GENDER ICT INCLUSION

Final Report

(public version)

Strategies of Inclusion: Gender and the Information Society

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Gender and the Information Society

Final Report (Public version)

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SIGIS

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FOREWORD

This report summarises the main research findings from the project Strategies of Inclusion: Gender and the Information Society. This European study explored initiatives to include women in Information and Communication Technologies (ICT). 48 case-studies were undertaken of inclusion initiatives in the public and private sector and of the experiences of those involved. These have been collected in three volumes and are available on the SIGIS website (www.sigis-ist.org). Cross-cutting analysis of these findings led to two reports: Designing Inclusion: The development of ICT products to include women in the Information Society (Deliverable D06), and Gender and Inclusion Policies for the Information Society (Deliverable D07). This final report brings together these main findings. A series of policy guidelines targeted towards various policy and practitioner audiences are included as an appendix.

The partners in the project were Dublin City University (Ireland), Studio Metis (Italy), The University of Twente (the Netherlands), the Norwegian University of Science and Technology (Norway) and The University of Edinburgh (U.K.) which coordinated the project. This research was supported by the European Commission, 5th Framework, Information Society Technologies (IST) Programme (IST-2000-26329). It was an accompanying measure under the Cross-Programme Actions of IST (http://www.cordis.lu/ist).

We thank the Commission for its generous support, which has made possible one of the most significant enquiries to date into the involvement and exclusion of men, individually and in groups, in the development and use of ICT, focussing upon the ways in which women could be more effectively included. As well as strengthening scholarly enquiry in this important field, we hope these findings will help guide the policies and strategies of governments, firms, technical specialists and lay citizens pursuing a more equitable and inclusive information society.

Copies of these publications can be obtained from the SIGIS website at www.sigis-ist.org

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PRINCIPAL SIGIS PUBLICATIONS

Knut H. Sørensen and James Stewart (ed.) (2002), Digital Divide and Inclusion Measures: A review of Literature and Statistical Trends on Gender and ICT, Senter for teknologi og samfunn Report 2002-59, December 2002 NTNU, Trondheim. ISSN 0802-3581 (SIGIS Deliverable D02).

Merete Lie and Knut Holtan Sørensen (eds.) Strategies of Inclusion: Gender in the Information Society Vol. I Experiences from public sector initiatives, Senter for teknologi og samfunn Report 2003-63, December 2003 NTNU, Trondheim. ISSN 0802-3581 (SIGIS Deliverable D03).

Carol MacKeogh and Pascal Preston (eds) Strategies of Inclusion: Gender in the Information Society Vol. II Experiences from private and voluntary sector initiative,s Senter for teknologi og samfunn Report 2003-65, December 2003 NTNU, Trondheim. ISSN 0802-3581 (SIGIS Deliverable D04).

Nelly Oudshoorn, Els Rommes and Irma van Slooten (eds) Strategies of Inclusion: Gender in the Information Society Vol. III Surveys of Women's User Experience, Senter for teknologi og samfunn Report 2004-66, December 2004 NTNU, Trondheim. ISSN 0802-3581 (SIGIS Deliverable D05).

Els Rommes, Irma van Slooten, Ellen van Oost and Nelly Oudshoorn (eds) Designing Inclusion: The development of ICT products to include women in the Information Society, January 2004, University of Twente, Enschede, ISBN 90-365-2017-7 (Public version of SIGIS Deliverable D06).

Knut Holtan Sørensen (ed.) Gender and Inclusion Policies for the Information Society (Public version of Deliverable D07).

Wendy Faulkner (ed.) Strategies of Inclusion: Gender in the Information Society: Final Report (Public version of SIGIS Deliverable D08).

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1. INTRODUCTION AND SUMMARY

The Strategies of Inclusion: Gender and the Information Society (SIGIS) project started from the premise that overall more women than men are excluded from the information society, both as users and as designers of new information and communications technologies (ICTs). Our literature review at the start of the project confirmed that there is still a gender gap in terms of ownership of some ICT products and, to a less extent, in terms of access and use. It also confirms that gender cuts across other dynamics in the digital divide – income, occupation and age being generally more significant than gender, with other factors (eg, ethnic minorities, lone parent families) also intervening. The trend with respect to the use of ICT products is one of a closing gender gap, although it is clear that diffusion alone is not sufficient to close the gap all together; inclusion efforts are still warranted in this area. By contrast, there is a persistent and sizeable gender gap within computer specialisms and professions designing ICTs, with the proportion of women entering computer science and engineering courses in most countries static or in decline in spite of sustained inclusion efforts. So, the overall picture across Europe is a contradictory one: optimistic with respect to what we call women and ICT and pessimistic with respect to women in ICT.

The SIGIS project was concerned with inclusion initiatives rather than exclusion. The main research effort consisted in 48 case studies of different inclusion strategies, backed up by a sizeable cross-cutting analysis, presented in two reports: Designing Inclusion: The development of ICT products to include women in the Information Society (Deliverable D06), and Gender and Inclusion Policies for the Information Society (Deliverable D07). A list of the case studies is included as an appendix. However readers wanting to know more about the research design and methodology adopted and the substantial body of detailed research findings that emerged should consult these volumes

(available on the SIGIS website), as there is not space in this brief report to do justice to them. Together, these represent a huge resource for furthering both theoretical development and policy intervention in the area of gender inclusion in the information society. What follows is an overview of the main cross-cutting conclusions arising from this research, starting with an overview of the strategies investigated and finishing with the main policy guidelines we would highlight. Appended to this report is a set of guidelines targeted towards particular policy and practitioner audiences.

