

Women, science and computing: issues, needs and good tools

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Workshop Women in Computing

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To begin

- **I'll consider the theme of women's ease and uneasiness in science and computing under various points of view, focusing on European reality. Some of you already know aspects of what I'll say. Some of you may not. My aim is to share data and thoughts with you, in an active, proactive and creative atmosphere.**
- **In general, with European data some difficulties exist.**

Difficulties with European data.

- **different statistical methods**
- **different realities**
- **the number of States of the Union has been changing over time**

NEW BASIS

HELSINKI GROUP : in the nineties it was created by the European Union, with the aim to explore the wide question of women in science. Helsinki Group made a very valuable work, but noticed that to go in depth statistics disaggregated by sex were needed.

On this bases were realized

SHE FIGURES 2003-2006

(Women in science, statistics and indicators)

and the **EUROPEAN PLATFORM**

WOMEN IN SCIENCE EPWS

Gender and National backgrounds

- **Disaggregated data reveal a complex reality.**
- **These data are very interesting, but hide important differences between different countries. Let's see just some examples.**

2003. Proportion of female PhD (ISCED6) graduates by narrow field of study in natural science and engineering (from She Figures)

	Life science	Physical Sc.	Math & statistics	Computing
EU-25	54.4	33.0	31.6	18.6

2003. Proportion of female PhD (ISCED6) graduates by narrow field of study in natural science and engineering (She Figures)

Examples of different European countries

	Life science	Phisical Sc.	Math&statistics	Computing
Belgium	40.3	29.8	35.4	3.2
Germany	46.7	22.8	27.9	11.9
Italy	72.4	45.2	42.4	25.0
Turkey	54.1	31.7	28.6	28.6
Hungary	43.0	37.4	25.0	30.0

Proportion of female researchers in Gov Sector by field of science 2003

	Natural Sciences	Engineering & Technology	Medical sciences
EU 25	31.0	22.3	49.7
Romania	47.3	36.2	51.8
Germany	17.7	11.5	34.0
Spain	38.2	33.0	40.3
Denmark	23.4	14.4	36.5

“Glass ceiling index” in EU Science *

SHE Figures also explored the vertical dimension of women’s employment in science. A “ Glass ceiling index” was created.

- Index more than 1 indicates the degree of underrepresentation in the upper level.
- European mean is 2.5.
- In Europe the two countries that are near to 1, the good number, are just Turkey (1.1) and Romania (1.4). Italy is 1.9, Sweden 2.1, etc.

**Proportion of women in grades ABC divided by the proportion of women in grade A (full tenure) (from “She Figures” 2006)*

WOMEN IN BOARDS

Establishing scientific agenda

(She Figures 2006)

Finland & Sweden: 40 %

UK & Denmark: 30 %

Elsewhere: from 1 to 5, 1 to 10.

**In sum, range varies between 10
and 40 %**

Gender and culture

- **Such data, widely varying in different contexts, show clearly that gender gap is also a cultural matter.**
- **What questions and matters exist upriver the situation of women in science?**

How women risk to be lost for science

- **Several studies evidenced that the presence of women in science undergoes a continuous leak, beginning in childhood.**
- **Let's see the dynamics of such leak.**

“The Chrysalis & the Butterfly”

I’ll use metaphores from “La crisalide e la farfalla”, a book written by a well known male mathematician, Prof. Lolli, Univ. of Turin, Italy.

- It’s about how girls are discouraged from getting into mathematics and how good they can be if they do.**

LOST GIRLS

- **CRYSTALIS:** GIRLS WHO WOULD HAVE A SCIENTIFIC POTENTIAL AND ARE DISCOURAGED BY PARENTS, PEER & MEDIA CULTURE, SCHOOL CONTEXT ETC.
- **BUTTERFLIES:** GIRLS, YOUNG WOMEN, WOMEN WHO ENTER SCIENCE. BUT SOME OF THEM CAN GET LOST BY THE WAY.
- **MOTHERS:** SUCCESSFUL WOMEN WHO, FOR VARIOUS REASONS, DON'T BECOME MODELS FOR THE NEXT GENERATION OF GIRLS.

