

Gender HCI - Guidelines for gender aware design

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Abstract. Equality is said to have come a long way in the western world, but there are still differences in software use between men and women. Computer design today is mostly geared towards men, because of the myth of men being the more frequent users. Studies however show that women of today use just as much technology as men. Computer literacy is very important today and if software design does not invite women to think of the technology as theirs, they will never reach the higher degree of self-esteem which is very important for successful technology usage. This might later lead to disadvantages in the job market, where everything relies on technology. It is therefore important to explore this area further and clarify in what way gender is important when working with HCI design. To understand gender and how it relates to technology we must study the differences that exist. One important difference found between men and women is the degree of self-efficacy when it comes to software adoption and use. Women lack in self-efficacy and it makes them afraid of trying new features and inhibits them in their learning process. The degree of self-efficacy also affects people's motivation, problem solving strategies and information processing. This article investigates the gender issue from different points of view and identifies ideas for how designers of today can contribute to a more gender fair technology. To design gender aware does not mean to categorize women as a problem group, but to design for everyone. User involvement, thorough evaluations and awareness of the dynamic nature of sociological gender can be of help in distinguishing what a user really wants from what we think the user wants based on our stereotypes.

1 Introduction

A great part of Human-Computer Interaction (HCI) design is to know the user for whom the artifact is designed. Important parameters to consider are for example age, occupation, point of interest, context of use and of course gender. This article focuses on the equation; gender and technology design. Studies in this area claim that men and women process information and solve problems in different ways [1] and that software design of today focuses mainly on men. Men are seen as the main user group and women as a group in need of special solutions [6]. A great risk with this approach is that it, by assuming that women need help, makes them a problem group for HCI-designers. This might conduct

a self-fulfilling prophecy, women are not expected to be successful in using technology and therefore they won't be [6]. A well known researcher in this area, Laura Beckwith [1, 2], has come to a very interesting conclusion; the sense of a persons self efficacy is very important when it comes to how he/she relates to technology and software use. Self efficacy is a persons own valuation of his/her ability to manage a certain task. Women tend to have low self-efficacy and this causes problems and raises barriers for women in their interaction with software designed for people with a higher degree of self efficacy, simply said, men [4]. The degree of self-efficacy in its turn, noticeably affects a persons ability to process information and his/her problem solving strategies. Lower degree of self-efficacy inhibits people in their willingness to try new, unknown ways to complete a task and learn new features [4]. Designers should have this fact in mind when designing software and try to make solutions that invite users to play around (tinker) with the software.

To design gender aware means to design for everybody, to really know your user and to leave your stereotypes aside. Some ideas to keep in mind when desining gender fair software are the importance of particiatory design, and early rewardments for novices. Continuous evaluation and user involvement are important parts in reaching the goal of gender fairness. To incorporate womens beliefs and desires into the context of technology and rather describe them as people / user desires can make us see the issue in a different way.

In this article I aim to, by reviewing the ongoing research and the different viewpoints in the area, identify some ideas for how to take gender into account when designing software applications. The questions I ask is; Should we design especially for women or should we strive to design in a totally "gender-free" way? How can we work with the gender parameter in practice, in the design process? The focus of this study is mainly interactive software applications, such as in mobile phones or computer software where the user needs to make at least some decisions on his/her way from start to finish. In order to understand the different aspects of gender and technology the results are cathegorized in three different parts; a general description of the gender concept, gender differences in technology use and gender related to technology design. The article concludes with a discussion of the results and the introduction of some ideas that might be of help in the design process. Issues not discussed in this article are different feminist theories and design guidelines already established by famous interaction designers.

2 Method

The article is based on a literature study of articles found in the Umeå University library database and with help of the search engine www.google.com. Used keywords for the literature search are: "gender HCT", "gender design", "design for

women”, gender, software, HCI, design, ”gender problems”, user-interface and feminism.

3 Results

In order to understand the wide concept of gender and its relation to technology, an overview of the subject is given below. The chapter is divided in three sections; ”The gender issue”, that explains the general concept of gender from a sociological and biological point of view, ”Gender differences”, that looks at differences in problem solving, information processing, and the differences in self-efficacy and motivation, and finally a section about ”Gender technology and design”, that relates the two fields.

