
Learning with Magazines and TV? Gendered Images of Science, Engineering and Technology in Youth Media

Anita Thaler

Abstract

Digital and traditional media are of increasing importance for education processes, because they not only support formal learning processes, but also enable informal ones. In addition to various e-learning courses in schools and universities young people obtain much information by using various media in their leisure time. Students learn a great deal (and not always intentionally) while watching TV, reading magazines, communicating on the internet, playing games or collaborating in the virtual world.

In this paper I will summarize key findings of the MOTIVATION¹ project regarding science, engineering and technology (SET) and gender in youth media and present recommendations how we could use the informal learning potential of youth media to raise young people's interest in SET.

The educational impact of popular youth media

Science, engineering and technology are future job fields, but in many European countries the number of SET students is in decline. The European Union has thus formulated a future lack of SET students and professionals as a major challenge for European society (European Commission 2004).

A presupposition of the empirical work presented in this paper is that job choices of young people are influenced among other things by media representations of jobs and job features, so that popular media can be seen as today's informal vocational counsellors for young people. In the research described in this paper two youth relevant media fields were analysed: TV series (soap operas) and print media (magazines), which are popular among young people and can be interpreted as informal education areas.

Gender-focused media analysis has so far mainly concentrated on either quantitative analysis of gendered media usage (Grossegger 2005; Medienpädagogischer Forschungsverbund Südwest 2007) or on qualitative analysis of men and/or women in media (for instance European Commission 1999). Youth magazines in particular have often been analysed with a gender perspective. For instance Mühlen Achs (1996) criticized their focus on so called 'special female needs'; Chagheri (2005) showed in her feminist-linguistic analysis that the description and pictures of women in girls' magazines cannot be considered emancipatory. And Herrmann (1999) also explored a German teenage girls' magazine, describing it as reinforcing the myth of femininity.

Past research on science, engineering and technology and gender in the media – the focus of the MOTIVATION project – has, however, addressed only the role of female scientists or gender and SET professions in general (see for instance Bulck & Beullens 2005; Flicker 2005; Griffin et al. 1994; Wasburn 2004; Whitelegg et al. 2006), but missed the general focus on images of SET in youth media.

The idea behind the general focus on images of SET (and the question of their genderedness) is that the relevant SET image shaping information is not only connected to the scientists or engineers who are presented. Moreover, vocational and educational choices are not only based on explicit representations of SET professions and professionals. Through SET representations in youth media, various facets of SET images are individually constructed and added to existing image knowledge about SET (Neisser 1967). These images influence educational and professional choices both intentionally and incidentally. This means that besides their formal education at school, young people obtain much information and gain knowledge by using various media in their leisure time. Pupils learn a great deal (and not always intentionally) while consuming media, communicating on the internet, playing games or collaborating in the virtual world (Dohmen 2001; Thaler 2008). This is often interpreted as an indicator for the relevance of IT agency and media literacy through youth media (Universitat Autònoma de Barcelona 2007). But where is the gender competence in those agency and literacy concepts? Leisure time media, like TV, internet and computer games in particular conceal

much implicit gendered information, for instance about IT (see for instance Rommes 2002) and engineering as a gendered – masculine connoted – topic. One key question is: Why do so few women consider a career in science, engineering and technology although so many measures and initiatives are aiming at ‘young women in SET’? Can gendered SET images in youth media be the answer to a part of that question?

As a general rule it can be stated that television plays a huge role in the lives of young people, the youth researcher Beate Grossegger calls television the ‘leanback medium number one’ (2005). But other media are important as well: together with radio, newspapers and magazines, TV belongs to the ‘basic communication infrastructure’ of modern teenagers. In addition, special lifestyle niche media and the internet complete the media mix of young people. The motives behind media consumption is on the one hand a personal benefit, to satisfy one’s own interests, and on the other hand a social benefit, meaning to know something about topics which are discussed among friends or other groups and thus to increase one’s prestige (ibid.).

Methodology

In my function as a work package leader² of the MOTIVATION project I provided two content analysis tools and comprehensive guidelines (based on Bohnsack 2009 and Mayring 1997) for the other team members: one to analyse illustrations published in youth magazines (Thaler 2009); and another to analyse television soap opera scenes (Thaler & Scheer 2009).

