

## **Gender Equality**

The EU is committed to sustain strategies for ensuring full participation and achievement in the sciences by women and girls. According to the report She Figures 2012: Gender in Research and Innovation, women are still underrepresented in both the public and private research sectors. ([http://ec.europa.eu/research/sciencesociety/document\\_library/pdf\\_06/she-figures-2012\\_en.pdf](http://ec.europa.eu/research/sciencesociety/document_library/pdf_06/she-figures-2012_en.pdf))

Here are some of the findings of the survey in terms of scientific employment, scientific fields, career development and decision-making process of women:

### **In terms of scientific employment:**

- On average in the EU-27, women represented 40 % of all researchers in the Higher Education Sector, 40 % in the Government Sector and 19 % in the Business Enterprise Sector, but in all three sectors the number of female researchers has been witnessing higher growth rates than the number of male researchers.

### **In terms of scientific fields:**

- Over the period 2002–2009, female researchers were generally gaining ground in all fields of science in Higher Education, although at a very different pace in the different countries. In particular, the humanities as well as in engineering and technology; these fields were attracting more and more women. Contrary to the relatively uniform distribution of female researchers across science fields in Higher Education, the situation in the Government Sector is much more diverse and disparate, and the way the number of female researchers evolved over time in the different fields of science was highly country-specific.

### **In terms of career development:**

- Women's academic career remains markedly characterised by strong vertical segregation. In 2010, the proportion of female students (55 %) and graduates (59 %) exceeded that of male students, but men outnumbered women among PhD students and graduates (the proportion of female students stood at 49 % and that of PhD graduates at 46 %). Furthermore, women represented only 44 % of grade C academic staff, 37 % of grade B academic staff and 20 % of grade A academic staff.

### **In terms of decision making:**

- On average in the EU-27, 36 % of board members were women in 2010, whereas in 2007 they represented only 22 %, an increase which is influenced to a certain extent by changes in the computing methods for the EU average.

NANO TECHNOLOGY SCIENCE EDUCATION (NTSE)- 511787-LLP-1-2010-1-TR-KA3-KA3MP

### **Differences in boys' and girls' way of learning / behaviour – Classroom Practices**

According to the literature (UNESCO Guidelines for Mainstreaming Gender in Literacy Materials, PREMA project, TWIST project, PRAGES project, Equity Initiatives for Science and Mathematics), the learning behaviour of girls and boys differs. While the variance might be partly due to biological factors, current research focuses on behaviour aspects in teaching / learning. The genders are likely to process information and behave in a classroom in different ways.

Boys take a more abstract and holistic approach, are more receptive to symbols and formulas and because competition seems to be a good motivator for them to learn, they are often more competitive in their behaviour. Girls, on the other hand, tend to process information more sequentially and systematically; they are more linguistic, have a greater eye for detail and find tangible and concrete examples more appealing.

It is important to note that these differences are generalized for all boys and girls, based on research results. There will always be exceptions. Every child is different. Variations in the way children learn are found not only between the genders, but also within them. However, when teachers are aware of the general differences between boys and girls and know how to respond to them, the education of the whole class could be significantly more effective. We therefore need to acknowledge and encourage both ways of learning. Not only by differentiating the way we teach boys or girls, but by integrating both ways of learning into our teaching methods. In addition, teachers should be aware of their own ways of learning. Just like their students, male and female teachers may have a more “boy-like” or “girl-like” way of learning – which could make their teaching methods more suitable for either boys or girls. It is important to understand that a teacher’s way of learning and a teacher’s preferred teaching methods may not suit all students.

### **Classroom Practices**

A short outline of issues to be attended in Student/Teacher interaction is presented here below:

- Give equal attention to girls and boys. Call on girls as often as you do boys - ask boys and girls questions which are equally demanding.
- Have high expectations of both male and female students. Do not encourage learned helplessness by over-nurturing the girls.
- Encourage girls to be active learners by using manipulative and providing hands-on learning experiences.
- Use gender-free language in classroom discourse. Eliminate sexism in your use of language.
- Use quality, precise feedback to girls' as well as boys' answers - not just a nod or a "good."

The content of this deliverable is the sole responsibility of the partnership, and it in no way represents the views of the European Commission or its services.

