Positive Climate That Encourages the Recruitment of Femals in STEM

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Outline

1. Some specific projects in Science and Engineering
2. Projects in the demystification of Mathematics
3. Factors linked to underrepresentation of women in Engineering
4. Conclusions
NSERC-Industry Chairs

Natural Sciences and Engineering Research Council of Canada (NSERC) established since 1997, five regional NSERC-Industry Chairs for women in Science and Engineering (CWSE)

- to increase the participation of women in Natural Science (Pure and Applied Sciences) and Engineering
- to provide role models for women active in, and considering, careers in these fields, within their respective regions.
Objectives of the Chairs

- Develop, implement, and communicate strategies to raise the level of participation of women in Science and Engineering as students, as professionals and as academia.
- Provide female role models who are accomplished, successful and recognized researchers in Science and Engineering.
- Develop and implement a communication and networking strategy to ensure a regional and national impact on opportunities for women in Science and Engineering.
Chair Holders

In 2013, the five chair holders are:

- British Columbia and Yukon Territory, Prof. Elizabeth Croft, from the University of British Columbia
- Prairies, Prof. Annemieke Farenhorst, from the University of Manitoba
- Ontario, Prof. Catherine Mavriplis, from the University of Ottawa
- Quebec, Prof. Nadia Ghazzali, from Université du Québec à Trois-Rivières
- Atlantic, Prof. Tamara Franz-Odendaal, from Mount Saint Vincent University
“Les filles et les sciences, un duo électrisant!” (Girls and sciences, an electrifying duo!)

One day event, for girls from grades 8 and 9, a unique opportunity to discover the exciting careers in Science and Technology, through activities, discussions and experimentation workshops.

- Workshops in the morning (perfumes, math, etc.)
- “Magasine ton avenir” (Shop your future) on lunch break
- Science creative activity in the afternoon
“Future Ingénieure?”
(Future Woman Engineer?)

- activity to demystify the engineering profession, for grade 12 students, by spending four hours to a day with an engineer or a group of engineers, in the field of their choice
- initiated by the Marianne-Mareschal Chair,
- in collaboration with the Montreal Polytechnique,
- *The OIQ Professional and Engineers of Quebec*
- and the NSERC-Industrial Alliance Chair, in Quebec
“Future Ingénieure?”
(Future Woman Engineer?)

- Visits held in winter, January or February, just before the end of the main application period in universities in Quebec.
- In Quebec City, in 2009, 12 students were matched to six businesses and research centers:
  - DESSAU,
  - Research Group in Hydraulic Turbines of Laval University,
  - Hydro-Quebec,
  - Research Group for Defense Canada,
  - Ministry of Transportation of Quebec,
  - BPR-Bechtel.
SMAC Mission

Started in 2005

Arouse and reinforce the interest of teenagers for mathematics and sciences and demystify mathematics for the general public (www.smac.ulaval.ca/en)

- Show Math
- MathAmaze
Multimedia Show (www.mat.ulaval.ca)
More than 100 shows since its beginnings
More than 32,000 teenagers the show
Show Math in Class: Free Educational Kit

Can be downloaded from SMAC website (smac.ulaval.ca)

Was requested by teachers

Created to deepen the students understanding of topics covered by the shows

Written by a team of collaborators; teachers, graphic designers, etc.
Internet Game

FREE

3200 questions

Available for all users, from 6 to 99 years old!

Homework driven platform for teachers

Mathamaze.ca
Gender Summit, Nov. 13-15, 2013
Underrepresentation of women in Engineering

- Ghazzali and Myrand (2009)
  - “Facteurs liés à la faible présence des femmes en génie” (Factors linked to the underrepresentation of women in Engineering)
    - to identify the exclusion and self-exclusion factors, which could explain this underrepresentation.
Factors - underrepresentation of women in Engineering

- School Environment
- Family Environment
- Stereotypes
- Workplace culture, values, climate and labour relations
- Work-family balance
- Discrimination
# Institutional and social mechanisms of exclusion and self-exclusion

<table>
<thead>
<tr>
<th>Mechanisms of social and institutional exclusion (explicit or subtle)</th>
<th>In high school</th>
<th>In the University</th>
<th>In the Workplace</th>
</tr>
</thead>
<tbody>
<tr>
<td>✦ loss of interest for mathematics and physics (14-15 years old)</td>
<td>✦ dropout for boys</td>
<td>✦ lack of personal financial resources or of adequate child care</td>
<td>✦ work-family balance</td>
</tr>
<tr>
<td>✦ learning strategies between boys and girls</td>
<td>✦ influence of school staff and parents</td>
<td>✦ expectations of society different than towards men</td>
<td>✦ expectations (availability, mobility)</td>
</tr>
<tr>
<td>✦ biological clock</td>
<td>✦ subtle discrimination</td>
<td>✦ biological clock</td>
<td>✦ biases</td>
</tr>
<tr>
<td>✦ work-family balance</td>
<td>✦ expectations (availability, mobility)</td>
<td>✦ weak institutional support</td>
<td>✦ emphasize on valuing men’s work</td>
</tr>
<tr>
<td>✦ environment reflecting competition values (power fights)</td>
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<td>✦ weak institutional support</td>
</tr>
<tr>
<td>✦ Identity conflict</td>
<td></td>
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</tr>
</tbody>
</table>

| Mechanisms of self-exclusion | | | |
| ✦ misunderstanding the occupations | ✦ stereotypes | ✦ environment reflecting competition values (power fights) |
| ✦ lack of role models | ✦ self-actualization | ✦ Identity conflict |
| ✦ sensitivity to biases and friends | ✦ individual aspirations (weak sense of purpose) | |
Conclusions

- All projects focusing around two major poles: attraction and retention
  - Attraction:
    - efforts are mainly needed for the image problem surrounding the profession and the Engineering field.
    - As well, a work of education and promotion has to focus on highlighting the various types of engineers.
    - The Engineering community also has to promote the various faces of the work and reality of engineers.
    - Organizations have to make sure that their corporate image reflects the diversity policies

Gender Summit, Nov. 13-15, 2013
Conclusions

All projects focusing around two major poles: attraction and retention

- Retention:
  - to provide more female role models, fostering a culture of diversity and respect for differences, and finally, proposing various, adapted work-family balance policies
  - Organisations have to focus on listening to the specific needs of women. There is as well a necessity to increase awareness of the whole community to the adverse effects of subtle and explicit discrimination
Thank you