3.1 The gender issue

The term gender refers not so much to the biological sex, as to the social differences between men and women [11]. There are two main directions in the gender discussion, one that gender differences are purely a cultural construct, making men and women essentially equal, and the other direction is leaning towards gender being non distinguishable from the actual biological sex. This means that men and women are different by nature and it is only stupid to think that the sexes can be totally equal [5]. To address the gender issue in the technology field it is important to view both sides. We look different physically, often act different and are expected to be different because we are of opposite sex. But is it our different biology or our social expectations that form our concept of gender? The use of technology and design of HCI are however, two very much social issues, providing different social contexts. Our experiences form us as human beings and differences that may exist between genders origin from our social interactions and are reproduced through different categorizations in our social contexts.

First we have to understand gender as a social phenomenon, constructed in collaboration with other people. Second we have to understand the ground for the social expectations, our biological sex. Are there actual cognitive differences and are they there because of us being essentially different or just because we are expected to be? Meanings of gender differ over historical periods, over different cultures and depending on context. Gender is said to be of performative art [5], which means that people behave / perform their gender. It is possible for a man to imitate a woman because the womanhood is in itself an imitation of social norms and expectations. Hertig, referenced in [6] draws the conclusion from studies that the actual sex of a person is only important when gender is ”at issue”, as to say, when we see a context that in some way emphasizes our expectations of men and women. An example from a this study is when a group of viewers were asked to categorize people in a photo. One group was told the picture represented a group of successful executives and the other group was not told anything. The first group categorized the photo as being of ”men and women”, while the other group categorized it as being of a group of friends. [6]

3.2 Gender differences

Whether it originates from nature or nurture, there are some noticeable differences between men and women when it comes to software use. Studies have shown that there are differences in learning styles, problem solving processes and information processing. But most important and interesting is the difference in self-efficacy and motivation for computer use.

Self-efficacy and motivation

A person's self-efficacy is found to be very important when it comes to software adoption and use [4]. Self-efficacy has to do with a person's judgment of his/her own ability to carry out a specific task [1]. Studies conducted in this area show that women lack in self-efficacy when it comes to deal with computers and this fact affects their approach to problems, problem solving and information processing. Women also perceive higher risks which makes them less willing to engage with computer software [2]. According to a theory called self-efficacy theory [1], this trait is critical in problem solving, affecting the use of cognitive strategies, the amount of effort, coping strategies when faced with obstacles and therefore the final performance. Females are afraid of taking risks and this combined with the lack of self-efficacy make them less willing to explore and adopt new features in a software [1]. In some contexts this is a good trait however, but when it comes to exploring and using new software, it is inhibiting.

Another fact is that men and women have different motives for using the computer and how to relate to it. For a man, a computer is more of a toy, something that is made for him, while for a woman, the computer is a tool. This makes men and women behave differently when interacting with software. Men are more willing to apply general knowledge to task-specific demands [4], they tend to play around with the software, and they are not afraid to fail, which gives them great opportunities to learn new features. The "play around" approach, also called tinkering, has shown to be the most successful when it comes to learning new software. But it has to be just the right amount of tinkering. Too much playfulness might have a negative effect on the performance. The fact is though, that there are no noticeable differences in men's and women's actual performances and learning abilities. It is what they learn, the way they learn it and how they solve problems in a computer environment that differ. Women are significantly slower in trying new features, they are afraid it will take too long to learn and they lean towards using the old traditional way of solving a problem instead of exploring new ones. Men tend to overuse the tinkering approach instead, which makes them perform less. The sum of these facts shows that women's inaccurate estimation of own ability in many cases becomes a self-fulfilling prophecy [1]. This means that when believing oneself to be less successful, one will be less successful. Men on the other hand overestimate own ability and therefore underperform. Self-efficacy is of cumulative nature, increasing with more positive experiences. Those wishing to encourage software adoption and use need to

manipulate the users level of self-efficacy [4].

Older studies show that kids, already in kindergarten, think of the computer as a boys' toy resulting in boys spending more time with the computer [6]. Recent studies show however that girls spend just as much time at the computer as boys and girls being uninterested in technology is just a myth [12]. So the gender difference lies not so much in quantity as in motivation for and pattern of use. As for men, boys see the computer as a toy, they use the computer to play games and more often engage in activities that requires computer programming. Girls on the other hand, see the computer as a tool, needed for completing a task. They seldom have the motivation or courage to dive in to the underlying structures of computer functionality. Girls motivation for computer use is of collaborative and communicative art and adult women tend to see it the same way [6]. Men's approach is of controlling art, they want to dominate the artifact, while women works with it in a cooperative manner [7].