#### NANO TECHNOLOGY SCIENCE EDUCATION (NTSE)- 511787-LLP-1-2010-1-TR-KA3-KA3MP

- Make eye contact with all students and call them by name.
- Understand that girls generally begin processing information on the brain's left, or language, side. So, girls deconstruct science concepts verbally. Looking at something on a board or screen is not enough. They need to unpack the problem using language. They need to "talk it through".
- Provide adequate wait time, perhaps 3 or 5 seconds, before calling on a student to answer the question. Females often wait until they have formulated an answer before they raise their hands; boys often raise their hands immediately and then formulate an answer.
- Have girls read instructions aloud. When girls eventually perform science experiments, even when the project is relatively easy, this will help them break down the steps involved. It also helps with deconstructing more elaborate math problems down the road.
- Never tell girls the answer. The point of science is not so much to get the answer but to figure out how to get it. The more you do for your students the more you short circuit their self-esteem. If they are stuck on something, keep asking questions.
- Do not interrupt girls or let other students do so.
- Refrain from recruiting students to perform classroom "chores" based on traditional gender roles. Do not ask only boys to assist in carrying boxes and girls to clean the bookshelves.

As for the Lesson Planning/Classroom Management the following issues should be considered:

- Emphasize that we live in a scientific world. Girls can be increasingly resistant to the idea of "science" as a standalone subject until they reach middle school. When the same scientific principles are presented to them as "social studies", they become invariably receptive and energetic students.
- Raise the "fun-factor" in science lessons by e.g. including games, by offering a variety of teaching methods and by relating the subject matter to students' interests. For example, interactive teaching methods have proved efficiency in preventing gender gap in science teaching.
- Avoid gender -based stereotypes in the educational activities, experiments, teaching materials and teaching programmes. Give equal attention to girls and boys – giving boys and girls tasks which are equally demanding.
- Balance cooperative and competitive activities. Most girls learn more readily in cooperative situations.

**NANO TECHNOLOGY SCIENCE EDUCATION (NTSE)- 511787-LLP-1-2010-1-TR-KA3-KA3MP**

- Establish rules for participation and rotate jobs within each group.
- Give girls an equal amount of assistance and feedback. Boys usually receive more help and praise that builds self-esteem.
- Stress safety precautions instead of dangers for certain activities such as laboratory experiments.
- Avoid the digital gender gap by encouraging equity in ICT use. Insist that girls as well as boys learn to set up and use all electronic equipment.
- Address inappropriate behaviour with a fair and respectful attitude, regardless of gender, race, ethnicity, or socioeconomic class of students.
- Use computer and lab partners. Again, most girls work better in cooperative groups or teams.
- Provide female role models. Girls need to see females in certain professions or career choices in order to visualize themselves in the same or similar roles; whereas boys need only to hear about certain roles to imagine themselves taking place in those same roles.
- Provide learning experiences for girls to develop spatial visualization skills. Create an attractive classroom environment. Girls learn better in an aesthetically pleasing environment.

**GENDER EQUALITY IN THE CONTEXT OF NTSE**

The project is aware of the European priorities and tendencies concerning the science education in

COUNTRY	GENDER		TOTAL
	FEMALE	MALE	
<b>BULGARIA</b>	6	13	19
<b>GREECE</b>	14	13	27
<b>ITALY</b>	28	16	44
<b>ROMANIA</b>	20	8	28
<b>TURKEY</b>	31	48	79

girls. That is why it defines as its objectives to apply gender equity sensitive approaches and pedagogies toward teaching/learning about nanotechnologies. NTSE Team has paid strict attention to balance the number of participants while designing the national and international events. These are the figures based on the numbers of female and male participants of NTSE Project test implementation period, poster competition and science camp. The data for the test implementation period is not shown on a table due to the fact that the implementations still continue. However, special attention is paid to keep number of male and

female participants in balance.

Table 1: The number of participants for the poster competition based on gender

The content of this deliverable is the sole responsibility of the partnership, and it in no way represents the views of the European Commission or its services.

## NANO TECHNOLOGY SCIENCE EDUCATION (NTSE)- 511787-LLP-1-2010-1-TR-KA3-KA3MP

COUNTRY	GENDER		TOTAL
	FEMALE	MALE	
<b>BULGARIA</b>	4	3	7
<b>GREECE</b>	2	2	4
<b>ITALY</b>	2	4	6
<b>ROMANIA</b>	6	0	6
<b>TURKEY</b>	5	8	13

Table 2: The number of participants for the science camp based on gender