

WOMEN IN ENGINEERING: MORE THAN JUST NUMBERS

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INTRODUCTION

The Canadian Committee on Women in Engineering was formed in February 1990 under an Industrial Adjustment Agreement of Employment and Immigration Canada. Its formation was initiated by Industry Science and Technology Canada. The main signatories to the agreement are the Canadian Council of Professional Engineers, the Association of Consulting Engineers of Canada, the Association of Universities and Colleges of Canada, and the Canadian Manufacturers' Association. Support was also received from Noranda Inc., The SNC Group, GE Canada, Dofasco Inc. and The University of New Brunswick.

THE ISSUES

The cultural influences that channel girls and young women away from non-traditional roles start with parents and other caregivers in the pre-school years. Once in school, many girls and young women continue to be discouraged from pursuing interests in mathematics and science and from considering careers in engineering by teachers and guidance counsellors who are not sensitive to gender stereotyping. Because there are so few female science and mathematics teachers and even fewer women engineers to act as role models, young women are not likely to meet and interact with them. These influences are compounded by the perception that engineering is a "male" profession, that high grades are needed to succeed in engineering studies, and that engineers build bridges and roads.

Some young women who choose to study engineering have difficulty adjusting to the pervasive male culture of faculties of engineering and to a curriculum that does not reflect women's perspectives. Many never meet a woman engineer or engineering professor. Women who advance to graduate studies and aspire to academic careers are very few indeed.

Once in the workplace, women engineers encounter attitudes and activities that are systemically biased against women. Many face discrimination in hiring, promotion, job assignments and salary, and experience sexual harassment in their workplaces. Many have to cope with the isolation of being the only female engineer in a company or on a job site. As well, not enough employers have policies that enable employees to balance family and career responsibilities. Women engineers are also minorities in their professional associations. These associations have a key role to play in providing support to women members, creating greater public awareness of the engineering profession, and attracting more women to the profession.

RECOMMENDATIONS

LAYING THE FOUNDATION

The CCWE recommends

- 1. that the active role of women in engineering be portrayed so that parents and the public will encourage young women to pursue careers in engineering.**
- 2. that educators empower young women to fully develop self-esteem through significant and appropriate learning experiences in elementary and secondary school.**
- 3. that faculties of education include the study of equity issues, gender stereotyping and gender differences in teacher education programs so that all students have equal opportunities for learning, participating and contributing in the classroom.**

Schedule for success:

- ♦ Courses in equity and gender-related issues for all education students by 1995.
- 4. that educators enhance the mathematics, science and technical learning experiences of women students in elementary and secondary schools so that they develop interests and abilities in these subjects and acquire the academic prerequisites for engineering studies.**

Schedule for success:

- ♦ Development of mechanisms to monitor the participation and success of young women in secondary school mathematics and science courses by 1993.
 - ♦ Review of qualifications and standards of science and mathematics teachers by 1994.
 - ♦ Applied science topics and experiences of women incorporated in mathematics and science curricula by 1995.
 - ♦ Enhanced science and mathematics courses in all teacher education programs by 1995.
 - ♦ Increased science, mathematics and technical education courses required for secondary school graduation by 1995.
- 5. that teachers and guidance counsellors provide career information and guidance free of gender-bias about engineering and related fields to all students, so that women with interests in and aptitudes for engineering are informed, encouraged and supported.**

Schedule for success:

- ♦ Forums/seminars to increase the awareness of guidance counsellors regarding equity issues and changing gender roles by 1993.
 - ♦ Guidance counselling system for female students strengthened throughout the entire school system by 1995.
- 6. that educators introduce girls and young women to role models in the fields of mathematics, science, technology and engineering so that they realize women have career options in non-traditional professions.**

Schedule for success:

- ♦ Regular visits to elementary and secondary schools by role models by 1993.
 - ♦ Initiatives to encourage women with backgrounds in mathematics, science and technology to study education and become teachers by 1993.
- 7. that educators and employers develop extracurricular programs to ensure that girls and women develop self-confidence and competence in mathematics, science, technology and engineering in a non-competitive environment.**

Schedule for success:

- ♦ Job-shadowing, enrichment programs and work-experience programs for junior and senior high school students by 1994.

- ◆ Expansion of extracurricular science programs for elementary school children by 1995.

