, held special sessions, inviting students to visit the university so as to introduce them to the programs. A special effort was made to have female faculty members address the students to provide visible female role models.

The Engineering School held summer camps in which 40 percent of places were given to female prospective students. A special banquet would be held for the girls at which a practising female engineer would be the featured speaker, another role model. The Science School had different camps or internships, with special attention given to female students.

Results

- ✓ Female engineering enrolment increasing from 11% to 16% within the last four years.
- ✓ Female enrolment in Science increased from 37% to 42%.
- ✓ In Business and Management, without special recruitment efforts, female enrollment increased from 62% to 65%.

Education

Workplace

Research

Statistics

Study on the Development of an Educational Program for Women R&D Managers

Economy

Korea

Location

Economy-wide

Contact

Young-Ock Kim

Fellow

Korea Women's
Development Institute,
#1-363, Bulkwang-dong,
Eunpyung-ku, Seoul,
Korea
youngkk@kwominet.or.kr

Hye-Ryun Kang

Professor

College of Management
Ewha Women's
University
Seoul, Korea.

Program's Main Goals and Objectives

- ✓ To tackle the high unemployment rate of women graduates of science and engineering majors
- ✓ To specialize management personnel by utilizing new female graduates as research management personnel.

Overview

Female college graduates in science and engineering have low employment rates and do not utilize their diplomas. Meanwhile, technological innovation sectors such as R&D need the balanced development of professional research and supporting manpower. Efforts to specialize management personnel have been insufficient so far. The combination of scientific technology and management is one possible solution. A study on the development of educational programs for women R&D managers was done by Hye-Ryun Kang, professor of the College of Management, Ewha Women's University in 1998. The Korea Science Foundation provided a financial support for this project.

Results

- ✓ According to the survey, researchers prefer the supporting staffs of science and engineering majors. Thus it can be said that an increasing number of science and engineering majors should be readily allowed into the research management workforce.
- ✓ In government-sponsored research institutes, most women are working as a support staff, 3.7% as researchers and 7.1% as administrators. Therefore, there is potential to put female science and engineering professionals into different roles.
- ✓ There are recommendations to establish a preparatory program for business schools aimed at science female graduates, such as a linked major program, or a cooperative program within the graduate school, and then gradually develop these programs.

Education

Workplace

Research

Statistics

**Engineering
College in a
Women's
University****Economy**

Korea

Location

Seoul

Contact

Young-Ock Kim

Fellow

Korea Women's
Development Institute,
#1-363, Bulkwang-dong,
Eunpyung-ku, Seoul
Korea
youngkk@kwominet.or.kr

Yoon-Kuoo Jhee
Dean of the College of
Engineering
Ewha Women's
University
Seoul, Korea

Program's Main Goals and Objectives

- ✓ To produce highly educated female engineers and experts to serve in the leading fields of science and technology
- ✓ To develop the engineering fields in which women's capability can be maximised, so that students become professional in the areas which meet their aptitudes.

Overview

In 1997, while Korean women accounted for 43.5% of all graduates of natural science colleges, only 9.5% of graduates in engineering were women. Furthermore, as a minority, girls often fail to maximize their capability in male dominated atmosphere. A number of studies have suggested that hidden curricula and classroom climate affect girls interests and achievement in science and engineering. Gender equity in classroom organization and climate, sexism in the college classroom, coeducation and mixed schooling have become hot issues. The establishment of a women's college of engineering to address the meager female ratio especially in the department of engineering was seen as necessary

For information on this college, visit: <http://www.ewha.ac.kr>

Results

- ✓ The College of Engineering was set up at Ewha Women's University in 1996, which is composed of 4 departments, the Computer Science and Engineering, Electronics Engineering, Architecture, and Environmental Science and Engineering, which includes the Engineering Research Centre.
- ✓ As of 1997, there are 25 faculty members, 888 students in the undergraduate program, and 43 students in the graduate program.

Future Plans

- ✓ To monitor the impact of this initiative on the enrollment of women in engineering programs.