Problem solving

Sorte [7] describes a study conducted by Fennema and Sherman in 1977 that aimed to identify differences in male and female problem solving strategies. The study showed that men outperformed women in mental rotation tasks and problems requiring mathematical skills. Quinn and Spencer, also referenced by Sorte [7] claims that the well known stereotypes of academic skills has a lot to do with such results. It is commonly known that men are expected to be good at math while women dominate the area of language, such as reading, writing and learning new languages. These stereotypes are so integrated in all parts of society that we hold them for true. A study performed by Sorte [7] actually showed no difference in mathematical skills between men and women when the "stereotype threat" was low. By stereotype threat is ment that a person feels certain expectations being present. When the threat was high women underperformed in the mathematical area. These results show that certain social expectations may reduce a persons cognitive resources [7].

Information processing and decision making

A reasearch counducted by Meyers-Levy and Maheswaran, described in Sorte [7] shows that women's information processing is more detail-oriented, while men process information in a more theme-oriented or schema-based manner. Due to differences in problem solving and information processing there might be some differences in decision making. Decision strategies can be cathegorized as "compensatory" and "non-compensatory" [7]. Compensatory decision strategies take in all available information in a decision task, while non-compensatory strategies focus on a limited set of information. A hypothesis is that females generally will use compensatory strategies and males will use non-compensatory strategies. [7]

3.3 Gender, technology and design

A common belief, discovered in a study made by the Girl Scout Research Institute [12], is the belief that we have come a long way in developing gender fair systems and applications, but it is actually a myth [12]. Almost half of the top-selling video games with female characters contain negative messages about girls, such as stereotypical female characteristics, violence, unrealistic body images etc [12]. The main question is; Who is this software designed for? According to a majority of the studies conducted in this area, software design is mainly focused on men. A study made by Huff [8] showed that when asked to design a learning tool for girls, designers made it in a goal based and narrative way, as a traditional learning tool, while boy's learning tool was designed as a game, with joysticks, time pressure and hand-eye coordination. When the same design group was asked to design for students, they again made a game, seeing the group "students" as a group of boys. [8] This shows that in software design men are seen as the norm, or as the main user group, and it can mean serious disadvantages for women in a world filled with computers, and depending on them [6]. Computer literacy is very important today and if software design doesn't invite women to think of the technology as their, they never will reach the higher degree of self esteem which is very important for successful technology usage (see section "Self-efficacy"). This might later lead to disadvantages at the job market, where everything relies on technology now a days.

Many scientists in this area argue though, that by designing especially for women as a contrast, we reproduce the belief that men are the norm and women need special treatment. By making women a problem group for technology design, we exclude them. Huff [8] describes a study that was aimed to see if people working with software designed for the "wrong" gender made them experience more situational stress than if working with software designed for their own gender. The hypothesis was based on the notion that our stereotypes, when influencing our actions, create a self fulfilling prophecy. When we design software for girls / boys with our stereotypes as a base, we automatically build software that expects different things from its users. A test was conducted with boys using a girls' software and girls using boys' software. Another parameter was to let some of the students use the software in a private setting and some in a public setting. The results showed no difference in situational stress levels in the private setting. The other group, tested in the public setting, showed the expected increase of situational stress using the "wrong gendered" software. This shows that there are an increase of cross gender stress, but it is linked to public performance. [8] The results from this study emphasizes the social aspect of HCI. The design provides one social context but in combination with the surroundings it can provide another social context. This also emphasizes gender as a social concept, only important when everyone is watching and relates to the problem with womens lack of self-fficacy mentioned in the section "Self-efficacy" above. Huff summarizes the meaning of the results; "Gender differences are in fact a function of gender based expectancies of success or failure"[8].

There have been many attempts to design for girls and women though, resulting in pink coloured interfaces formed in a narrative way, looking like womens magazines, and games based on classic stereotypes about girls preferences in life. Girl games often involve social relationships, gossip, romance, family issues, such as how to mix work and family, etc. A game that got a lot of attention when it came out was "Barbie Fashion Designer" where the main plot was to design clothes for a Barbie doll. Even though it was based on all the stereotypes designers had about girls it invited girls to build, construct and imagine and it became very popular [6]. Another way that designers dealt with the girl game issue was adding girl characters to existing boy's games, resulting in girls, or women characters, that looked like models with unnaturally thin waists and big breasts, clearly made not to attract girls to play, but to fulfil boys' fantasies [6].