A total of 60 issues of eight different European youth magazines were analysed³ in a first phase of the MOTIVATION project in 2008. These magazines were the Austrian ‘Xpress’, the French ‘Closer’ and ‘Phosphore’, the German ‘Bravo’ and ‘Bravo Girl!’, the Slovak ‘Kamarát’ and the Dutch ‘Girlz!’ and ‘Quest’ magazines.

In the second phase, in 2009, the MOTIVATION team analysed images of SET and gender in television programmes. Our special focus lay on soap operas, because we knew from youth studies that in particular young women regularly watch daily soaps and mystery stories on TV

(Götz 2003). In total 62 episodes of the following European soap opera were analysed: 'Anna und die Liebe' in Austria (Scheer & Thaler 2009), 'Plus Belle La Vie' in France (Pinault 2009), 'Gute Zeiten, schlechte Zeiten' in Germany (Jennifer Dahmen 2009), 'Goede Tijden Slechte Tijden' in the Netherlands (Schönberger & Rommes 2009), 'Panelák' in Slovakia (Kol'veková 2009), 'Física o Química' in Spain (Alemany 2009), and 'Andra avenyn' in Sweden (Davidson 2009).

Results

Magazines

The consortium collected and analysed a total of about 1012 SET images which were distributed differently among the European youth magazines examined. 'BRAVO' leads with 491 SET images, because this magazine was analysed partly in Austria (316) and partly in Germany (175); on average 22.3 SET pictures were analysed per issue. 111 SET images were found in the Austrian magazine 'Xpress', which makes an average of 18.5 SET images analysed per issue; 13 in Dutch 'Girlz!' (4.3 per issue); 48 in Dutch 'Quest' (16 per issue), 4 in Slovak 'Kamarát', 202 in French 'Closer' (16.8 per issue), 60 in French 'Phosphore' (20 per issue) and 87 in German 'BRAVO GiRL!' (on average 14.5 SET images analysed per issue)⁴.

Of all 1012 pictures analysed nearly one half (48.8%) show SET as a main topic in a picture, for instance a singer singing with a microphone in her hand, and the other half (51.2%) represents SET in the background, for instance a car in the background of a fashion shooting.

Another question investigated was whether and to what extent the role of SET differs in the selected magazines. And indeed there are some interesting results: While in German 'BRAVO' SET is nearly equally represented in the background (49.7 %) and as a main topic (50.3 %), almost comparable with the French 'Phosphore' (46.7 % background; 53.3 % main topic), the French 'Closer', Dutch 'Girlz!' and German 'BRAVO GiRL!' show around two thirds of SET topics in the background, with the Dutch science magazine 'Quest' showing SET as a main topic in three quarters of the images analysed.

Most interestingly, the vast majority (96.2 %, of all the pictures analysed) represent SET as a product, e.g. a cell phone, an e-guitar, a computer, a car etc. Only 3.1% of all SET pictures analysed represent SET as a job, showing an engineer or a scientist.

A huge majority of pictures show SET with persons (78.3 %), and 51.4 % of all SET pictures show at least one female (some together with males). All in all, the SET images analysed seem to be relatively gender balanced: 27.1 % show only males with SET and 28.3% show only females with SET. Thus, females and males are quantitatively equally represented with science and technology in youth magazines. One exception is the German girls' magazine 'BRAVO GiRL!', where two thirds of all SET images show females. This over-representation of females goes along with the general over-representation of females in the whole magazine, as it is a girls' magazine explicitly aiming at female readers. But a closer look at one special field of technology (vehicles, i.e. cars, motorbikes etc.) shows that this pattern (over-representation of girls in SET images in a girls' magazine) is not generally the case. When it comes to vehicles, the girls' magazine shows more males than females in the respective pictures.