Education
Workplace
 Research
 Statistics

**WATCH of
 the
 Science
 Commission of
 the
 National
 Council of
 Women's
 Organizations**

Economy
 Malaysia

Location
 Kuala Lumpur

Contact
 Prof. Farida Habib Shah
 Chair
 S&T Commission
 National Council of
 Women's Organizations
 shahfi@pkriscc.ukm.my

Programs's Main Goals and Objectives

- ✓ To identify issues and problems of women in science
- ✓ To contribute toward the identification of priority interventions
- ✓ To implement relevant services and programs
- ✓ To monitor and assess discrimination practices
- ✓ To make recommendations toward redressing the problems

Overview

While women make up 50% of scientific personnel, excluding physical science, women are not well represented in top and management positions. In response to this situation and also responding to the United Nations Beijing Platform for Action, The National Council of Women's Organizations was created, composed of 86 affiliates established the Science Commission. This Commission was asked to set up a WATCH function with the objectives mentioned above. Upon approval of funding by the government, a series of activities will be undertaken.

Results

Too early to evaluate

Future Plans

- ✓ To conduct a survey to examine the role and status of women in science and engineering, as well as the problems women face

Education

Workplace
Research
Statistics

**Technical
Education
and Skills
Development
Authority
(TESDA)
Women's
Center**

**Economy
Philippines**

**Location
Manila**

Contact
TESDA Complex
East Service Road
South Superhighway
Taguig, Metro Manila
Philippines
Ph: (632) 817-4076/ 85
local 118-119
Fax: (632) 818-8062

Program's Main Goals and Objectives

- ✓ To provide market-oriented modern technology-based education and training, policy and action-oriented research and pro-active advocacy in support of women's economic empowerment

Overview

In 1993, the Philippines Government met with members of the Japanese government and discussed possible cooperation between the two economies on the topic of the advancement of women's status. In 1996, Japan granted 2.6 billion Jyen for the creation of a national center for women. In 1998, the National Vocational Training and Development Center for Women (TESDA) Women's Center was inaugurated in Manila.

The Center offers training in a variety of non-traditional occupations, as well as entrepreneurship. It also supports socio-economic action-research, advocacy activities and information session. Trainees can access a series of services such as career guidance, job placement, day-care center, a dormitory, and networking.

Results

- ✓ After one year of operation, TESDA counted 91 graduates in 10 different occupations.
- ✓ A national conference on the "Economic Empowerment of the Filipina" was held in March 1998, which welcomed 260 participants.
- ✓ Collaboration with the University of the Philippines (UP) College of Social Work and Community Development, the UP Center for Women's Studies, and the Ateneo Institute of Philippines on a variety of research projects.
- ✓ Production of brochures and information documents distributed nationwide
- ✓ Production of a video "TESDA Women's Center: Empowering Women in Asia"

Future Plans

- ✓ On-going training of staff in management, curriculum development, stress management, and gender sensitivity.

Education

Workplace
Research
Statistics

Support Programs of the National Science Foundation

Economy United States

Location
Economy-wide

Contact

Frances C. Li, Ph.D.
Executive Secretary
NSB Task Force on
International Science
and Engineering Issues
Division of International
Programs
National Science
Foundation
4201 Wilson Blvd.
Arlington, VA 22230
Tel: 703-306-1709
Fax: 703-306-0476
e-mail: fli@nsf.gov

Program's Main Goals and Objectives

- ✓ To encourage change in the way science and math are taught to girls and young women at the elementary and secondary levels
- ✓ To encourage change in the cultures of science, mathematics, and engineering (SME) university departments, and to improve support for both the recruitment and retention of women and girls.

Overview

At the pre-college level, the National Science Foundation supports programs designed to improve the educational experiences of all students in school settings –prekindergarten through the 12th grade. Programs to change the infrastructure of SME education support projects that build on existing research about gender and the SME infrastructure in order to create permanent change in academic, social, and scientific climates. These programs also support information dissemination activities, to insure that there is widespread dissemination of strategies, research results, and resources that will accelerate efforts to increase women's involvement in SME.