A researcher that discards the whole idea of designing especially for one gender is Justine Cassell at MIT Media Lab in Cambridge. [6] She argues that it is dangerous to categorize women as a group of equally formed individuals, because they are not. We have to consider the diversity of women, and also the diversity of men, as they are all individuals with unique personalities and unique problems. The designers have to understand that the users of technology have many faces and "women are central to technology when all users are central to technology". Categorizing women into one focus group risks ghettoizing them, making them a problemgroup in software use. Instead we should try to design for the individual's right to choose their own "software personality". As a solution Cassell suggests Undetermined Design (UD), which is a form of design that allows the user to create his/her own perception of gender. This idea builds on theories about participatory and user-centred design, where the user is invited into the design process. [6] The difference between undetermined design and participatory design is though, that while participatory design includes the user in the process, the product is still static, made by the designer in the end. Undetermined Design on the other hand, allows the user to design the interface by using the system and this way the design process continues into the use of the system [6]. This way the user do not have to accept others beliefs about him/her. UD integrates the design in the goals of the software, so that the user will not miss the goal by being caught up in, for example, building characters and not solving the main problem. This way of looking at software design, the author claims, is a good way of creating gender freedom. If everyone can create his/her own interface just by using the software, no one will be excluded. This kind of design provides users with the possibility to learn and use the software in their own terms, and the differences that may exist between boys and girls, men and women will not have any value in the use of this software [6]. She also claims that there are no totally "gender free" interfaces, not even in her idea of UD. But in UD the dynamic nature of gender is integrated, by allowing users to build their own concepts of gender in different contexts and different times. This idea takes away the importance of multiple viewpoints during the design

process and the interface, so to say, becomes "undesigned". It is up to the user to design it in action [6].

To understand the whole concept of software design one also has to consider the design process itself. To create a good design one has to iterate over the different parts of the design process. Another important part is to have a diverse design group. It can be beneficial if the design group consists of different individuals with different backgrounds, experiences, ages, and genders, providing different opinions and viewpoints. Women may not design differently from men, but they will have other perspectives, because of their different social experiences. A study described by Holmlid et. al. showed that there actually are gender issues in the design process. The results of the study showed that the female design group was focusing on utility and the male group on symbolic values such as what kind of button would look nice and what an icon would represent. The women were also more willing than the men to follow instructions for the design task showing that men have higher degree of self-efficacy when it comes to technology. Both design groups also ranked opinions from male test persons as higher than from females [3].

4 Discussion

By reviewing the literature it is easy to lean towards the belief that gender is a social construct. Men and women tend to differ in things like cognitive problem solving and information processing, which can be a biological difference. But it can also be explained by the fact that social expectations and experiences have an impact on the use of cognitive resources. The question about nature or nurture will maybe never be answered and it is difficult to draw conclusions about what constitutes a human being. But we have all reasons to explore the sociological aspect of gender and technology, as a lot of results points towards the importance of the socially constructed gender behaviour. If the world expects us to behave in a certain way, we will sooner or later fulfill the expectations. We incorporate the beliefs of others into our own minds and are even able to reduce our cognitive power if we believe it to be "necessary".

There are a lot of myths circling about men, women and technology, and a question that many have tried to answer is: What do women want? The important question should rather be; What does the user want and in what way we as designers should provide it? The fact seems to be that girls of today are just as computer literate as boys, but they still do not see themselves as competent when it comes to technology, nor as the primary users of it. People assume that girls are just not interested, but that is also a big myth. Are these stereotypes the reason to girls low self-efficacy? We are building myths about myths, by just accepting the idea of the technophobic girl and making conclusions based on stereotypes. Girls are afraid of the computer, we say, they do not use it as much, then lets design with boys as the target group because they are the ones who will

use the technology. And so it continues, in a spiral, leaving half the population out of the process. If the context around us assumes that women are secondary users we will integrate this fact into our beliefsystem and see women as just that. This might affect our selfesteem and have an impact on our ability to interact with and learn how to use technology. People of today, kids and adults, boys and girls, men and women, play, work, learn and communicate through technology every day. This opens up a big arena for designers to create new exiting solutions. But there is a big responsibility also, to design as fair as possible and to include all individuals. Today most of the software design is shown to be geared toward men. Might this contribute to most of the software designers being of the male sex? We need women and girls to be part of the equation. In order to do that we need to raise girls interest for, not only using the computer, but also building the applications and interfaces for it.