Soap operas

The 62 soap opera episodes analysed comprise 1620.5 minutes of analysis material. On average 63 % of all scenes had SET in them, showing for instance a cell phone, a notebook, an engineer or a scientist. When considering only active SET scenes, meaning scenes with SET in the foreground, the percentage is much lower, on average 24.2 %. This means that SET plays a role in all soap operas, the extent to which this happens tends to be dependent on the current content of the soap opera episode (e.g. a storyline playing in a hospital and showing machines increases the number of SET scenes). The active usage of SET is much lower in all soap operas analysed. This is not so much influenced by the actual content, and it seems to be as if SET is – as in the magazines – more often part of the stage set than an actively used actor in the soap opera.

The 23 episodes of 'Anna und die Liebe' analysed in Austria mainly showed two technological artefacts: cell phones and elevators. In 80 out

of the 650 scenes analysed, the persons portrayed used cell phones to communicate. In second place comes the elevator, which plays a rather important role in this soap opera, because the protagonists usually use an elevator to get to the different locations. SET in the background is commonly used to emphasize the function or purpose of a room, e.g. an office or a café. Summing up, one can say that (cell) phones are used to emphasize the profession of the men portrayed. Other technological artefacts like laptops, computers, coffee machines or stoves, which in reality would be regularly used by people in the occupations portrayed, are almost totally absent. Altogether, the role that SET plays in 'Anna und die Liebe' is very unrealistic and relatively unsatisfying in terms of a gender equal representation (Scheer & Thaler 2009b).

The French soap 'Plus Belle La Vie' on the other hand shows not only the lives of and events in different families but also covers contemporary problems and also SET topics such as water contamination (Pinault 2009). In former seasons mad cow disease, homosexual parenthood, euthanasia and other socially relevant topics brought the possibility to show SET professions like engineers and scientists. The good practice aspect of this French soap can indeed be found more in the jobs of the characters or in their good deeds, where some of the men would even go beyond so called hegemonic masculine identity, but the soap does not show SET usage. One suggestion for improvement could be to bring some insights into what a site forewoman actually does in her job (ibid.).

'Gute Zeiten, schlechte Zeiten', the most successful German daily soap opera covers various topics of life from birth to death, love to hate, wedding to divorce, hetero- and homosexuality, employment and unemployment (Dahmen 2009). The majority of technological artefacts portrayed in the two weeks of analysis belong to technology used by people every day such as cell phones, TVs, fridges, coffee machines or notebooks. The series does not explicitly create a positive or negative image of SET. Technology is mostly casually used for working or communicating and it is only very seldom that it plays an active part in the plot. Despite all the science and technology connections in the soap, no good practice SET scenes were found in any of the 10 episodes analysed. The SET use portrayed is mainly gender equal, for instance notebooks and cell phones are used

equally by female and male characters, but SET related professions are mainly roles for men (ibid.).

The Dutch soap opera 'Goede Tijden Slechte Tijden' often showed technology in a situation demanding the attention of someone, for instance the episode of handyman Danny who works with electrical equipment, while Ronja wants Danny's undivided attention (Schönberger & Rommes 2009). Mobile phones have a rather communicating image, but the gender analysis showed that male characters use it for communicating about work or business issues. The Dutch soap opera contained no good practice SET scenes, only few women (25 %) have non-traditional jobs (owner/director, stockholder) and none of the men has a female connoted profession. Three of the male characters have SET jobs (e.g. handyman) or work with technology. A female photographer could be interpreted as SET-related, but only to a minor extent as she is never shown with technology (ibid.).

Gabriela Kol'veková (2009) divided her analysis results of the Slovak soap opera 'Panelák' into three different SET situations: first, persons who have contextual knowledge of SET (for instance a male character who prefers using old music technology such as a gramophone or a female army pensioner who likes tinkering with model aircraft); second, SET presented by characters (the male character of an IT professional); and third, SET scenes showing artefacts. Two situations were interpreted as good practice SET scenes in the Slovak context, one in the episode where a male character takes the iron from his wife and does the ironing himself, and the other where a female character (the army pensioner) glues her model aircraft (ibid.). On the other hand it must be mentioned that SET jobs (scientist, PC expert) are portrayed as exclusively male domains.