Results

- ✓ High school graduates are now completing more mathematics and science course than in the early 1980's
- ✓ "National Science and Technology Week" gives special attention to showcasing role models for girls and other under-represented groups (www.nsf.gov/od/lpa/nstwl/).
- ✓ "Telemonitoring Young Women in Science, Research and Engineering, and Computing Project" builds on-line communities of support through having professional women in technical fields adopt students and mentor them along the path towards their entry to university.
- ✓ An undergraduate program supports both curriculum and faculty development to strengthen SME education for SME majors, for future teachers at the elementary and secondary levels and for non-science majors seeking scientific and technological literacy.
- ✓ Grants from the NSF Engineering Directorate may be increased if projects include women and other people from under-represented groups as research assistants.

Good Practices in the Workplace

Education
Workplace
Research
Statistics

The National and International Programs: Women in Engineering and Science (WES)

Economy
Canada

Location
Ottawa

Contact
Stuart Wilson
Senior Advisor
International Relations
National Research
Council of Canada
Ottawa, Ontario
Canada, K1A 0R6
Ph: 613-998-0761
Fax: 613-952-9696
stuart.wilson@nrc.ca

Program's Main Goals and Objectives

- ✓ To provide positive research experience to female graduate students.
- ✓ To offer mentorship to female university science students.

Overview

The National Research Council of Canada (NRC) created a national training program called the "Women in Engineering and Sciences". This program provides mentorship for women engineers and scientists at the bachelor-level in its own research laboratories. The NRC hopes that by providing a positive research experience, more women will enter and remain in non-traditional occupations in the science and engineering fields.

In 1996, NRC, in co-operation with Thailand's National Science and Technology Development Agency, established the Thai-NRC Women in Engineering and Science (WES) Program. The program provides Thai women students, in university engineering or science degree programs, an opportunity to work for one year in NRC labs, with the objective of providing a positive work experience to encourage the candidates to develop careers in non-traditional engineering and science disciplines. The training program consists of a one-year assignment in one of the NRC's 16 research institutes. The participant is assigned to a mentor and contributes to the research objectives of the host institute. As a general rule the program accepts women either in their Masters or Ph.D. programs.

The program is supported by four partners: NRC, the Canadian International Development Agency (CIDA), the Canada-ASEAN Centre (CAC), based in Singapore, and the participating developing economy.

Results

- ✓ For the first two years, four Thai participants per year completed the program. In the year 2000, the program expanded to include the Philippines and Vietnam and the total number of women will rise to six.

Education
Workplace
 Research
 Statistics

Participation of Women in the Public Service

Economy
 Korea

Location
 Economy-wide

Contact
 Young-Ock Kim
 Fellow
 Korea Women's
 Development Institute,
 #1-363, Bulkwang-dong,
 Eunpyung-ku, Seoul,
 Korea
 youngkk@kwominet.or.kr

Program's Main Goals and Objectives

- ✓ To address the gender imbalance among public sector employees, especially in high-ranking public officials
- ✓ To strengthen women's participation in the decision making process

Overview

In December 1996, women public employees constituted 27.8% of total public employees, showing a 3.3% increase from 1991's 24.5%. However, women public employees who are above the 5th rank represented only 2.5% of the group, while the majority were in lower ranks. As a definitive move to address the gender imbalance among public sector employees, the government instituted a female public employee target system which allows a set ratio of women to be recruited into the public sector each year regardless of the ratio of women who pass competitive public employee examinations. This system will be in effect until the year 2000 and the target female ratios will rise to 20% by the year 2000 from the 10% base in 1996. The application of this system is, however, confined to the civil service examinations for the 5th level administrative and foreign service personnel.

Results

- ✓ An increase in the percentage of women passing relevant examinations to 9.0% in 1996 from 4.7% in 1995 (from a pool of 300 persons)
- ✓ Possibility of extending a positive opportunity for women to a broader segment of the country's business/ industrial community.
- ✓ The system is applied to the higher levels of bureaucracy which will facilitate women's participation in the decision making process.