Sections 2 – 8 present key general conclusions, some of which are relevant to any digital inclusion strategies while others concern gender inclusion specifically. We address the links between digital exclusion and inclusion, highlighting the general importance for digital inclusion strategies of heterogeneous packages of measures which together pay attention to ICT resources, competence, confidence and relevance. We then highlight the need for gender inclusion strategies to challenge gender binaries and stereotypes, and to build more plural and dynamic versions of masculinities/femininities and of ICTs. Precisely because of this diversity, 'one size does not fit all' in terms of strategies for gender inclusion in the information society. Effective tailoring of such strategies means paying attention to the specifics of how both inclusion measures and exclusion may be gendered, and bringing ICT to 'where people are at'. In particular, because informal learning is a vital part of how people acquire ICT capability, there is a need for measures to encourage the growth and dynamism of 'local ICT experts', and so support the less computer literate or confident within their existing social networks and spaces. Finally, SIGIS research demonstrates the general importance to inclusion strategies, gender or otherwise, of quality – be it in ICT training and educational measures, or market based ICT products.

Sections 9 – 15 address the various different types of inclusion strategies we investigated. Some operate by creating women-centred spaces. Women-only training is effective in raising confidence and self-esteem, women-friendly networks support women working in ICT, and web magazines for women act as a means of 'self inclusion'. By contrast, our studies of ICT products indicate that it is not always more effective to design for women specifically as opposed to designing 'for everybody' including women. Ideally, the latter strategy acknowledges the interests and tastes of heterogeneous groups of girls/women and boys/men and, thus, gender plurality. Yet the market has not generally proved a very innovative mechanism for improving gender inclusion in the information society – in part because of its inherent conservatism, and in part because of heavy reliance on the I-methodology.

Many strategies geared to getting more women into ICT occupations address the 'image problem'. One of the more unexpected conclusions of SIGIS research is that any image problem has more to do with the low relative numbers of women in ICT than with a presumed symbolic association of ICT and masculinity. Accordingly, we emphasise the need to make visible the growing numbers of computer enthusiastic and computer competent girls and women, and to send out the message 'women are welcome here'. We further conclude that measures which directly increase the relative numbers of women in ICT, and achieve a 'critical mass', are particularly critical. The relative isolation of those women who do work in ICT means they experience the sector as a 'chilly culture', and this contributes to the 'leaky pipe' problem of poor retention. Networking and role models are important ways of empowering women in ICT occupations; but corporate measures, such as more employee-centre flexible working arrangements, are also needed.

Overall, although progress over women in ICT occupations continues to be slow, SIGIS research reveals many encouraging signs of a closing gender gap in the use of ICT products (what we call, women and ICT). It remains unclear how much these latter developments might impact positively on the position of women in ICT. What is clear, however, is that there is a serious lack of 'joined up policy' in most countries with respect to gender and ICT, whereby government support to bring women into ICT specialist work sits alongside wider digital inclusion efforts which are 'gender blind'. The evidence collected by SIGIS indicates that gender gaps in digital inclusion will not disappear without intervention, and that gender blindness in digital inclusion strategies may even exacerbate the exclusion of specific groups (of men or women). If governments are serious about gender inclusion in the information society then a thorough gender awareness must permeate all digital inclusion strategies, be they education, work or community based.

2. THE RANGE OF INCLUSION STRATEGIES INVESTIGATED

Altogether 30 different initiatives to include women into the design or use of ICT were investigated; a further 18 'user studies' solicited the experiences and meanings of selected strategies and ICTs for men and women in everyday contexts. The inclusion strategies investigated differ on a number of counts.

First, they cover a wide range of inclusion goals and measures, in diverse social settings:

- School and university education in ICT
- Measures to increase the recruitment of women into ICT occupations (including computer parties)
- Support networks for professional women in ICT sectors (virtual and real)
- Basic and vocational ICT training (for socially excluded groups and specific occupations)
- Design of new ICT products for female audiences (mobile phones, web publications and computer games)

Second, there are several important differences in terms of how these strategies were framed:

- Public sector vs private or voluntary sector
- Gender inclusion an explicit objective vs a 'de facto' outcome
- 'For women' vs 'for everybody'
- Focus on women in ICT occupations vs women and ICT products

Third, our analysis suggests a further conceptual distinction based on different kinds of inclusion thinking or processes underlying the different strategies:

- Facilitating informal ICT learning
- Creating women-friendly spaces
- Redefining symbolic images of ICT
- Improving relative numbers of women

All of the inclusion strategies investigated were successful to some degree. The SIGIS project therefore reveals that gender inclusion in the information society can occur through a variety of strategies – including all of the dimensions listed here. Particular features, and strengths and weakness, are addressed in the following sections.

3. LINKS BETWEEN DIGITAL EXCLUSION AND INCLUSION

Whilst inclusion does not map simply onto exclusion, there are several obvious areas in which the mechanisms of exclusion can be and need to be addressed through inclusion measures, in particular: resources, skills and knowledge, confidence, relevance. These points obtain for any digital inclusion strategies, gender or otherwise.

Resources: Both the statistical evidence on the digital divide, and all of the community-based ICT access and training initiatives we studied, confirm a simple message: some people (women and men) are digitally excluded because they are poor. Resource barriers to digital inclusion are real in such cases and can only be overcome through the provision of free access to and training in ICT. For example, low income women who are parents, especially lone parents, need free childcare if they are to be able to benefit from ICT training!