The Spanish soap opera 'Física o Química' is set in a secondary school and is mainly about six to eight teenage characters and their love issues (e.g. sex, ménages-à-trois, jealousy, homosexuality), and also about the school teachers and their love affairs with each other. The portrayed technological devices are connected to everyday life and represented in the light of a 'customary use of present-day consumption society' (Alemany 2009, 3). As computers are part of contemporary school life and have become an essential tool, laptop computers are parts of teachers' equip-

ment, regardless of their gender. But although technology is a logical actor in this soap, the technological devices are presented as part of the background setting and Alemany criticizes that SET is represented gender stereotypically (ibid.).

And finally, the Swedish soap opera 'Andra avenyn' deals with families living in a suburban environment in Gothenburg, including a school, a café, a boxing club, a church and a bed factory (Davidson 2009). Especially the location of Gothenburg itself, a busy city with a very famous technical university (Chalmers), but also the bed factory 'Björnsängar' (Bearbeds) portrayed should bring more up-front technology scenes into the storyline of 'Andra avenyn' than it actually does. But Davidson states that she could not find a good practice SET scene or even the use of simple technologies in her analysis (ibid.).

Conclusions

Although European students agree on the importance of science and technology – as revealed in several studies (see for instance European Commission 2001; OECD 2007) – only a minority of them can envisage a career in science, engineering or technology. In the MOTIVATION project we searched for possible explanations, especially in the context of youth media. This analysis and knowledge exchange process should bring more insights into the role of media in the process of shaping stereotypical images of technology in the minds of young people (Osborne, Simon & Collins 2003) and help in explaining effects such as the declining numbers of SET students.

Two major findings can be highlighted from the analysis of the leisure time media for young people:

- First, youth magazines and soap operas show a lot of SET, especially technology, and therefore have a huge potential for informal technology learning.
- Second, the representation of SET lacks meaningful embedding contexts and is often presented stereotypically, mainly gender-stereotypically

(Thaler 2010). To provide information about how SET could be embedded meaningfully and gender equally in magazines and TV productions was one of the aims of this paper and will be the focus of our final recommendations (mainly for media producers).

Only 3.1 % of all the 1012 magazine pictures analysed represent a SET profession. This confirmed our decision of setting a broader scope of SET and analysing all SET representations (mainly technological artefacts) instead of focusing on scientists and engineers only. Indeed the great majority of SET images in youth magazines portray SET products, either as a main topic or in the background.

Another important result is that the majority of SET images (depending on the magazine) are placed in the editorial content (and not in advertisements), which leads to the conclusion that the relevant stakeholders in a knowledge exchange process have to be first and foremost journalists. One key finding is that journalists use SET too seldomly in stories about SET professions or SET education possibilities, but too often as stage props set in the background.

Another field of action is the gender equal and meaningful representation of SET, i.e. good practice. A candidate for good practice was found in the German 'BRAVO', where an irregular special section called 'Job Attacke' introduces future job fields to young people. One issue (BRAVO, nr. 43, 2008) even uses the 'CSI effect' (Rommès et al. 2007) where work in forensics is presented as a 'dream job'. This magazine section is also not free from gender segregation, however, as some technology fields such as electronics or mechanical engineering are again presented as male domains, while chemistry and medicine are portrayed with females. This reproduction of gendered SET fields contradicts the general intention of this job special, which is to promote gender equality as demonstrated by the gender-sensitive language and the equal portrayal of women and men. This could be explained with Angelika Wetterer's (2008) concept of 'gender knowledge' (in German: *Geschlechterwissen*), where a rhetorical and a pre-reflexive level of 'everyday gender knowledge' (in German: *alltagsweltliches Geschlechterwissen*) can be distinguished. In the context of the magazines' analysis results it can be assumed that gender equality has

become an important value, at least it is important enough to take place on a rhetorical level – on the surface – for instance when it comes to an equal representation of females and males. But a deeper analysis (the qualitative gender analysis of magazine pictures) revealed that the gender knowledge applied still derives from an everyday perspective and not from gender expertise, because the pre-reflexive level (visible in the detailed analysis of pictures) consists of gender stereotypes and the conservation of traditional gender roles (Thaler 2010). Thus even the irregular job section of 'BRAVO' which looks like good practice at a first glance, cannot be recommended without reservation as a good practice SET education measure.