Future Plans

- ✓ General evaluation planned in 2000, the final year of the system and potential continuation of the quota system
- ✓ To extend this system to the civil service examination for the 5th level technologists

Education
Workplace
 Research
 Statistics

Financial Support for Information Promotion

Economy
 Korea

Location
 Economy-wide

Contact
 Young-Ock Kim
 Fellow
 Korea Women's
 Development Institute,
 #1-363, Bulkwang-dong
 Eunpyung-ku, Seoul
 Korea
 youngkk@kwominet.or.kr

Program's Main Goals and Objectives

- ✓ To strengthen girls' and women's access to information technology
- ✓ To facilitate women's employment and entrepreneurship in information and communication fields

Overview

A 1997 survey showed that women scored significantly lower regarding access and use of information technology. In 1998, the Ministry of Information and Communication (MIC) sponsored two programs: "Provision of Computers and Communication Equipment to Girls' Technical High Schools and Colleges", and "Information Promotion Education for Women". These programs will be in effect until the year 2001. These programs include the provision of computers and communication equipment for girls' technical school and colleges; funding for women's educational centers; job training centers linked to the YWCA and Girl Scouts; Business venture centres based in universities.

For information on MIC, visit: <http://www.mic.go.kr/s2.html>.

Results

- ✓ Successful start-up of firms in intellectual property services, shopping on-line.
- ✓ The establishment of the Sook-Myung Women's University Women's Venture Business Centre
<http://apwinc.sookmyung.ac.kr>
- ✓ Almost one million dollar (US) was provided for the training of over 9000 women

Education

Workplace

Research

Statistics

A Sourcebook of Gender Cases in Agriculture, Forestry, and Fisheries

Economy
Philippines

Location
Economy-wide

Contact

Philippines Council for
Agriculture, Forestry
and Natural Resources
Research and
Development
Los Baños 4030
Laguna, Philippines
ph: (63)(049)536-0014
fax: (63)(049)536-0016
bpr@uitra.pcarrd.dost.gov.ph

Program's Main Goals and Objectives

- ✓ To strengthen strategies to effect the inclusion of the gender variable in the sector's development agenda
- ✓ To provide more training material tailored to a targeted sector

Overview

The Philippines Council for Agriculture, Forestry and Natural Resources Research and Development, along with the Department of Science and Technology are promoting gender and development initiatives in the sector of agriculture. They realized that lessons from the past should not be lost, as they represent valuable information on which to base the future. As a result, the Sourcebook was produced.

It is a compilation of case studies written by gender experts. The material provides significant insights on integrating gender concerns in the conceptualization of programs and projects, as well as the formulation of relevant policies.

Results

The Sourcebook contains:

- ✓ Four agricultural projects
- ✓ Six forestry projects
- ✓ Four fisheries projects
- ✓ Reports are inspiring stories or initiatives that worked, or if they did not, some analysis is offered.

Education
 Workplace
 Research
 Statistics

Two Government Programs to Support Women in Technical Careers

Economy
 United States

Location
 Economy-wide

Contact
 Frances C. Li, Ph.D.
 Executive Secretary
 NSB Task Force on
 International Science
 and Engineering Issues
 Division of International
 Programs
 National Science
 Foundation
 4201 Wilson Blvd.
 Arlington, VA 22230
 Tel: 703-306-1709
 Fax: 703-306-0476
 e-mail: fli@nsf.gov

Program's Main Goals and Objectives

- ✓ To provide women with training and experience in leadership development and self-sufficiency.

Overview

The US Department of Education "School to Work Opportunities Program" aims to provide young women and men access to the same opportunities, particularly in non-traditional occupations, where women represent less than 25% of the workforce. Strategies include outreach, recruitment, exposure to career information and career exploration activities, training for teachers, links with out-of-school programs, such as girls' clubs and professional associations of women, workshops to discuss challenges facing women in non-traditional occupations, mentors, and education for employers and unions.