But making ICT resources available is not enough to ensure digital inclusion. Hence:

Skills and knowledge: In addition to resources, people obviously need to acquire skills and knowledge in using ICTs if they are to participate in the information society at any level. Less obviously, the SIGIS training cases revealed that informal learning is a vital feature of how people acquire ICT competence even if they receive formal training (see below), and that relevance and building confidence are key ingredients for success in ICT training.

Confidence: Building ICT skills and building confidence go hand-in-hand, in a kind of virtuous circle. Thus, community-based training initiatives work to the degree that they are effective in building confidence. This is not confined to confidence about

ICT. For many, social and economic exclusion is associated with poor self-esteem and confidence in general. In such cases, enhanced confidence is a nexus linking greater digital inclusion with social inclusion more broadly. A dramatic example of this is provided by the 'Edinburgh Women's Training Course'. Previously unemployed and unemployable trainees are empowered because learning about computers proved they could do something; as one graduate reported, "I am not the same person!".

Relevance: Many non-ICT users are 'excluded' from the information society because they don't see this technology as relevant to them. It is what the technology can do that makes ICT interesting to people – be it pursuing an existing hobby on the Internet, or communicating with distant family by email. Diverse strategies confirm the importance of finding ICT applications or content which are relevant to people's lives – as, for instance, with the 'Domestication' training case in Ireland. Many ICT trainers who find the technology itself inherently interesting tend to teach ICT as 'merely skills'. A far more effective approach is to foreground the uses of ICT rather than the technology per se. Highlighting relevance can result in a process we have called self inclusion. A very clear example of this is the Lupus web magazine, which provides information and advice to people (mostly women) who suffer from a rare skin disease. It is notable that all the web magazines we studied succeeded in turning many women readers with no prior experience of the Internet into enthusiastic users, by addressing topics like health and fashion found in conventional women's magazines.

In sum, SIGIS research confirms the following overarching conclusion concerning links between digital exclusion and inclusion: because digital exclusion is multi-dimensional, inclusion strategies generally require a 'heterogeneous' package of measures – heterogeneous in the sense (derived from the

sociology of technology) of extending well beyond just making technology available. This simple but crucial point is still not fully grasped in some policy circles.

4. CHALLENGING GENDER BINARIES AND ESSENTIALISMS

Our studies of strategies of gender inclusion in the information society were underpinned by key sociological conceptualisations – about gender, and about gender and ICT. These conceptualisations are not solely of academic interest; they also have crucial implications for our understanding of what kinds of strategies are likely to be successful, with which groups and in which settings.

With respect to gender, we challenge essentialist and binary approaches, which presume that all women/men are necessarily the same, and that femininity and masculinity are necessarily opposites – on the empirical grounds that there are huge differences amongst women and amongst men. Precisely because class, family status, age, ethnicity and so on cut across gender in terms of digital inclusion (and much else), there are plural femininities and masculinities in practice. With respect to gender and ICT, we challenge stereotypes which say that women and girls are more likely to use ICTs instrumentally and to favour communication activities, where men and boys are more likely to have fun with ICTs and to favour 'techy' activities.

Our case studies confirm that essentialist and binary understandings of femininity and masculinity are remarkably pervasive and tenacious – at least in people's accounts of themselves. Typically, people's actual practices are far less gender differentiated than their accounts. For example, girl participants in 'The Gathering' computer party in Norway are seen (and see themselves) as 'just users' or 'chatterers', where the boys are described as 'programmers' and 'games players'. Yet they are all skilful and enthusiastic users, and most do all of these things.

In all of the inclusion strategies we studied, we found a profound tension between embracing gender stereotypes and binaries and challenging them – a tension which occurs not least because of the tendency for perceptions of gender difference to be exaggerated. On the one hand, drawing on gender essentialisms and binaries (although simplifying) can serve to validate women's perceived interests and practices, and so may be effective in engaging otherwise excluded groups of women – as occurred with the web magazines. On the other hand, this approach is unlikely to be effective, precisely because there are so many differences amongst women. It will not appeal to those women who do not fit the stereotype being promoted. As we demonstrate below, design strategies which start from plural understandings of gender are more likely to be inclusive than design strategies which start from essentialist, binary understandings of gender.

Moreover, strategies which draw on gender binaries and essentialisms risk exacerbating gender inequality, if it is not challenged, by ghettoising or stereotyping women. Ideally, any appeal to gender stereotypes should therefore be combined with efforts to move beyond or 'destabilise' those stereotypes which are particularly outdated, iniquitous or which palpably fail to acknowledge variety amongst 'real' people. This strategy was pursued by designers of the web magazines 'Donna Moderna' and 'Libelle'. They started from the 'lowest common denominator' assumption that 'women are computer reticent or incompetent and need user-friendly interfaces' but, at the same time, made concerted and creative efforts to help their customers gain ICT skills – by creating interactive discussion sites and virtual communities which readers participate in and learn through. By facilitating such informal learning about ICTs (see below), this strategy actively undermines, and so renders redundant over time, the original assumption of computer reticence and incompetence amongst women.

5. CO-CONSTRUCTING GENDER AND ICT

Another key sociological concept underlying our analysis of inclusion strategies has been an understanding of gender and technology as co-constructed. This means that those strategies which successfully include more women into the information society necessarily change both ICT and gender. They change what is meant by technology and, by the same stroke, they change what is meant by femininity/ masculinity, albeit the emphasis may differ.