Switch points where today butterflies may get lost

- **In childhood, at school**
- **When choosing school in adolescence (crucial temporal crossing between “gender identity” construction and choices for life)**
- **At the moment of selection to enter college**
- **At the end of University, when perceiving the milieu**
- **After PhD and initial grants**
- **When getting pregnant and becoming mothers**
- **At mid age, when making a balance of their life.**
- **When by the way they meet difficulties in establishing and developing their career**

How and why “mothers” can be lost or lacking for the next generations

- **Women’s presence in science is recent**
- **Women scientists are not very visible**
- **Women successful in life are often forgotten after death**
- **Not always successful wom- scientists feel that they can be conscious and attentive in taking care of younger women**

Some general difficulties along women's scientific career

- **Not always well informed**
- **because scarcely integrated in males' informal social networks** (often practised in places, times and ways that exclude women, but important to create affinities, relationships, alliances, power groups etc)
- **Working isolated or in smaller groups than men**
- **Possible different style in publishing: fewer but perhaps longer articles (hypothesis)**
- **Perhaps some apply less frequently for grants and funds (vicious circle with points 1.2.3.)(hypothesis)**
- **The time of career intersects with the time of motherhood (narrow "temporal windows" for choices, delays)**
- **Conciliating travelling and private life**

CRITICAL MASS

- **These issues can be common to all women in science, and some of them also in other activities.**
- **But such issues are the more true the more women are far from reaching a minimal “critical mass” in a specific field.**
- **It is also clear that a special problem exists with Computing. People in the field wonder why in Computing women still risk to remain spare immigrants in a male milieu. Various factors have been hypothetically detected, and checked by some researches.**

What makes the Computing courses environment chilly

(adapted from a contribution by Dianne P. O'Leary, Dep. C.S, UMIACS, Univ. Maryland)

Contextual dimensions

- few women assistants and faculty members (models)
- programming projects designed for male interests
- boys' languages, habits, styles, largely prevailing
- ugly spaces

Computing chilly (follows)

Relational dimensions

- reduced access to study groups where boys prevail
- devaluing of w's contributions, attributing them to male colleagues (reduced creativity)
- friction between women coping by being "one of the boys" and women seeking a different way of being
- disturbing hostile attitude from a few male students
- reversed "Pigmalyon Effect": expectation of instructor that she will do poorly, negative feedback from instructors and peers
- male language and gender-stereotyped examples

Cumulative effect can be overwhelming.

ISSUES & NETWORKS

- **To face all these and other problems, since the seventies in US women scientists began to build up networks, in Canada & Australia too, European women came later. Networks are useful think tanks: a whole set of tools has been imagined and practised.**

SOME TOOLS CONCEIVED FOR WOMEN IN SC & COMPUTING

- **TOOLS FOR VISIBILITY**
- **TOOLS FOR FEMALE MODELS
CONSTRUCTION**
- **TOOLS FOR NOT BEING A LONELY
IMMIGRANT AND FOR SOCIAL SKILLS**
- **TOOLS TO SUPPORT DEVELOPMENT
AND CAREER (AT A SMALL & LARGE
INSTITUTIONAL SCALE)**

TOOLS FOR VISIBILITY

- **DATA COLLECTING (Who, how many, where, women in science):**
 - **QUANTITATIVE RESEARCH;**
 - **QUALITATIVE RESEARCH***
- **NETWORKING**
- **WOMEN'S DATA BASES** (to be remembered when choices and proposals have to be done, for inst. for boards, committees, invitations, presence in broadcasts etc)
- **SCIENTIFIC PRIZES & AWARDS**
- **MEDIA, JOURNALISM, CONFERENCING**
- **HISTORICAL MEMORY AND RESEARCH****
- **MUSEUMS**

*Qualitative and historical research

- **Collecting data is a necessary basis.**
- **But qualitative research also results to be very important to explore women's situation in science: the way they experience and live the context, under their own point of view, can give very useful suggestions about what could be done.**
- **Historical memory about women in science is needed to develop social perception and self perception (as it is for men).**

