

# How to change stereotypical images of science, engineering & technology?

## Results and conclusions from the European Project MOTIVATION

**What images of disciplines and professions in science, engineering and technology (SET) are prevalent among adolescents and what factors influence them? These questions were addressed in the last two years by teams from Austria, France, Germany, Slovak Republic, Spain, Sweden and The Netherlands in the EC-funded project "MOTIVATION – Promoting positive images of SET in young people under gender perspective".**

*Felizitas Sagebiel, Associate Prof., University of Wuppertal, Coordinator of MOTIVATION.*

*Carme Alemany, Director of research of CEDIS (Centre for Studies on Women and Society, Barcelona).*

*Jennifer Dahmen, social scientist at the University of Wuppertal.*

*Bodil Davidsson, consultant and a freelance journalist in Sweden.*

*Anne-Sophie Godfroy-Genin, Associate Prof. at University Paris-Est-Creteil-Val-de-Marne and researcher at the Ecole Normale Supérieure de Cachan.*

*Gabriela Kolvekova, Assistant Prof., Technical University of Kosice.*

*Cloé Pinault, research assistant for European projects (MOTIVATION, HELENA).*

*Els Rommes, Assistant Prof. for "Gender, ICT and Pedagogy" at the Institute for Gender Studies, Radboud University Nijmegen.*

*Mariska Schönberger, social scientist at the Institute for Gender Studies, Radboud University Nijmegen.*

*Anita Thaler, Head of the research area "Women – Technology – Environment" at IFZ.*

*Natasa Urbancíková, Associate Prof., Head of Department of Regional Science and Management, Technical University of Kosice.*

*Christine Wächter, Associate Prof., Director of IFZ, Scientific Director of the Centre of Women Studies and Gender Research at Klagenfurt University.*

## Introduction

Research on SET and gender in media focussed on SET professionals so far. The new focus of MOTIVATION was to focus on general images of SET in youth magazines and television, in school and by the young people themselves taking initiatives of good practice on a national basis into account (Sagebiel 2008). Methods included document and media analysis, interviews, focus groups and drawings.

## Youth magazines as SET learning fields

In a first phase of the project, in 2008, the consortium explored relevant youth magazines and analysed images of SET and gender quantitatively and qualitatively (Thaler 2009). In total 1.016 SET images of Austrian, French, German, Dutch and Slovak youth magazines were analysed. One remarkable insight is that technology plays a great role in youth magazines, but only 3.1% of the analysed images show SET as a job field; the rest represent SET products. German magazine "BRAVO" (which is the most popular youth magazine in Germany and Austria) is partly overt gender and SET stereotypical. For instance vehicles are presented as male technology, showing males driving cars, motorbikes and even boats, females are mostly presented as co-drivers or not even that but just like models posing beside vehicles. "BRAVO GIRL!" has been identified as a magazine with a strong hetero-normative direction mainly aiming at girls and how they can appeal to boys (cf. Dahmen, Thaler 2009). Austrian magazine "Xpress" has less overt gender and technology stereotypes but in the analysis more

subtle forms are visible (ibid.).

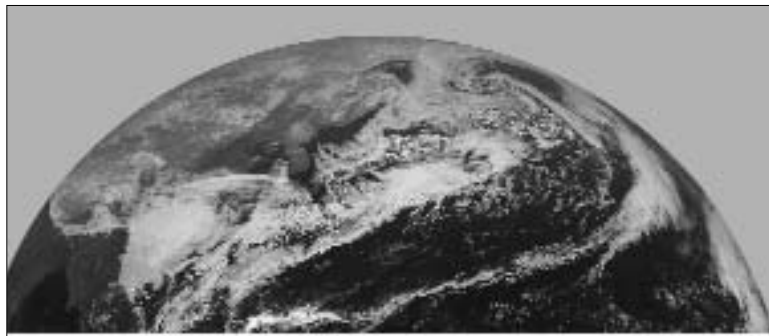
French magazine "Closer" presents SET as a job field only in training ads. Beside that SET is predominantly shown with males. Females in SET pictures are presented not only gender stereotypical but moreover sexist. The second analysed French magazine 'Phosphore' presents SET equally with males and females. Dutch magazine "Girzl!" presents SET with competent females, but mostly competent with female connoted technologies. In contrast, the other Dutch magazine "Quest" presents SET mostly with males, and there especially male connoted technologies. In mixed gender groups or female representations in SET images, traditional gender roles are often reinforced.

## Soap operas as informal SET education

In the second project phase, in 2009, the consortium analysed images of SET and gender in "soap operas" in all partner countries. Six of the seven analysed soap operas "Física o Química" (Spain), "Gute Zeiten? Schlechte Zeiten" (Germany), "Goede Tijden? Slechte Tijden" (Netherlands), "Panelák" (Slovakia), "Andra avenyn" (Sweden) and "Anna und die Liebe" (Austria) are offering similar results than the magazine analysis: Technology is often part of the stage set and seldomly used in a meaningful way. The positive exception of our soap opera analysis is the French TV series "Plus Belle La Vie", which broaches the issue of SET in various ways, mostly via female and male SET professionals and up to date scientific and engineering stories (Thaler et al. 2009).

