FP7 CAPACITIS SCIENCE IN SOCIETY:

STRUCTURAL TRANSFORMATIONS TO ACHIEVE GENDER EQUALITY IN SCIENCE STAGES

Workshop of the UAIC's Network of Academic and Researchers Women

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Q??? Why so Few? Why so Slow? Why so Low? (M.Ranga)

- The dynamics of women in science & research in the EU 27 displays a wide variability, and important imbalances.
- For some EU countries the trend is descendent (Germany, Netherlands) while for others –especially the Eastern Europe and Baltic countries- the average of women graduated in STEM is above the European mean (EUROSTAT, 2010)

Problems /questions:

- Why fewer and fewer female chose an education and a science & research career in STEM fields?
- Why girls drop out from STEM education and career?
- Can we promote, encourage and motivate especially girls and young women for STEM?
- Can we create new ways and educational methods to make the image of science and technology more attractive for both boys and girls?
- Can we build a gender friendly organizational environment?
- T*he possible answers and solutions* became of strategic interest for the EU 27 and the EU Agenda 2020.

Human Capital for Knowledge Society: A Strategic Issue for the EU

- How to improve the human capital in science and research?
- How to better prepare the female and male students for a more complex labor market re-shaped by the information and knowledge society became an issue of worldwide concern for states and governments.

Dealing with (some of) these questions : Research outcomes from selected EC projects: FP6 UPDATE

- An impressive body of research has been carried out (EU, international) in order to find out why women are so poor represented in science research, especially in STEM

- Many of them offered partial and limited answers and also place the intervention strategies at later stages (higher education, companies, labor market segregation etc) letting out of interest exactly the time (periods) when the structures of personality as well as the behavioral patterns are set up...

Research findings: Women/girls' motivation for science and research (STEM)

- Feminist theories (I.M.Young, A.Jagger , 'the normative dualism'); feminist psychoanalysis (N.Chodorow); Post structuralism feminism (J.Abbiss)
- Theories of motivation (T.Amabile, E.Deci and M.Ryan (self determined competencies), A.Bandura (self-efficacy), C.Alderfer (growth needs)
- Early child development
- Neuroscience theories (J.Eccles)
- New sociology of childhood (child as an active agent/researcher, J.Qvortrup) etc

The ‘normative dualism’ and women’s work devaluation

- The devaluation of women’s work is rooted in the so called ‘normative dualism’.
- It introduced a difference and than a hierarchy among ‘intelligence ‘and ‘body’, later reproduced in the hierarchy of work and professions. Based on this stereotypes some **professions dominated by women have been considered ‘of lower value’, the work undertaken by women as ‘less scientific’ and, generally as being tied “to the body and need: teaching young children, social work, nursing”** (A.M.Young, 1990: 220)
- Self-devaluation

Neuroscience

Lessons from neuroscience:

- **Diversity of cognitive interests, early childhood education and brain's natural propensities…'use it or loose it' !**

FP6 project UPDATE: Approach and Research Design

- Consortium
- 15 partners (universities, research centers, NGOs) from 10 EU Member States

- Sample : N=1707 (females and males students/ engineering and ICT; non-engineers females and males students+ secondary education students
- Sampling method (non-probability samples /intentional samples)

Data analysis

- The method of central tendencies was used for data analysis in order to identify possible synergies/commonalties among the samples of young people coming from different cultural and educational traditions.

- For a more analytical identification of the peculiarities of cases we have used K-means cluster analysis. Operationally, the combination of the central tendencies with data segmentation through cluster analysis made possible **the identification of the 'profiles'**.
- For the respondents' *structural profiles* identification, we have chosen a method of data classification (clustering) based on similarities and dissimilarities among the cases. We have opted for the 'K-means' clustering method