The US Department of Labor's Women's Bureau developed the "Working Women Count Honor Roll". The "Honor Roll" promotes cooperative relationships among businesses, unions, NGOs, and government to encourage programs and policies to address women's demands. It enlisted 1300 organizations, affecting 2 million workers. Organizations in the "Honor Roll" offer their own training programs, which include computer technology classes for girls, networks to decrease isolation at male-dominated workplaces, developing new occupational positions, changing corporate culture, and increasing the number and size of women-owned businesses.

Results

- ✓ Greater participation of women in non-traditional occupations.

Future Plans

- ✓ New initiatives are being developed all the time, at the federal, state, and local levels of government, in the private sector, in academia, and in NGOs.

Good Practices in Research

Education
Workplace
Research
Statistics

NSERC: Participation of Women in Science and Engineering Research

Economy
Canada

Location
Economy-wide

Contact
Isabelle Blain
Corporate Secretary
NSERC
350 Albert Street
Ottawa, Ontario
Canada, K1A 1H5
ph: 613-995-6295
fax: 613-992-5337

Program's Main Goals and Objectives

- ✓ To create an environment that facilitates and encourages greater participation by women in science and engineering research in Canada.

Overview

In universities in Canada and around the world, women are under-represented among researchers and graduate students in the fields of science, particularly in the physical sciences and engineering. For this reason, The Natural Science and Engineering Research Council (NSERC) created a special Task Force to examine barriers and obstacles that may limit the participation of women in these activities, and to make recommendations to overcome them.

The Task Force was composed of seven women and three male researchers from Canadian universities, supported by high level staff members of NSERC. The Task Force proceeded to identify the issues, examined NSERC's guides and manuals, collected statistics on the participation of women and men in NSERC's various scholarship and grant programs, committees and on the Council. The members then developed 21 recommendations, all but one addressed at NSERC, and the last one addressed at the universities. The report was completed in 1996.

<http://www.nserc.ca/news/women.htm>
<http://www.nserc.ca/pubs/wocon.htm>

Results

- ✓ NSERC implemented all the recommendations to remove Biases in the process of allocating awards, fellowships, scholarships, and grants.

Future Plans

- ✓ It is now up to the universities to implement the last recommendation, which contains several sub sections.
- ✓ Some of the issues that remain a concern relate to the climate and culture in which women faculty operate.

Education
Workplace
Research
Statistics

Seminar for Potential Women Engineering Graduate Students

Economy
Canada

Location
Calgary

Contact
Elizabeth Cannon and
Marcia Inch
Department of
Geomatics Engineering
Faculty of Engineering
University of Calgary
2500 University Dr.
NW Calgary, Alberta
Canada, T2N 1N4
cannon@ensu.ucalgary.ca
minch@ucalgary.ca

Program's Main

Goals and Objectives

- ✓ To increase the participation of women students in graduate studies in Engineering by providing them with an opportunity to hear about graduate studies and job possibilities for women with post-graduate degrees.

Overview

The present rate of participation of women graduate students in Engineering at the University of Calgary stands at approximately 20% of the total number of students enrolled. By introducing young women to graduate studies in Engineering, it is hoped that this participation rate can be increased. This program aims to address the fact that many young women are not aware of either the process of applying for graduate studies or the job opportunities for those with a graduate degree in engineering.

Approximately 100 young women are contacted through a personal letter in February each year and invited to an informal supper and presentation on graduate studies. Personal letters have been found to be the best means of contacting the students as posters are generally not responded to. During the session, students are presented with pertinent information on how to apply for graduate studies: the funding available to assist in their education, the qualifications required, and the process of finding a Graduate Supervisor. A speaker from industry who has successfully completed a graduate program and is a practicing engineer gives students examples of practical applications of graduate studies, and an opportunity to ask specific questions. Finally, presentations by women who are studying at a Master's or PhD level in engineering provide the audience with opportunity to meet and ask questions of students presently in the program

www.socs.uts.edu.au/wic/index.html

Results

- ✓ Students have indicated that up to 80% were not previously considering graduate studies, but had been persuaded to give it strong consideration after the evening's presentations.