4.1 Should we or should we not?

As mentioned in the chapter "Gender issue" there are two main approaches for how to take gender into account in software design. One is to see women as different from men and value this differences the other is to deny differences between men and women. So, shall we encourage women to take on men's area of expertise or should we design especially for women? I think, like many of the researchers mentioned above, that both of these approaches builds on the assumption that the computer is a men's toy and reproduces the belief that women are a problem group in need of special help. This way of thinking does not bring us towards a more equal use of technology; it only reestablishes the myths and enhances the differences.

Differences between men and women in technology use exist however at this time. The lack of self-efficacy and the unwillingness to explore is two great obstacles that designers need to overcome. By this is not ment that the design should be "genderized" resulting in pink coloured and easy-to-use software made especially for women, but that overall software design should in some way encourage women to use it. Do we even need to discuss differences between girls and boys at all when designing technology? It can be dangerous to get stuck on differences and not focus on the essential, how to design for everybody. By designing for everyone, allow users to make mistakes and give early rewards software design can help women, and men, with lower self-efficacy to take in a greater deal of features and learn the software faster.

It might be a good idea to start at the beginning, with kids. This can be done by educating teachers in how to encourage girls to play with computers, solve mathematical problems and maybe the most important part, to encourage boys to use the computer in other ways than just for playing games. The fact is that girls can play with boy games, it is only seen as "cool", but boys seldom play with girl games because of the risk of being ridiculed [6]. Maybe the problem is not women's gender role, but men's? The gender discussion often tends to

concentrate on girls and the problems gender biases bring to their life. But it is important not to forget about the boys. They are also a part of the role building patterns in society and their gender role is even more narrow than girls'. The discussion, feministic or not, always places the two genders in opposite to each other. Girls and boys, men and women. Everything that a man are, the woman are not and vice versa. Maybe it is time to stop dividing and categorizing people and realise that everybody have a part of both in them, if allowed to act free. The desires men and women have are all human desires. All people have the ability to feel, think and act in many different ways. The deviation of traits into male and female is actually made by ourselves, our experiences and expectation. Desires are also manufactured by the industry before designers actually have a chance to ask boys and girls what they really want. Many studies show that when actually asking girls, they do not want pink barbie games that educate them on how to raise a family. So, maybe it is the design itself that makes us behave differently, not the other way around? Stereotypes in design expects things from us when we are using the artifact and we take on a role of that person, especially when in public.

So, how can we as designers contribute to the evolution of a more diverse gender role? By being aware of the facts presented and constantly question ourselves we can come a long way. There are some well known interaction designers that have stated a number of guidelines for HCI design. These guidelines are too concrete though, given the abstraction level of this article and will therefore not be introduced. I do not intend to extend or modify the existing guidelines, but rather summarize some thoughts and ideas to keep in mind when working with design.

4.2 Ideas

Participatory design

Let the user and his/her context be a part of the design process. By inviting the user into the process of design at as many levels as possible, you can avoid letting your stereotypes make the design decisions.

User-centered design and gender-oriented evaluation

The designer should closely explore the context of use to see how the user will interpret the software and what expectations it might put on him/her. By doing this designers will be able to make design decisions that reduce social pressure on the user to follow expected patterns. It is also important to add the gender parameter to the evaluations being performed [8].

Design for early rewardment

Women's (and some men's) lower self efficacy tend to make them more hesitant to explore new software. By building good tutorials and design the software

so that it does not break if something is done wrong, those with lower self efficacy are invited to explore. Also, in accordance to the fact that self-efficacy is cumulative, training programs for software use should be designed to ensure early rewards.

Build software in a narrative and collaborative way

Men tend to use the technology for playing and in a controlling and dominating way. Women use it as a tool for education, expression and communication. Men could benefit from using software that appeals to the communicative part of their behaviour and women could benefit from taking on a more dominant role.