The five profiles identified

a) The High Profile (I Know, I Can, I Want, I Do)

b) The Low Profile (The compensatory profile / I Want to Do –but I am not confident that I Know and I Can)

c) The de-motivated profile (When I faced the difficulties …I quit)

d)The gender stereotyped profile (I Know, I Can but I Did not Want to Do)

e) The a-motivated profile (Never thought to take this educational direction)

a)The High Profile

Descriptors- motivators

- **High intrinsic motivation** –self determined competencies. The subjects who are sharing this profile expect to achieve something, to have the possibility to use their initiative, to use all their potential, to do interesting and challenging activities.
- **High extrinsic motivation**. The subjects who are sharing this profile expect to be well considered, to have promotion possibilities, to have enough vacation, to make a good living. Females, more than males, expect not to work under pressure, to have enough vacation and not to lose the job (with higher scores for Eastern women).
- **High level of aspirations and expectations**
- **Constant interest** and good results/achievements in math alongside the educational cycles
- **Diversity of the cognitive interests** along the educational cycles (starting with the primary one) in math, foreign languages and sport and also in physics for males and life sciences for females.
- **Self efficacy / self-confidence** – trust in their own capabilities to solve technical problems and taking the difficulties more like challenges than failures
- Independent thinking
- **Self image**: social and leading competences, intellectual competences, technical competences and machine orientation, thinking creatively and

High profile (2)

- **Self efficacy / self-confidence** – trust in their own capabilities to solve technical problems and taking the difficulties more like challenges than failures
- Independent thinking
- **Self image**: social and leading competences, intellectual competences, technical competences and machine orientation, thinking creatively and innovatively, hard-working and ambitious. At the level of the overall sample there are slightly differences among females and males students. Female students describe themselves as less intellectually competent than male students. They also describe themselves as less technically competent and machine-oriented, but, more creative, innovative and more hard-working and ambitious than the male students.

b) The Low Profile (The compensatory profile / I Want to Do –but I am not confident that I Know and I Can)

- **Descriptors- motivators**
- Medium intrinsic motivation
- **High extrinsic motivation**
- Non-gender biased education
- Medium interest and non-permanent good results in math alongside the educational cycles These subjects report good math results within primary education cycle, difficulties in middle educational stage and some good but a non-permanent bases in secondary education stage.
- Medium self efficacy and self-confidence – medium trust in their own capabilities to solve technical problems; taking the difficulties rather like sources of anxiety and failures.
- Non-independent thinking (the decision to take engineering education route was influenced by parents, peers, older brothers/sisters, teachers)

c) The de-motivated profile (I thought I know and I can, I wanted (tried) but when I faced the difficulties ...I quit)

- **Descriptors-motivators**
- Medium intrinsic motivation
- Medium extrinsic motivation
- Medium to low self-efficacy; the difficulties are taken more as failures and incapacity to be as good as they should
- Non-gender biased education
- Constant good and medium results in math alongside the educational cycles.
- Medium self efficacy and self-confidence – medium trust in their own capabilities to solve technical problems; taking the difficulties rather like sources of anxiety and failures.
- Non-independent thinking (the decision to take engineering education route was influenced mainly by teachers).

d) The gender stereotyped profile (I Know, I Can but I Do not Want to)

- This profile mirrors in many respects the first one. The main difference is made by the early (and constant) gendered biased education and the influence of parents & teachers in educational path/career choice.

- **e) The a-motivated profile** (never thought to take this educational route)

Some conclusions from UPDATE

- Many of the researches in the field of gender and science were looking for a sort of ‘fix pattern of factors’ that would have explanatory virtues for a wide range of persons/ from different cultures, with different life experiences ...
- Unlike other researches in this field we built a case oriented analysis and have chosen a different technique for the quantitative and qualitative data analysis (data mining).
- It offered us the possibility to (really) identify the commonalties as well as the differences among different cases (not variables) and to build profiles.
- Each profile has its peculiarities – **and different patterns of motivators and barriers.**

- **There are configurations that augment the probability to increase the number of women in SET while others decrease them.**

FP7Meta analysis of gender and science research http://www.genderandscience.org/web/project.php

The purpose of the **Meta-analysis of gender and science research** study was to collect and analyse gender and science research on the following topics:

- » **Horizontal segregation in research careers**: this topic covers the issue of choice of scientific subjects by girls and occupational choices by women, the perception and attractiveness of science, engineering and technology, the causes underlying these choices (e.g. stereotypes, influence of family and role models, etc.), the causes of success and failure at university level, etc.
- » **Vertical segregation in research careers**: this topic covers the barriers for women to reach top scientific positions ("glass ceiling" or "sticky floor"), mentoring/tutoring initiatives, etc.
- » **The underlying causes and effects** of these two aspects, including work-life balance issues, pay gap, mobility-related obstacles, dual careers, evidence of discrimination, working culture, stereotypes, gender bias in research contents

FP7Meta analysis of gender and science research/Romania

http://www.genderandscience.org/doc/CReport_Romania.pdf

- In Romania, women's issues became a topic of national interest integrated within the official policies only from 20004 onward, once with the starting of the EU negotiations of accession. Under the obligation to harmonise with the 'acquis communautaire' the legal- institutional frame has been considerably enriched. Among these, the setting up of the
- Ombudsman, of the National Agency for Equal Opportunities (with territorial branches), of a National Council for Anti-Discrimination, a special Gender Statistics Division at the National Institute of Statistics etc., as well as the elaboration of an important set of legal regulations aiming at implementing the 'equal opportunities among women and men' in all the spheres of social, political, educational, scientific, economic etc., life.

FP7Meta analysis of gender and science research/Romania

http://www.genderandscience.org/doc/CReport_Romania.pdf

- Horizontal and vertical segregation
- Pay and funding
- Stereotypes and identity
- Science as a labour activity
- Scientific excellence

Promoting change and transformation:

Practising Gender Equality in Science: Guidelines for Gender Equality Programs in Science (PRAGES) http://www.reteparioppportunita.it/Rete_Pari_Opportunita/UserFiles/Progetti/prages/pragesguidelines.pdf

- **Strategic areas of risk and intervention**

I. Three areas of risk:

a) Science as an unfriendly environment

b) **Science as gender-insensitive**

c) Scientific leadership: missing women

Practicing Gender Equality in Science: Guidelines for Gender Equality Programs in Science (PRAGES)

- **II. Three areas of intervention**

- **a) A friendly environment for women**
- **b) Gender aware science**
- **c) Women's leadership of science in a changing society**

ADVANCE Program NSF-USA: Good practice

http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5383

- **The goal of the National Science Foundation's (NSF) ADVANCE** program was to increase the representation and advancement of women in academic science and engineering careers, thereby developing a more diverse science and engineering workforce.
- **ADVANCE encourages institutions of higher education** and the broader science, technology, engineering, and mathematics (STEM) community, including professional societies and other STEM related, not for profit organizations, to address various aspects of STEM academic culture and institutional structure that may differentially affect women faculty and academic administrators.
- **As such, ADVANCE is an integral part of the NSF's multifaceted strategy** to broaden participation in the STEM workforce, and it supports the critical role of the Foundation in advancing the status of women in STEM academic careers.

ADVANCE Program NSF-USA

Research has shown that women's representation and advancement in academic STEM positions are affected by many external factors that are unrelated to their ability, interest, and technical skills, such as:

- Organizational constraints of academic institutions;
- Differential effects of work and family demands;
- Implicit and explicit bias; and
- Underrepresentation of women in academic leadership and decision making positions.
- The cumulative effect of such diverse factors has been to create barriers that impact the number of women entering and advancing in academic STEM careers.

ADVANCE Program NSF-USA

The ADVANCE program currently supports the following types of projects:

- **Institutional Transformation (IT)** supports comprehensive, institution wide projects at institutions of higher education to transform institutional practices and climate.
- These projects must be based on the relevant social science literature. This organizational approach was identified as an important strategy by NSF because research indicates that the lack of women's full participation in science and engineering academic careers is often a systemic consequence of the academic culture and organizational structure of institutions of higher education

ADVANCE Program NSF-USA

Institutional Structure: Universities and colleges often have organizational barriers that can negatively impact the participation of women and other underrepresented individuals in academic careers.