Our case studies reveal a range of new 're-constructions' of gender and ICT, which move beyond the traditional stereotypes, including:

- In the case of vocational ICT training initiatives, computers are strongly portrayed as 'just a tool' which is useful in the workplace. This apparently gender-free construction is interesting because it distances the technology (and hence trainees) from the nerd/hacker image of computers as something men have a playful but obsessive relationship with, and indeed (though perhaps less strongly) from the identification of men as computer specialists. For some users, the notion of ICT as a workplace tool also distances trainees from the stereotypically feminine associations of office work!

- In the case of the computer parties, the image of computing as fun for boys but not girls is being challenged. For example, the 'IT Beat' strategy in the UK creates a space in which teenage girls can have fun with computers in the context of their (otherwise strongly gendered) interest in 'boy bands' and pop culture. In this way, the strategy also says, you can be a girl in stereotypically feminine ways (liking boy bands) and in

stereotypically masculine ways (having fun with computers); the two are not mutually exclusive.

- In the case of computer games, designers try to appeal to girls and women variously – by emphasising communication, educational or role-playing features ('Kidcom', 'Fun' and 'Gender Games'). Accordingly, the definition of a computer game is broadened from the 'first person shooter' games, which (it is presumed) only boys and men enjoy. Note that the emphasis on communication plays to a familiar gender binary (which presumes a feminine interest skill in social interaction), where the educational and role-playing emphasis is less obviously gender differentiated or essentialist.

In general, inclusion and design strategies would do well to recognise the empirical reality of plural and dynamic genders. This in turn suggests that we should be developing more plural and flexible understandings and versions of ICTs – be they products or activities.

6. ONE SIZE DOES NOT FIT ALL

The SIGIS case studies indicate that 'one size does not fit all' in the sense that the same measures may not be effective with different groups or in different settings. So, there can never be a single 'cure all' strategy to improve gender inclusion in the information society – precisely because there is so much diversity and fluidity in both gender and ICTs. Multiple and diverse strategies are likely to be required for different technologies and uses, and for different social groups and settings.

Context matters, and this means that effective tailoring is necessary if inclusion efforts are to succeed in reaching their target groups. Effective tailoring of digital inclusion strategies requires an awareness of:

- Which groups are excluded from the information society, and how?
- What are each group's needs and interests (hence, how might ICT be relevant to their lives)?
- And what measures are likely to reach them?

SIGIS research demonstrates that it is vital to understand not only how exclusion mechanisms may be gendered, but also how inclusion mechanisms may be gendered.

Ironically, this point is poignantly illustrated by the case of the 'Ardmore Community Resource Centres' – a 'for everybody' community-based ICT access and training network in rural Scotland, which 'de facto' included more women than men and failed to reach certain groups of middle-aged men. Within this locality, more men are digitally excluded than women of the same

age, in part because they tend to be concentrated in outdoor manual jobs. To compound this, the strategy itself, which was so effective in drawing in even computer reticent women, did not work for these men. In a culture that remains strongly gender segregated, socially as well as at work, such community-based initiatives are marked as 'women-friendly' spaces. So these are not spaces where computer reticent men are likely to be willing to expose their ignorance.

The 'Ardmore Network' case serves to remind that 'gender in/exclusion' is not just a 'women's issue'. It also demonstrates that good intentions about reaching 'everybody' will not be effective unless they are backed up with a recognition of the specific ways in which diverse groups of women and men within the target constituency experience barriers to digital inclusion. We did not find a 'for everybody' strategy that was effectively targeted in this way, yet numerous SIGIS cases confirm the importance of bringing the technology to 'where people are at'. Effective tailoring of inclusion strategies means not only finding applications of ICT which are interesting to people, but also finding mechanisms for effectively reaching people in their existing social networks and practices. The importance of this latter point was underlined by our observations about informal learning to which we now turn.

7. INFORMAL ICT LEARNING AND 'LOCAL EXPERTS'

In all social settings and in all walks of life, informal processes are a recurrent and vital means by which most people learn about computers and extend their ICT skills. This was evident in the self-inclusion which resulted from the web-based magazines mentioned earlier. It also emerged in two cases of occupational ICT training: 'The new Cinderellas' study of civil servants in Italy and the 'Teacher training' study in the UK. These cases confirm that informal learning about ICT routinely takes place alongside and supplements more formal kinds of learning. Yet, it is rare to find digital inclusion strategies which explicitly address informal learning. SIGIS research highlights the following general features:

- Informal learning is part of 'domestication' processes in which ICTs become embedded in everyday life. In this sense, informal learning is also 'social learning': interest and competence in ICTs evolve within complex interactions between education, work and leisure. And gender differences and inequalities in these areas spill over into ICT access, uses and skills.

- People turn to 'local experts'. Most computer users (and increasing numbers of those who are not regular users) know somebody – a friend, colleague or family member – who knows something about computers. SIGIS cases demonstrate that these local ICT experts play two really crucial roles. They act as positive role models for building confidence, competence and enthusiasm about using computers. And they are a free and accessible source of practical advice about computers and ICT, to whom we can turn if there is anything we don't understand or can't do.

- People's life setting and social ties shape their particular networks of ICT experts. Most people under the age of 30 have learnt something about computers at school and are more likely to have peers who know about and have computers than do middle- and retirement-aged people; the latter more usually acquire ICT skills through work or from a local expert in the family. To the extent that people's social networks are gendered, their networks of ICT experts are also likely to be gendered (as in the 'Ardmore Network').
- Informal networks of ICT expertise are dynamic and have a multiplier effect locally. As one person's expertise increases over time, so does the potential for friends, family and colleagues in that person's social networks to extend their ICT skills and confidence, and in turn act as local ICT experts for others.