Education
Workplace
Research
Statistics

Women Graduate Engineering Student Network

Economy
Canada

Location
Calgary

Contact
Elizabeth Cannon and
Marcia Inch
Department of
Geomatics Engineering
Faculty of Engineering
University of Calgary
2500 University Dr.
NW Calgary, Alberta
Canada, T2N 1N4
cannon@ensu.ucalgary.ca
minch@ucalgary.ca

Program's Main Goals and Objectives

- ✓ To give women graduate students in engineering an opportunity to meet and network with each other
- ✓ To provide them with information on job opportunities for women who continue on to PhD studies.

Overview

The present rate of participation of women graduate students in Engineering at the University of Calgary stands at approximately 20% of the total number of students enrolled, but drops to approximately 10% at the PhD level. By assisting students in connecting with other women students in engineering, and providing them with information about continuing in graduate studies, it is hoped that more women will complete both Master's and PhD studies in Engineering.

There are approximately 75 part-time and full-time women graduate students in the Faculty of Engineering at the University of Calgary. Students have been placed on an email list-server, and are invited to events through email. Personal contact with each student through email has been found to be the most effective and timely method of maintaining contact with the students.

Events are held during an extended noon-hour, approximately three times per year. Students are provided with a buffet lunch and given approximately 1/2 hour to connect with each other. This is followed by information on graduate studies, and a guest speaker.

Guest speakers cover a variety of topics relevant and interesting to women engineering graduate students. Such topics include "Managing the Mingling Scene", which provided information on handling events such as receptions that they may be required to attend for business reasons, or "The benefit of a PhD Degree in Industry".

Results

- ✓ Verbal feedback has been extremely positive, and student attendance gives an indication that the sessions are viewed as valuable.

Education
Workplace
Research
Statistics

Women in Management in Higher Education

Economy
Malaysia

Location
Kuala Lumpur

Contact
Prof. Farida Habib Shah
Chair
S&T Commission
National Council of
Women's Organizations

shahfi@pkrisc.cc.ukm.my

Program's Main Goals and Objectives

- ✓ Enhancing the participation of women in research, to empower them into management positions

Overview

Initiated at the ministerial level, this program is not limited to women in science, but is open to all women in research. It provides 5-day intensive course aim at junior academics as well as mid-level researchers. The course involves information on every aspects of research, such as planning a research, getting funding, networking, supervision of students, transfer of technology, intellectual property rights.

Results

Too early to evaluate

Education
Workplace
Research
Statistics

NSF - Standing Committee on Equal Opportunities in Science and Engineering

Economy
United States

Location
Economy-wide

Contact
Frances C. Li
Executive Secretary
NSB Task Force on
International Science
and Engineering Issues
Division of International
Programs
National Science
Foundation
4201 Wilson Blvd.
Arlington, VA 22230
Tel: 703-306-1709
Fax: 703-306-0476
e-mail: fli@nsf.gov
Program's Main

Goals and Objectives

- ✓ To draw on the talent pool of the entire U.S. population to develop the national's intellectual capital.

Overview

The Standing Committee on Equal Opportunity in Science and Engineering (CEOSE) provides an oversight over all of the National Science Foundation's (NSF) efforts in the area of participation of women and under-represented groups in SME. To ensure accountability by NSF staff in fulfilling this mandate, all senior NSF staff have as one element in their performance plans their contribution toward equal opportunity. NSF is fortunate in having a professional staff that is enlivened by an influx of researchers from the academic community who work for a year or two at NSF managing research programs in their disciplinary specialty. This system helps bring more women and members of minority groups into the policy making of NSF, and increases the diversity of viewpoints in the merit review process.