TOOLS FOR CONSTRUCTING FEMALE MODELS

- **MENTORING** (very important, it has a long tradition among american w.scientists who "invented it", and starts being used in EU)
- **"SHADOWING"** (young women following successful women in their working place for one day)
- **SPECIAL PROGRAMS FOR SCHOOL TEACHERS**
- **SPECIAL SCHOOLS OR WOMEN CENTERS** (Exp in Germany, Women@SCS, The University of Maryland-Baltimore)
- **WIDENING SYMBOLIC PRESENCE AND COMMUNICATION:**
 - AMBASSADORS OF WOMEN IN SCIENCE
 - BROCHURES, GAMES, ETC
 - WEBSITES
 - HISTORICAL RESEARCH
 - DRAMA & MEDIA
 - ADS, MEMORIALS etc)

TOOLS FOR NOT BEING A LONELY IMMIGRANT AND FOR SOCIAL SKILLS

- **SELF ACTIVATION AS A KNOT OF NETWORKS**
- **NETWORKING**
- **MENTORING & COACHING:**
HELP IN IMAGINING & PLANNING ONE'S CAREER
& in FACING CRISIS

But NETWORKING FOR WHAT??

- **RECIPROCAL HELP AND CONSULTATION**
- **SHARING INFORMATIONS**
- **SHARING PERCEPTIONS**
- **NOT FEELING ALONE** (es. BCSW)

Ex: Activities of BCSW (UK)

**British Computer Science Women BCSW, founded by Sue Black,
2001 London South Bank Univ)**

- **CV review service by volunteers**
- **Seminars held in local schools (for instance where they were children)**
- **Informing about government or industry initiatives**
- **Job and positions advertising**
- **Cross-postings with other groups.**
- **Sharing news and women stories**
- **E-group discussions subjects:**
 - **advice about technical problems**
 - **strategies for job applications and interviews**
 - **technical assistance**
 - **how to deal with redundancy and employment rights**
 - **maintaining skills**

TOOLS TO SUPPORT DEVELOPMENT AND CAREER (AT A SMALL & LARGE INSTITUTIONAL SCALE)

WHAT IS NEEDED ARE NOT GHETTOS BUT FORMULAS TAILORED ON NEEDS

Examples for Juniors

- **Changing criteria of enrollement** which exclude girls (Carnegie Mellon)
- **Reciprocal mentoring between women students & graduates**
- **Scholarships, grants, fellowships etc, tailored for women needs (for W. and W&M)** (Turin Polit Italy, Dorothy Hodgkin Fellowship Programme UK)
- **Mentoring**

MUTED NEEDS, SPECIAL FORMULAS

Examples

- **Suppressing age barriers (still existing for example in Germany)**
- **Schemes for returning after career breaks**
- **Help for family needs**
- **Training seminars at critical points (offered for ex by EPWS)**

Example 1. Dorothy Hodgkin Fellowship Programme UK

**Aimed at young people (F & M) in the first
years after PhD:**

- salary for 4 years**
- annual research expenses grant**
- poss. of converting full time/part time and
viceversa for work or family commitments**
- some funds for family support during
conferences abroad**
- career advice**
- mentoring**
- networking**

Example 2.1 Ontechnico di Torino Italy. 2002

Program for women in engineering

Needs: extra encouragement and visibility

Tools:

- **No enrollement expenses**
 - **Scholarships**
 - **Tutoring**
 - **Mentoring in the last year**
-
- **2001.** before the Program, the rate of women' enrollement was **15.8 %**
 - **2006-7** the rate is **23 %**

INSTITUTIONAL LEVEL

- **Consulting women and people from more advanced institutions**
- **Promoting Transparent rules for funding, applications etc**
- **Monitoring institutional policies (restructuring, implications of new laws, redundancy)**
- **Institutional public pay audit**
- **Re- thinking excellence criteria (this discussion was opened by European Platform WS)**
- **Using external gender experts to rethink institutional gender balance situation**

POSITIVE ACTIONS, MAINSTREAMING

to have more women in

committees

boards

relevant decision making levels

top positions

To conclude

**Best wishes to all the girls...
and to smart boys**

**Quotations where source is acknowledged
are welcome.**

**A more complete article will be in FTI website
in 2007-2008. www.forumti.it**

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