The policy significance of these observations for digital inclusion is enormous. Informal learning through networks of local experts helping out and passing on their knowledge and enthusiasm to others who have less expertise or confidence, is clearly very significant for ICT capability building, for women and men. We need to understand better how people blend formal and informal learning, where they find local ICT experts, and how these inclusion processes are gendered in particular settings and for particular groups. Further efforts are needed to stimulate informal learning and to encourage the growth and dynamism of local networks of ICT expertise, so as to support the less computer literate or confident within their existing social networks and spaces.

8. QUALITY

Another general conclusion which emerges from SIGIS research is that quality is a vital ingredient if inclusion is to be effective. This was evident across a range of strategies:

- In the case of training initiatives – mixed-sex or women-only, vocational or community-based – effectiveness rests heavily on the experience and commitment of trainers, including their individual ability to identify and meet the particular interests and needs of their trainees.
- In the case of schools' efforts to integrate ICTs into education, the critical factor is the willingness of individual schools and staff members to be visionary and imaginative in addressing the challenge (see leaflet on ICT in Schools).
- And in the case of games design, there is a strongly held view that computer games must be of good quality (eg, have a 'good story'), if they are to appeal to more women.

Everyone gains from increased quality of ICT offerings – be they products, services or education. The point these examples suggest is that quality - of the product, service or education - may be particularly critical in reaching excluded groups. This suggests a kind of 'win : win' situation in which improvements in quality should achieve greater digital inclusion for those women who feel marginal in relation to ICT, but not at the expense of anyone else. This conclusion may be of particular practical value in the context of school education in computers, which so many children find 'boring' ('The pupils' case').

We now move from thse general conclusions to conclusions concerning specific types of inclusion strategies.

9. WOMEN-CENTRED SPACES

The SIGIS project found several different types of strategies which successfully increase women' inclusion in the information society by creating women-centred spaces. These may be women-only or women-friendly strategies. The women-only vocational ICT training courses we studied (see our leaflet on women-only training) confirm our conclusions above about the need to identify and meet the needs of specific groups. We found that the women-only route is extremely effective in these cases because the safe and supportive environment it creates is especially beneficial for the particular target group. Specifically, it is beneficial to women whose self-esteem and confidence is low – as a result of being out of the labour market for some time and, in some cases, as a result of disadvantaged or vulnerable circumstances. We believe this justifies additional funding support for this strategy which has rather 'fallen from fashion' in recent years.

It does not follow that women-only training is either needed or effective for all women or for all types of training. However, the women-only training cases do highlight the general value in terms of confidence building of providing:

- 'safe spaces'
- role models and networks of solidarity to encourage and support learning about ICT
- one-to-one support within training initiatives so that people can learn about ICT at their own pace and get individual encouragement and help with specific aspects they are interested in or struggling with.

Significantly, these ingredients are present in many mixed-sex training initiatives. The 'Ardmore Network' is one, which clearly worked well for women. Another such, 'Fasttrack to IT' in Ireland, has found that a mixed-sex course modelled on women-only training works well for men. This does not mean, of course, that all women will do as well in mixed-sex training as in women-only training. But in general, mixed-sex inclusion strategies which incorporate the elements of safe spaces, networking, role models and one-to-one support are likely to act as women-friendly spaces.

Certainly, several different strategies we studied succeed because they have similar ingredients. Virtual and real life networks for women working in the ICT sector, for example, are effective as women-friendly spaces. The virtual network 'WOW' in the Netherlands supports skill and confidence building for beginners and ICT professionals, and is explicitly woman-only. User feedback indicates that members value this feature highly. By contrast, in the cases of 'Untold' in the UK and 'WITI' in Ireland, there has been a deliberate decision not to be women-only. Part of the reason for this is a desire not to ghettoise women or alienate potentially sympathetic men – especially when one aim (for Untold) is to increase the visibility of women designers. But the key justification is a recognition that what women who work within ICT need more than anything is to build networks, skills and confidence in order to overcome their felt isolation at work and to progress their careers (see leaflet on Empowerment). These women-friendly spaces meet this need and so provide an effective route to empowerment at work. But it is notable that participants feel a tension about how much emphasis to put on gender in this context and how much the issues are merely about 'individuals'.

Another kind of women-friendly space is created in the case of some ICT products designed specifically for women. The web magazines we studied, for example, are women-centred in the sense that they speak to 'the modern woman', even though

some men do read them. As mentioned earlier, these magazines are an effective means to self inclusion because they create the motivation and opportunity for readers to become more familiar with using the internet. They are also women-friendly in the sense that the readers learn about ICTs in part through interacting with, and getting advice, support and encouragement from, other women readers. The enthusiasm with which these sites are used confirms that they are experienced as a virtual 'room of one's own'.

10. DESIGNING FOR WOMEN

Our case studies of the design of ICT products indicate that it is not always more effective to design for women specifically as opposed to designing 'for everybody' including women. For at least two decades, the computer industry and ICT sector have been criticised for making products and systems that are 'made by men for men'. This complaint has been particularly strong in relation to computer games, with many feminists arguing that the industry should develop games for girls and women in order to meet the needs of this potential market. In two cases we studied, the designers chose to do this. Both started from assumptions of stereotypical differences between girls and boys, drawing on established designs and themes in children's toys and magazines. In 'Boys and girls stay in to play', the strategy is deemed to have been a commercial success. In 'Kidcom', the designers discovered that girls did not want the 'pink look' and 'round shapes' they had suggested.