## Gendered curricula and school books

In addition to interviews with high school students (age 13-18) and with teachers, school books for secondary schools were analysed. Books contain very few images of persons (except in biology). There are sometimes some paragraphs about the history of science highlighting famous figures as Archimedes, Newton, Volta, etc. with very few female figures. Inside general education, biology is more related to real life than physics or chemistry. Maths appears as the



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“driest” discipline with almost no images, no context, and in some cases black and white books. When there are different curricula in general education, as in France, these trends are reinforced in the science curriculum, when the humanities curriculum has a very light scientific contents embedded in historical and social context.

The result is quite paradoxical: dry and theoretical approaches are less attractive for pupils, but representations of science and scientists are not obviously gendered (except in the historical chapter). Contextualised approaches are more attractive, but tend to present gendered representations of science: women are often the patient, the mother, the cashier, etc. when men are engineers, medicine doctors, etc. In almost all European countries, regulations or laws recommend to pay attention to gender issues in school books, in fact, it is not taken into account everywhere. Vocational education is very gendered and it is not so surprising to find very gendered representations in schoolbooks. The challenge would be to have an attractive presentation of sciences (including maths) in context, with an attention to gender and without abandoning the substance of the scientific contents. For vocational education, the issues would be a more gender-balanced representation of sciences; it would imply a gender-neutral representation of professions.

### Interest in and Image of SET

Besides the 77 interviews with pupils 10 focus group discussions were done to study

how various youth cultures and cultural beliefs about what kind SET people are potentially influencing pupils' choices about SET. Participating were 50 different kinds of pupils (boys, girls, interested in SET or not, heterosexual/non-heterosexual). Pupils in all countries seem to find SET sometimes interesting, e. g. as subject or hobby, but rather not as career, to do “all the time” because it is “not fun”, “not about people” and “monotonous”. What they do consider SET jobs to be about is about “earning money”, “getting opportunities” and it is “for/with men”. These are for most pupils not the most relevant aspects of a future career. Opinions about SET do, however, to be somewhat depending on how much they like and how good their teachers are. In total almost all the boys in our sample indicated that they were interested in SET and only half of the girls were interested in SET. Family relations seem to be mostly traditional in all countries. In all countries the father is by far most often considered the most competent SET person in the household with Slovakia as the biggest exception. It seems that pupils with a traditional work distinction in the family will make more traditional choices. Only a few of the pupils have the intention to work in a SET-profession, of who most are boys (42%), versus 19% of the girls.

Pupils' images of SET persons are still very stereotypical, despite the increased numbers of women SET persons there are in society. Less than 4% of the drawings they were asked to do show a woman SET person. This

outcome is conform (or even more stereotypical than) earlier “draw a scientist” (DAS) studies in other countries. Interestingly, of the girls who did draw a woman SET person, a relatively large number drew “their teacher” or “themselves”.

### Success of inclusion SET initiatives

Good practice examples to change images of SET professions among young people were identified for each partner country, founders and persons in charge of these initiatives were interviewed to learn more about their sustainability. Initiatives that have been running for many years have made a much stronger impression in young people than projects of shorter duration. This was true for selected German national wide established Girls' Day, a one-day activity for girls that offers insight into job fields where women are still underrepresented with the aim of weakening gender stereotypes in job decisions. Pupils who because of inclusion initiatives were keen on SET in ages of 10 to 12, and who after that did not attend any such initiative, were after some years not planning any SET education or profession. Initiatives including practical training seem to become more successful in encouraging pupils into SET than others.

### Conclusions

Overall we can conclude that technology plays an important role in young people's lives. No wonder that those technological devices are part of media representations as

well. Youth magazines and soap operas have lots of different possibilities to embed SET as meaningful topics. But only few producers use this chance, like in a job special section of the German youth magazine "BRAVO" or for an explosive storyline in the French soap opera "Plus Belle La Vie". Most youth media represent SET, and most often technology as well, in an accessory-style, like clothes or furniture they are used in the stage set of TV scenes or magazine pictures to represent modernity, where unfortunately the message too often is that possessing is more important than using and understanding (Thaler 2009). A lack of visible female SET role models also explains why pupils hardly ever draw a woman SET person. If they draw a woman engineer or scientist they indicate that this is a drawing of a specific person they know. More emphasis, thus, has to be put on showing careers and cultures of SET in youth media and to make women in SET and their professional life visible, not only to change the all too often still one-sided representations

of SET as a male domain but also to bring SET on the adolescent's "radar of interesting job perspectives", for both boys and girls. For that reason, one aim of the project is to have an impact on youth media and to inform and motivate "persons in charge" of possibilities to show technology and SET-professionals more often and also more appropriately. Our dissemination approach was a bottom-up one, thus leaflets, personal meetings, seminars were the best advertising of the objectives important to the motivation team. Non-academic journal or newspaper editors, even TV producers were interested in our research, and the project website provides further information: [www.motivation-project.com](http://www.motivation-project.com).

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