Do not "overdesign"

Do not make unnecessary decisions for the user. A lot of the design can be removed from the software. By designing software that leaves as much as possible to the user to decide, it can help him/her to perceive his/her own idea of gender.

Do not make design decisions based on the classic stereotypes

All women do not want pink and childlike layouts that are "easy to use", just as all men do not want interfaces based on stereotypes about them. Do not add unnecessary stereotypical parts only for the fun of it. Get to know your user, for real, by interviews and fieldstudies if possible.

Encourage tinkering

Tinkering is shown to be an effective way of learning new features. A good software design should encourage the user to explore and play around. It might help the user if the graphical interface provides the user with necessary clues and does not appear to be technically advanced without losing its seriousness.

5 Conclusion

The questions I asked in the beginning of this article was if we should design for women or in a gender free way and how we in practice could work with the gender issue in the design process. The first answer is that to design with gender awareness does not actually mean to design especially for a specific gender, but to support both genders, making the software as much as possible gender free. Software design carry social values that can influence the user. If we design for women, then we expect the woman user to act in a way that we designed for. This is where we have to be careful, while we want to include women in the frequent computer use by designing for them, we may unintentionally force the gender stereotypes on them.

Women are just as interested and just as competent when it comes to technology, as men, they just don't value themselves to be competent. By designing for everybody, not just for a specific gender, the designer can contribute to reaching equality. So, to answer the second question, supporting self-efficacy, encourage tinkering and really understand the user are three important things to have in mind when working with HCI design. How to do this on a more concrete level is up to the designer together with the user in an iterative process. By inviting the user into the design, the designer can become more objective, leaving his/her own stereotypes aside. It is also very important to encourage kids to work with technology in diverse ways, letting boys use the typical girl approaches, such as narrative and collaborative ways of usage, and vice versa.

By designing with the gender issue in mind, we can break the circle and invite girls and women into the technological world. We should see technology in a way that incorporates and builds on perspectives and values that girls have rather than focusing on how to adapt girls to a male world of technology. Encouraging girls to design, build and be involved in the production of technology will be beneficial to us all, making technology more diverse. We must not forget that men are also limited in their computer experiences by this exclusion. Men's gender role is quite narrow these days too and everyone will benefit from a more equal society.

References

- [1] Beckwith, L., Gender HCI: What about the software?, Oregon State University, Computer[0018-9162] vol. 39, nr. 11, page 97
- [2] Beckwith, L., Gender HCI Issues in Problem-Solving Software., Oregon State University, CHI 2005, April 2-7, Portland, Oregon, USA. ACM 1-59593-002-7/05/0004.
- [3] Holmlid, S., Johansson, K., Montañ so, C.F., Gender and design: Issues in design processes.
- [4] Hartzel, K., How self-efficacy and gender issues affect software adoption and use., Communications of the ACM, September 2003/Vol.46, No.9ve
- [5] Eriksson, O., Mokhtari, A., Design som k nsstruktur, samtal om genus, makt och mobiltelefoner. Uppsats f r p byggnadsutbildning i Medieteknik, HT 2004., Institutionen f r Kommunikation, Teknik och Design, S dert rns H gskola.
- [6] Cassell, J., Genderizing HCI, The Handbook of Human-Computer Interaction. Mahwah, NJ: Lawrence Erlbaum, pp. 402-411.
- [7] Sorte, S.R., End User Software Engineering Features for Both Genders., Oregon State University, June 2006
- [8] Huff, C., Gender, Software Design, and Occupational Equality, SIGCSE Bulletin June 2000 / Vol. 34, No. 2.
- [9] Faulkner, W., Lie, M., Gender in the Information Society: Strategies of Inclusion., Gender, Technology and Development 2007; 11; 157, DOI:

- 10.1177/097185240701100202., (The online version of this article can be found at: <http://gtd.sagepub.com/cgi/content/abstract/11/2/157>)
- [10] Balka, E., *Gender and Skill in Human Computer Interaction*, Women's studies, Memorial University of Newfoundland, St. John's Nfld. Canada., Published in: CHI 96 April 13-18, 1996.
- [11] <http://www.wikipedia.com> 2007-12-03, 18:50
- [12] Schoenberg, J., *The Girl Difference: Short-Circuiting the Myth of the Technophobic Girl*, A report from the Girl Scout Research Institute, New York, 2001