The two other games cases we studied, 'Fun' and 'Gender game', indicate that the differences between girls/women and boys/men with respect to computer game playing are not as great as those amongst girls/women and boys/men. These designers report that girls and women are much more into playing (existing) computer games than is usually assumed, even if they are critical of some 'boyish' aspects. But they do recognise that they need new designs in order to appeal to a wider cohort of girls and women. As noted earlier, their strategies are not about designing games specifically for girls and women, but about designing what we might call 'cross-gender' games, which seek to cater for a variety of tasks and interests within the same game.

In sum, design strategies targeted specifically on women tend to build on stereotypical gender differences. In some circumstances, this can be an effective means to self-inclusion in the information

society. However, to the degree that these strategies assume all girls/women share the same interests and tastes, and do not move beyond the stereotypes, their success will always be limited – and, of course, their political impact will be gender conservative not progressive. By contrast, 'for everybody' design strategies can work in attracting women if, rather than treating the market as homogeneous, they acknowledge the interests and tastes of heterogeneous groups of girls/women and boys/men. Once again, specifics matter. 'Women' is not a particularly useful design category, any more than is 'men' – a conclusion which is entirely in line with the emphasis on gender diversity or plurality.

11. MARKET MECHANISMS FOR INCLUSION

From the outset of SIGIS, we were interested in how much product development acts as a route to greater gender inclusion in the information society. Contrary to initial expectations, we found only very limited evidence of the market mechanism being able to deliver more innovative routes to inclusion.

The SIGIS case studies suggest two reasons for this. First, the design of computer games revealed that the market pressures which favour incremental over radical innovation tend to encourage conservatism in 'configuring' the market. This would account for the appeal to conventional gender stereotypes, drawn from other product areas, in some games designs. On the other hand, the alternative strategies emerging, which appeal to diverse interests amongst both women and men, arguably have greater market potential ultimately.

The second reason why ICT companies have not always been successful in reaching out to girls and women is the heavy reliance on the I-methodology in design in this sector. Technology designers and developers often build understandings of the user and use of an artefact around their personal experience and presumptions, rather than on information about the perceptions and activities of diverse actual or potential technology users. This is obviously not encouraging in a situation where design jobs within the ICT sector remain male-dominated. In addition to actively cultivating more heterogeneous understandings of their markets, therefore, the industry should address these barriers by supporting efforts to increase the number of women in ICT design roles, and by developing more effective means of accessing 'authentic' user perspectives.

12. THE 'IMAGE PROBLEM'

It has long been presumed that symbolic associations between technology and masculinity – in particular the (for women) gender inauthentic, a-social connotations of the 'nerdy' hacker image – are important barriers to women's inclusion in ICT. One of the more unexpected findings from the SIGIS research is that this particular 'image problem' is very much less evident than we might have expected, suggesting that the emphasis on symbolic redefinition has been misplaced.

It is true that an element of 'impression management' remains important in many inclusion strategies. Commonly the emphasis is on how much ICT is fun and/or useful, for everybody. It seems that any associations between masculinity and ICT are largely disappearing – or at least readily dismissed and easily overcome – with respect to women and ICT inclusion strategies. By contrast, strategies to encourage more women into ICT frequently address the 'image problem' explicitly, by seeking to change the image (if not the content) of computer science and engineering in order to make it more appealing to women. This is evident in the fairly innovative strategies of 'IT Beat' in the UK and the 'Squares and Circles' campaign at the Norwegian University of Science and Technology (NTNU).

The latter case is particular interesting since it included a very high profile advertising campaign which played directly to the nerd/hacker image and associated gender stereotypes, arguing that computing needs more social skills which (it asserted) women bring. To our surprise, interviews with women who choose to go into computer science and engineering during the period of this campaign revealed that this message was largely ignored. Although the wider initiative of which it was part did result in a significant increase in the number of women going into computer science, the main contribution of the advertising

campaign was to convey the message that 'women are welcome here'. It made the women in computing visible, and provided positive images of them, demonstrating that it is no longer exceptional to be a woman in computing.

This suggests that the critical aspect of the 'image problem' in relation to women in computer science and engineering has to do less with any symbolic association of ICT and masculinity, and more with the relative numbers of women in ICT – to which we now turn.

13. RELATIVE NUMBERS OF WOMEN

Our analysis of the 'Squares and Circles' strategy reveals that its most important feature was that the various measures adopted together had a direct effect on the numbers of women taking computer science and engineering at the university – the most significant of which was probably the introduction of quotas to ensure additional female entrants every year. One consequence of this (amplified by the advertising) was that people could see there was a sizeable number of women students in the department (over one third for a while). We conclude that some sort of critical mass needs to be reached – and be seen to have been reached – in a previously male-dominated technological field before entry becomes a 'gender authentic' rather than gender inauthentic option for girls and women.

A similar 'critical mass' phenomenon is probably occurring with respect to the uptake of ICT products, like computer games, and the spread of ICT use more generally. The more counter-examples there are – computer enthusiastic and competent girls and women – the harder it is for people to view ICT as a technology for boys and men where the odd girl or woman is merely the 'exception that proves the rule'. Numbers matter!