<http://www.nsf.gov/od/ceose/coese.htm>

Results

- ✓ In the past five years, the percentage of women holding science and engineering positions on NSF's staff increased from 26% to 31%.
- ✓ Women represented up to 35% of the membership of the numerous advisory boards to NSF, while women represented 22% of the S&E workforce pool .
- ✓ "Special Targeted Initiatives" support the systematic inclusion of women in NSF advisory boards.
- ✓ The NSF's Professional Opportunities for Women in Research and Education (POWRE) and the National Institutes of Health (NIH) support funding programs specifically designed to include researchers whose careers have been interrupted, such as in cases justified by family responsibilities , or relocating with a spouse.
(<http://www.nsf.gov/pubs/1998/nsf98160/nsf98160.htm>)

Good Practices in Statistics

Education
Workplace
Research
Statistics

Sex- disaggregated Data Related to Science and Technology

**Economy
Canada**

Location
Economy-wide

Contact
Nancy Ghalam
Target Groups Project
Housing, Family and
Social Statistics Division
Statistics Canada
Ottawa, Ontario
Canada, K1A 0T6
tel: 613-951-8645
Fax: 613-951-0387

Program's Main Goals and Objectives

- ✓ To document progress in the participation of women in science and technology fields

Overview

Statistics Canada (StatCan), the statistical bureau of the government of Canada, routinely disaggregated all social data by sex. Hence, a broad range of statistical information is available for gender-based analysis of science and technology issues.

www.statcan.ca

www.swc-cfc.gc.ca : for the publication: "Finding Data on Women: A Guide to Major Sources at Statistics Canada"

Results

- ✓ The Census of Population provides the most detailed source of data on occupations, and since 1996, includes data on unpaid work;
- ✓ The Labour Force Survey, is a monthly survey of 96 000 individuals, providing a timely set of data on occupations;
- ✓ The Survey of Consumer Finances, provides information on the income of individuals and families, including the female-to-male earning ratios;
- ✓ The Center for Education Statistics at StatCan provides data including student enrollment, fields of study, types of institutions, and highest level of educational attainment;
- ✓ The General Social Survey, conducted annually, fills the gaps by covering issues such as work and education, and time-use, the latter one being very useful in understanding unpaid work;
- ✓ The Survey of Labour and Income Dynamics explores the links between demographic events, labour market events, and change in income;
- ✓ The National Graduate Survey examines the transition from school to the labour force of university and college graduates,
- ✓ The Workplace and Employee Survey covers topics such as training, technology use, hiring practices and workforce characteristics.

Education
Workplace
Research
Statistics

Statistical Reports with Sex Disaggregated Data

Economy
United States

Location
Economy-wide

Contact
Frances C. Li, Ph.D.
Executive Secretary
NSB Task Force on
International Science and
Engineering Issues
Division of International
Programs
National Science
Foundation
4201 Wilson Blvd.
Arlington, VA 22230
Tel: 703-306-1709
Fax: 703-306-0476
e-mail: fli@nsf.gov

Program's Main Goals and Objectives

- ✓ To track progress toward the goal of full participation of women and under-represented groups in science and engineering

Overview

The U.S Congress has mandated a policy of strengthening the participation of women and under-represented groups in science and engineering, and has directed the National Science Foundation to track progress.

www.nsf.gov/sbe/srs

Results

- ✓ The Biennial report "Women, Minorities, and Persons with Disabilities in Science and Engineering", which contains information on pre-college, undergraduate education, graduate education, and employment.
- ✓ The biennial report "Science and Engineering Indicators", which includes gender-disaggregated data on the higher-education system, rate of employment, types of employers, and salary ranges
- ✓ Special report (1993) "Human Resources for Science and Technology: The Asian Region", includes tables on the number of advanced degrees in science and engineering earned by women in selected Asian economies and the U.S. during 1975-90.
- ✓ Special report (1998) "Statistical Profiles of Foreign Doctoral Recipients in Science and Engineering: Plan to Stay in the U.S.", which provides data on the percentage of women in each field, by country of origin.