EDUCATION BY AND FOR WOMEN ENGINEERS

The CCWE recommends

8. that universities create attractive environments for women and commit--in principle and practice--to the recruitment and retention of women faculty and students, especially in faculties of engineering.

Schedule for success:

- ◆ Harassment policies and procedures by 1993.
 - ◆ Regular compulsory sensitization programs on harassment for all students, faculty and staff by 1993.
 - ◆ Employment and pay equity programs by 1993.
 - ◆ Gender-inclusive language policy by 1993.
 - ◆ Gender-sensitivity programs for faculty, staff and students by 1995.
 - ◆ Childcare referral system by 1995 and on-site childcare facilities by 1997.
- 9. that faculties and schools of engineering develop programs to attract women into undergraduate engineering programs to increase the pool of well-qualified, talented engineers.**

Schedule for success:

- ◆ Regular visits to elementary schools by 1993.
 - ◆ Information sessions for teachers, guidance counsellors and parents by 1993.
 - ◆ Mechanism to monitor impact of attraction programs by 1993.
- 10. that faculties of engineering encourage mature and other non-traditional students to enter engineering programs.**

Schedule for success:

- ◆ Introductory, transitional and qualifying courses for non-traditional students by 1994.
 - ◆ Adoption of flexible admission policies by 1994.
 - ◆ Part-time undergraduate engineering programs by 1995.
- 11. that faculties of engineering establish academic adjustment and social support programs for undergraduate students and especially for women students.**

Schedule for success:

- ◆ Voluntary mentorship program by 1993.
 - ◆ Mechanism to monitor attrition by 1993.
 - ◆ Advisor to the dean by 1994.
- 12. that faculties of engineering create an environment that ensures the physical, emotional and psychological security of all students, and contributes to a more positive image of engineering students.**

Schedule for success:

- ◆ Written code of behaviour for students by 1993.
 - ◆ Editorial policy and editorial board for student publications by 1993.
- 13. that faculties of engineering accelerate efforts to attract women students to graduate studies and to ensure they continue to graduation so that the pool of candidates for faculty positions and senior positions in industry is increased.**

Schedule for success:

- ◆ Strategies to identify potential graduate students by 1993.
- ◆ List of and network for women graduate students and faculty by 1993.
- ◆ Assistance for professional development by 1993.

- ◆ Investigation of maternity/paternity needs of graduate students by 1994.

14. that faculties of engineering develop an action plan to increase the number of women faculty in engineering so that a more gender-balanced engineering faculty is created and all engineering students have women role models.

Schedule for success:

- ◆ Specific goals and strategies for recruitment of women faculty by 1994.
- ◆ Database of qualified candidates for faculty positions by 1994.
- ◆ Agreements with employers of engineers for adjunct, part-time or term appointments by 1994.
- ◆ Fully integrated, short-term, part-time positions for individuals desiring such appointments by 1995.

15. that universities design tenure and promotion criteria and processes to allow for family responsibilities so that maternity, paternity and parental leaves do not jeopardize career progression or achievement of tenure and promotion.

Schedule for success:

- ◆ Credit for faculty participation in programs to attract and retain students by 1993.
- ◆ Flexibility in requirements and timeframe for tenure and promotion by 1993.

16. that the engineering curriculum be made relevant to current societal realities and future needs so that engineering students are conscious of the effects of engineering decisions and designs, and develop an understanding of and appreciation for the humanities and social sciences.

Schedule for success:

- ◆ Incorporation of social context and human values in technical courses by 1994.
- ◆ Incorporation of gender-related and equity issues in engineering curriculum by 1994.
- ◆ Review of possible excessive academic workload of engineering programs by next review of the Canadian Engineering Accreditation Board.

17. that faculties of engineering develop and expand work-experience programs and encourage women students to participate so that they are able to validate their career choice and relate engineering studies to the workplace.

Schedule for success:

- ◆ Orientation programs for work-experience students by 1993.
- ◆ Procedures for reviewing work experiences and follow-up of problems with employers by 1993.

ENGINEERING WORKPLACES FOR WOMEN

The CCWE recommends

18. that all employers of engineers develop and implement corporate strategies and policies that demonstrate commitment to the hiring, promotion and career development of women professionals, especially engineers.

Schedule for success:

- ◆ Plan for recruiting, hiring and promoting women engineers by 1993.
- ◆ Women's advisory councils by 1993.
- ◆ Commitment to the principles of equity by 1993.
- ◆ Identification of systemic barriers by 1993.
- ◆ Gender awareness programs for all employees by 1995.