Moreover, as the 'Squares and Circles' case demonstrates, visibility of growing female numbers matters – especially given the tendency noted earlier for iniquitous gender stereotypes to persist in our perceptions even when these are at odds with real people and practices. Again, this observation has wider significance. It suggests that one of the more effective ways to extend gender inclusion in the information society is to make visible the growing numbers of girls and women who challenge old stereotypes about gender and technology counter-examples – of computer enthusiastic and computer competent girls and women – and so put to rest, once and for all, the 'ghosts' of old stereotypes about gender and ICT.

14. THE 'CHILLY CULTURE' FOR WOMEN

In many European countries, there is a serious 'leaky pipe' problem within the core ICT sectors, whereby proportionately more skilled and experienced women leave than men. The main issues here tend to be about 'chilly' occupational cultures and workplace practices (see 'Tackling the 'Chilly Culture'' leaflet).

The retention of women working in ICT raises different challenges to the recruitment of women into the sector. However, the issue of relative numbers is also important with respect to those women working within ICT professions and sectors. Currently individual women are very isolated from other women in the same line of work. As noted earlier, the use of role models and support networks in initiatives contribute powerfully to overcoming problems of isolation at work precisely because they bring women together in sizeable numbers.

In addition to supporting such 'self-help' measures, the ICT industry could do much more to address the retention problem – by concerted corporate attention, from Board level to the bench, to performance criteria and gender inclusion goals; and by more positive approaches to employee-centred and care-friendly flexible working conditions and to work-life balance.

15. THE NEED FOR 'JOINED UP' POLICY

The literature review conducted at the beginning of the SIGIS project identified a contradictory pattern across Europe – a closing gender gap in the use of ICTs (what we call, women and ICT) but a persistent gender gap within computer specialisms and professions designing ICTs (women in ICT). An important policy question with which we started our research was to explore how strategies to improve the position of women and ICT might impact positively on the position of women in ICT.

It remains difficult to discern underlying trends and causalities clearly, but SIGIS research does point to some encouraging signs:

- The image which people have of computers is less a 'techy', 'for men only' image, as ICTs become more widely used and an everyday part of social and economic life.
- Designers are increasingly aware of the missing females in their markets, and increasingly reflexive about how they might attract girls and women to their products.
- Growing numbers of girls and women are doing things previously presumed to be the preserve of boys and men – computer enthusiasts, game players and, in some places, computer science courses.

In addition, it seems likely that there will be increasing crossovers between increasing use of ICTs by women and increasing numbers working in ICT – at least in the context of ICT work where the boundary between using and creating ICTs is now very blurred.

What is clear is that there is a serious lack of 'joined up policy' in most countries with respect to gender and ICT, whereby government support to bring women into ICT sit alongside wider digital inclusion efforts which are 'gender blind'. In the UK, for example, there have been concerted government efforts to get more women into ICT, but gender is virtually absent from some discourses about the digital divide. This became apparent in our 'Teacher training' study of a recent government initiative to upgrade school teachers' ICT skills and further the integration of ICT into education. Although teachers were primed to look out for differences in pupils' confidence and competence around ICT, there was no orientation to challenge stereotypes around gender and ICT in the classroom, or to particularly encourage girls in this subject. By contrast, the presence of state feminism in Norway means that public policies are frequently scrutinised to assess whether they help promote gender equality. Accordingly, there is a strong awareness – evident in the 'Girls and Computing' case on school education in Norway – of gender as potentially a dimension in the digital divide.

The lack of explicit and comprehensive treatment of gender inequality within most European countries is worrying. The SIGIS findings indicate that gender gaps in digital inclusion will not disappear without intervention, and that gender blindness in digital inclusion strategies may even exacerbate the exclusion of specific groups (of men or women). If governments are serious about gender inclusion in the information society then a thorough gender awareness must permeate all digital inclusion strategies, be they education, work or community based.

16. POLICY GUIDELINES

1. Digital inclusion strategies require a heterogeneous package of measures, extending beyond simply making the ICT technology and skills available. They must acknowledge that:

    - Resources barriers to digital inclusion are real for some people and can only be overcome through the provision of free access to and training in ICT, including (especially for lone parents) free childcare.

    - Building ICT skills and building confidence go hand in hand for many people; confidence building can be a vital link between enhanced digital and social inclusion.

    - Digital inclusion measures need to make ICT relevant to people's lives; strategies which foreground the uses of ICT, rather than the technology per se, are most likely to be inclusive.

2. Appealing to gender stereotypes is likely to be counter-productive, because there are huge differences amongst 'real' women and men, and because stereotypes draw on gender binaries and essentialisms which undermine gender equality. Ideally, any appeal to gender stereotypes should be combined with efforts to move beyond or 'destabilise' those stereotypes.

3. Inclusion and design strategies should start by recognising the empirical reality of plural and dynamic genders. Because gender and ICT are co-constructed, this will result in the development of more plural and flexible versions of ICTs – be they products or activities – and of gender.

4. One size does not fit all! Effective tailoring is necessary if inclusion efforts are to succeed in reaching their target groups. This demands an awareness of how both exclusion mechanisms

and inclusion mechanisms may be gendered. And this awareness must recognise the particular barriers experienced by specific groups of women and men – a point which is often neglected in strategies targeting 'everybody'.

5. Digital inclusion strategies need to 'take ICTs to where people are' and acknowledge the significance of informal learning in building ICT capability. This means finding effective mechanisms for reaching people in their existing social networks and practices, and encouraging the growth and dynamism of local networks of ICT experts amongst less computer literate or confident groups

6. Quality is a vital ingredient if inclusion strategies are to be effective – be they products, services or education. Whilst everyone benefits from improvements in quality, these are particularly critical in reaching excluded groups of women who feel marginal in relation to ICT.