In this analysis point, however, it becomes clear why the media and their influence need to be further researched, because while rules about gender equality exist in formal learning settings, gender knowledge is generally not taken into consideration in informal learning contexts (Stern et al. 2007; Thaler 2010).

The analysis of seven soap operas in the different countries of the consortium brought only a few good practice examples in terms of representation of SET and even less in gender equal SET representations. Six of the seven soap operas analysed, namely 'Física o Química' (Spain, Alemany 2009), 'Gute Zeiten – Schlechte Zeiten' (Germany, Dahmen 2009), 'Goede Tijden Slechte Tijden' (Netherlands, Schöneberger & Rommes 2009) 'Panelák' (Slovakia, Kol'veková 2009), 'Andra avenyn' (Sweden, Davidson 2009) and 'Anna und die Liebe' (Austria, Scheer & Thaler 2009) produced similar results to those of the magazine analysis: technology is often part of the stage set and seldomly used in a meaningful way. The few meaningful SET examples (like actually working on a computer or repairing a machine) were sometimes perpetuating gender stereotypes and in most cases adjusting traditional gender roles. The positive exception of the soap opera analysis is the French TV series 'Plus Belle La Vie' (Pinault 2009), which broaches the issue of SET in various ways, mostly via female and male SET professionals and up to date scientific and engineering stories. This soap opera could be seen as a popular and good practice of informal SET learning, because the SET images represented are relatively diverse and real (Thaler et al. 2009).

This is very unfortunate because we know of the influence daily soaps have on young people; they play an important part in terms of identity construction for their young audience (Göttlich et al. 2001). Theunert and Gebel (2000) emphasize in their book that soaps contain learning effects concerning gender roles, relationships and life plans.

The overall conclusion of this paper is that technology has a very special and important role in young people's lives. Grossegger and Heinzlmaier (2007) say in their current study about Austrian youth that the leisure time of today's young people consists of people plus media plus technology. Young people use technology to expand their communication zone (ibid.).

Against this background it is no surprise that technological devices are also a part of media representations. The fact that magazines and soap operas often present SET in their images and scenes could also be used in formal SET learning arenas such as schools. The topics of youth interest portrayed together with SET in media can be used for SET education, by connecting exactly those leisure topics of interest with science and technology classes in school. For instance the research project 'Engineer Your Sound!' showed how the interest field of music can be used as a vehicle to raise pupils' interest in technology and furthermore teach them technology with an appealing and participatory approach (Thaler & Zorn 2009). This interdisciplinary gender-sensitive technology learning process implemented results from previous studies and will be supported by MOTIVATION results as well. It enables upper secondary school pupils to gain hands-on experiences, to experience problem-based science and technology learning, to learn in teams, to apply own competencies and to experience SET as a topic with relevance to their everyday lives (ibid.). The knowledge about what technology-compatible interest fields young people have and where teachers can readily find these topics of interest (all popular youth media offer ideas and not only magazines and soap operas) can be retrieved from youth media analysis results.

Youth magazines and soap operas, however, also have an unused potential to embed more SET as meaningful topics. Only a few producers are currently using this opportunity, for example in a job special section of the German youth magazine 'BRAVO' (which could be further im-

proved with gender expertise) or for an explosive storyline in the French soap opera 'Plus Belle La Vie'. Most youth media represent SET (mostly technology) as an accessory; like clothes or furniture, they are used in the stage set of TV scenes or magazine pictures to represent modernity, where unfortunately the message is all too often that possessing is more important than using and understanding (Thaler et al. 2009).

Recommendations

A first and obvious recommendation is that youth media producers, especially soap producers and soap authors could need some support to integrate SET in a meaningful and less stereotypical way. The story need not become boring and complex as a result, on the contrary, the stories would win from a new pool of situations and characters. TV producers could use the support of industries and universities in order to create interesting characters who act a little more like real people, whose everyday lives at home, at school or at work provides them with new challenges (Davidson 2009).

TV series such as 'Emergency Room' and other (medical) drama series showed that realistic presentations of professional spheres are compatible with the dramatic elements of love and crime stories. The inclusion of SET related consultants (with gender expertise!) could thus improve the presentation of SET in daily soaps and bring new ideas for stories of topical interest as demonstrated in the French soap 'Plus Belle La Vie' (Thaler et al. 2009).