19. that employers of engineers develop recruitment practices to attract women engineers, and ensure the hiring of the best-qualified and most productive employees by creating a

selection process that is fair, objective and free of gender bias.

Schedule for success:

- ◆ Realistic objectives for hiring women engineers by 1993.
 - ◆ Appointment of one professional woman to every selection process by 1993.
 - ◆ Training program for participants in selection process by 1993.
 - ◆ Recognition for participants in recruitment programs by 1993.
 - ◆ Attraction programs for elementary and secondary school students by 1995.
- 20. that employers of engineers institute career development and promotion strategies to prepare women engineers for management, and to ensure the promotion of the best-qualified and most productive employees.**

Schedule for success:

- ◆ Networking opportunities within organizations by 1993.
 - ◆ Mentorship programs for recent engineering graduates by 1993.
 - ◆ Mentorship programs for engineers with management potential by 1993.
 - ◆ Career development programs for women engineers by 1993.
- 21. that employers of engineers adopt policies that support the professional, personal and family needs of all employees and ensure employees are able to balance family responsibilities with professional responsibilities and career development.**

Schedule for success:

- ◆ Alternative work arrangements and schedules by 1995.
 - ◆ Maternity, paternity and parental issues addressed by 1995.
 - ◆ Access to childcare or a childcare referral system by 1995.
 - ◆ Examination of employee compensation and benefits packages by 1995.
- 22. that employers of engineers initiate, update, promote and enforce policies to eradicate harassment in the workplace.**

Schedule for success:

- ◆ Harassment policies and procedures by 1993.
- ◆ Regular compulsory sensitization programs on harassment for staff and management by 1993.

SUPPORT BY ASSOCIATION

The CCWE recommends

- 23. that associations of professional engineers develop and institute programs for all members and engineers-in-training to ensure full acceptance of women engineers in the profession, and to eradicate harassment and discrimination against women members.**

Schedule for success:

- ◆ Committees to address issues of concern to women members by 1993.
 - ◆ Special events for women members by 1993.
 - ◆ Nominations of women for election to national, provincial and territorial councils by 1993.
 - ◆ Appointment of at least one woman to each committee by 1993.
 - ◆ Gender-inclusive documents and ceremonies by 1993.
 - ◆ Development of applications of the engineers' code of ethics in instances of personal harassment and discrimination by 1994.
 - ◆ Gender sensitivity programs and workshops by 1994.
- 24. that associations of professional engineers improve the information base on equity and human resource distribution, particularly as it pertains to women engineers, by expanding**

regular member surveys.

- ◆ Expansion of member surveys by 1993.
- ◆ Distribution of survey results to members and employers of engineers by 1994.

25. that associations of professional engineers design and launch a public awareness campaign to promote engineering, especially as a career for women, across Canada.

Schedule for success:

- ◆ Development of the national campaign by 1993.
- ◆ Distribution of information about engineering careers to all elementary and secondary educators by 1993.
- ◆ At least one woman on awards committees by 1993.

26. that associations of professional engineers establish or expand comprehensive attraction programs at elementary and secondary schools in co-operation with other organizations concerned with encouraging women to study engineering.

Schedule for success:

- ◆ School visit strategy and plan by 1993.
- ◆ Registries, resources packages and gender-sensitive training program for role models by 1993.

27. that associations of professional engineers develop voluntary career advisory programs to provide support and guidance to young people who are just beginning engineering careers.

Schedule for success:

- ◆ Career advisory programs for engineering students and engineers-in-training (EITs) by 1993.
- ◆ Training program for advisors by 1993.

28. that associations of professional engineers develop close working relationships with faculties of engineering to ensure engineering students are aware of the associations' expectations regarding fairness and equity.

Schedule for success:

- ◆ Regular presentations on ethics at engineering schools/faculties by 1993.
- ◆ Communication channels with engineering deans, student leaders and newspaper editors by 1993.

29. that associations of professional engineers make employers aware of the different perspectives and qualities women bring to engineering work.

MAKING IT HAPPEN

To sustain the momentum for change created by the CCWE's work, action will be required on many fronts. Such action must include monitoring, measuring and reporting on progress in the implementation of the CCWE's recommendations, as well as an ongoing media campaign to keep the issues before the public. It will be necessary to maintain the monitoring, reporting and communications functions at least until the end of the decade.