- **Review, revise, and increase the transparency** and effective implementation of policies and procedures (particularly recruitment, promotion, and tenure policies).
- **Develop systematic and recurring institutional** data collection and reporting of faculty data and climate surveys, disaggregated by demographics and rank, for use in decision making.
- **Incorporate equity and diversity responsibilities and accountability** into institution wide administrative positions, departmental leadership, and faculty to ensure equitable distribution of resources, responsibilities, and commitment.

ADVANCE Program NSF-USA

WorkLife Support: Retention of both female and male faculty is closely related to satisfaction with work-life balance. Women are disproportionally impacted by work-life issues because female scientists and engineers are much more likely to have a dual-career partner in science and engineering than their male colleagues and because women continue to have a larger share of dependent care responsibilities.

- Implement flexible career policies that address needs identified by the community.
- Develop career and life transition support programs.
- Establish dual career hiring programs tailored to the institution and region.
- Encourage department and institutional flexibility and support for dependent care responsibilities.
- Create institutional and departmental climates that encourage faculty to take advantage of work-life programs and ensure that there are no negative impacts on a faculty member's career for participating in the programs.

ADVANCE Program NSF-USA

- **Equitable Career Support:** Career support programs, such as mentoring and leadership development, are important for retention and promotion of female and male faculty. Women are typically disadvantaged with respect to their male colleagues when career support activities are informal.
- **Establish formal mentoring structures** and provide recognition of service for the time and effort of mentors.
- **Develop mechanisms to recognize professional excellence** of both female and male faculty.
- **Provide workshops, training, and coaching** on the tenure and promotion processes to all faculty.
- **Implement leadership development,** career coaching, and network building programs.

ADVANCE Program NSF-USA

- **Empowerment:** Faculty, department leaders, and institutional administrators are empowered when introduced to the scholarly findings on gender equity barriers and given the tools and resources to address barriers in their decision making.
- **Provide faculty**, department leaders, and institutional administrators with the tools and resources to address gender equity barriers.
- **Provide training** on effective strategies to reduce the stressors that result in a greater reliance on implicit biases when making decisions, especially in search committees and promotion and tenure committees.

UAIC: where are we standing statistical data

- After 1990 the UAIC has developed from 9 to 15 faculties and the number of students grew to more than 38,000.

... **leaky pipeline at (the very) home**

- In 2010-2011 the ratio of female to male students was **1.93.**
- The **graduation statistics by gender** keep this trend, **with more graduated females than men** (total ratio being **1,7**).
- At **postgraduate level** the women to men ratio is **2.46**.
- The **retention females to male ratio is reversed** (**0.80**)
- The downward of females in academic and research positions is strong in the upper levels of the hierarchy ratio **C professors/researchers 0.86; B professors/researchers** 0.60; **A professors/ researchers 0.38**; **leading/managerial positions 0.24**)

UAIC's ACTION PLAN

- 1. **Actions promoting change in organizational culture and formal/informal behaviors:**
- Setting up the "UAIC's Network of Women Academic and Researchers;
- Documenting and evaluating both qualitatively and quantitatively, equal opportunities
- **2. Actions promoting work-life balance**
- **3. Actions supporting early-stage career-development**
- Negotiating with the National agencies (UEFISCDI) to extend the provision of grants to be allocated by universities and research institutions for women's professional development

UAIC's ACTION PLAN

- 4) Actions challenging gender stereotypes and consequent horizontal segregation;
- Creating the **Compendium of Women researchers at UAIC** and their contribution in S&T, as an open source database;
- Setting up the special section/permanent **exhibition** of women researchers at UAIC's museum
- 5) **Actions promoting women's leadership in the management of research**
- Negotiating for the establishment of new transparent rules and procedures for appointing/electing scientific/ research/ educational boards/committees/ commissions' members and leaders at local/university level

UAIC's ACTION PLAN

6) Actions promoting women's visibility:

- Documentary (film or publication) on "Life and career of outstanding women scientists in Europe" in cooperation with a Broadcasting Company;
- Implementing the "**Science and Technology Excellence Awards**" for outstanding women who have achieved: a) excellent results in scientific research; b) excellent results in technological innovation. Under this task, the prizes for scientific excellence will be awarded. Awards will be granted for early-career researchers; middle-career researchers and senior researchers.

Join us

Thank you.

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