A further recommendation is that magazines and especially TV series should generally integrate more diverse and realistic job images, and especially SET related professions (see also Dahmen 2009; Davidson 2009). In total about 90% of the jobs presented in soap operas belong to the service sector so that this branch is clearly over-represented in TV (MMB Trendmonitor 2004). The job representations in soap operas are generally too unrealistic; in the seven soap operas analysed, we found restaurants where no one ever cooks, advertising offices where no computers are used, or photographers who never use a camera. Dahmen

(2009) refers to two studies which underline the importance of offering more realistic job images. A Belgian study proved that audience perceptions about specific occupations (midwives and veterinarians) tended to become more positive after regular watching of the related TV shows (Van den Bulck & Beullens 2007). And Maya Götz (2003) identified soaps as having a high potential to influence the socialisation of girls, but the danger of more effective stereotypes and clichés in soaps is also evident.

Another recommendation is that SET must be connected to topics which are relevant to the audience. We live in a technological society and it is thus not very difficult to find examples of technology in our everyday lives. Thinking about the social and ethical impacts of SET and environmental issues is just the beginning. Many books tell dramatic stories with a prominent role for SET such as the novels of Michael Crichton and Carl Djerassi, who invented the genre of 'science-in-fiction' (http://de.wikipedia.org/wiki/Carl_Djerassi). Both of them explicitly made science the theme of their books: Crichton told stories about dinosaur cloning, global warming, nanotechnology, time travel, animal behaviour, and human genetics (Grazier 2008). Djerassi additionally created many interesting female characters in his books (Gehrke 2008); like Stieg Larsson who created 'Lisbeth Salander', a female IT hacker in his Millennium thriller trilogy (<http://www.stieglarsson.com/>). As youth media want to reach young people these new SET topics definitely have to include teenagers' interests (Dahmen & Thaler 2009; Thaler & Dahmen 2009a+b) and leisure topics such as music (one practical example: Thaler & Zorn 2009).

And finally, youth magazines as well as soap operas and all popular youth media should be aware of their influence on perpetuating stereotypical gender knowledge (Thaler 2010). Soap operas in particular are very often watched by young girls and could easily break up some traditional gender roles by creating female role models or 'sheroes' as Karin Lenzhofer describes them in her book 'Chicks rule!' (2006). SET related female role models are in especially short supply (Becker 2009).

So why not create a female character who is smart and earns a good salary with her SET job? She does not have to be an unrealistic super-person, but she could have a good job and also lead a highly satisfactory private life. In too many series the female characters in particular have

to give up one for the other, but why not aim at introducing characters who have it all? The (female) audience would love such role models with whom they can identify and also look up to.

Notes

- ¹ The empirical data presented in this paper is derived from the EU 7 FP-funded project 'MOTIVATION'. The following persons were involved: Felizitas Sagebiel (coordination) and Jennifer Dahmen in Germany, Anita Thaler and Christine Wächter in Austria, Anne-Sophie Godfroy-Genin and Cloé Pinault in France, Els Rommes in the Netherlands, Carme Alemany in Spain, Bulle Davidsson in Sweden and Natasa Urbancíková and Gabriela Kolveková in Slovakia. For further information see www.motivation-project.com.
- ² The EU 7 FP project MOTIVATION is divided in several work packages, of which I led 'Youth, gender and SET in media', which is described in this paper.
- ³ The magazine analysis was done by Jennifer Dahmen (BRAVO, Bravo Girl!), Gabriela Kol'vecková (Kamarát), Karen Mogendorff and Aniek Willemsen (Girlz!, Quest), Cloé Pinault (Closer, Phosphore), Anita Thaler (Xpress) and Magdalena Wicher (BRAVO).
- ⁴ The differences in the amount of images analysed in the individual magazines are a result of different foci of the consortium partners (MOTIVATION is a co-ordination action and not a research project, and therefore it was more important to try out methodologies and exchange knowledge and results, rather than analysing representative numbers of issues in each country).

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