7. Creating women-centred spaces can be an effective route to including more women in the information society. This is achieved by diverse strategies:

   - Women-only vocational ICT training provides a safe environment in which women who are low in self-esteem and confidence (because have been out of the labour market for some time, and/or are particularly disadvantaged or vulnerable) can gain ICT skills.

   - Women-friendly networks (both virtual and real) and role models help support women working in the ICT professions and sectors, empowering them in their work and careers.

   - Some ICT products designed specifically for women, like women's web magazines, can act as routes to 'self inclusion', by providing opportunities, motivation and support to learn more about ICT.

   Significantly, all of these strategies incorporate confidence-

building elements of 'safe spaces', networking, role models and one-to-one support.

8. Designing for women specifically tends not to acknowledge the diverse interests and tastes amongst women (and amongst men). Designing 'cross-gender' ICT products for everybody may well be a more effective way of including women, and ultimately more successful commercially. ICT companies should therefore cultivate more heterogeneous understandings of their markets.

9. To date, the development of ICT products has not proved a particularly innovative route to inclusion – partly because of the inherent conservatism of the market mechanism and partly because of heavy reliance on the I-methodology in design. The ICT industry should address these barriers by supporting efforts to increase the number of women in ICT design roles, and by developing more effective means of accessing 'authentic' (therefore heterogeneous and plural) user perspectives.

10. Inclusion strategies which address the 'image problem', of a presumed symbolic association of ICT and masculinity, may be misplaced if not counter-productive. It is vital that efforts to increase the recruitment of women into ICT, including ICT professions, make visible the growing numbers of computer enthusiastic and computer competent girls and women, and send out the message 'women are welcome here'.

11. Achieving a critical mass of women in (or using) ICT is vital if ICT careers (or products) are to become a 'gender authentic' option for girls and women. The most effective measures for increasing the recruitment of women into ICT degrees and professions are those which directly increase the relative numbers of women in ICT, such as quotas and role models.

12. There is a serious 'leaky pipe' problem within the core ICT sectors whereby skilled and experienced women leave

disproportionately. In addition to supporting women's self-help and networking, this retention problem demands concerted corporate attention – to performance criteria, gender inclusion goals, employee-centred and care-friendly flexible working conditions, and work-life balance.

13. There is a lack of 'joined up policy' in most countries with respect to gender and ICT. Governments must address the gender blindness which permeates most digital inclusion strategies – be they education-, work- or community-based.

A1. APPENDIX: OVERVIEW OF THE SIGIS CASE STUDIES AND THEIR SHORT-NAMES

A1.1. Case studies of Public sector initiatives

Girls and Computing: Girls and computing as national educational strategy (NTNU)

Limits of state feminism: Limits of state feminism: Chaotic translations of the 'girls and computing' problem (NTNU)

Squares and circles: Squares and circles. Getting women into computer science (NTNU)

Computer courses: Computer courses and the Internet for 'everybody' 'I don't know how to fit it into my life' (Twente)

VVS designer case: VrouwenVakScholen: designer case Women's Vocational Training (Twente)

Women's square: The women's square in a digital city: The Women's Square in a Digital City; 'Inclusion for all' versus 'inclusion for women' (Twente)

EWTC designer case: Edinburgh Women's Training Centre: Edinburgh Women's Training Course: An Old Idea Still Working (UEDIN)

Rural community resource centres: Rural community resource centres; A case of 'de facto' women's inclusion in the information society (UEDIN)

Teacher case: Teaching the Teachers: a gender blind approach to IT training (UEDIN)

Behind the mask (Metis)

The new Cinderellas: The new Cinderellas: How public administration has been attempting to include women as well (Metis)

Lifelong education: Lifelong education and strategies of gender inclusion in the Information Society (Metis)

WITS role model project: Women in Technology and Science Role Model Project (DCU)

Fasttrack to IT: The Cork Institute of Technology and Fastrack to IT, Initiatives for the lone parents and the long-term unemployed (DCU)

CAIT: Community Application of Communication Technologies (CAIT): The case of the Cork Women's Education Initiative (CWEI) (DCU)

A1.2. Case studies of the Private sector and voluntary sector

The Gathering designer case: The Gathering: Computer parties as means for gender inclusion (NTNU)

Femme: Web Magazine: Strategies of Inclusion in three Web-based Magazines(NTNU)

The Gender Game: The Gender Game. A study of Norwegian computer game designers(NTNU)

WOW designer case: Women on The Web (Twente)

Libelle: A case study on the website of the Dutch women's magazine Libelle (Twente)

KidCom: "KidCom": Game Design Study (Twente)

IT Beat designer case: Bringing Pop and Glam to IT (UEDIN)

Untold designer case: New media, old world: the Untold story

(UEDIN)

Boys and girls stay in to play: Boys and girls stay in to play: creating computer entertainment for children (UEDIN)

Donna Moderna designer case: Donna Moderna: The Information society at the service of tradition (Metis)

The Work up case study: Women and the New economy: the Work up case study (Metis)

TILAB: TILAB From the GSM to the UMTS: is it a path towards women (Metis)

WITI designer case: WITI Women in Technology International (DCU)

eVenos designer case: eVenos: Creating a Space for Women on the Web(DCU)

Win Win: A Win Win Situation: Human Resources Perspective on Gender in the ICT workforce (DCU)

A1.3. Case-studies of female user experiences

IT Beat user case: Don't leave it to the boys (UEDIN)

WITI user case: Give and take, a user perspective of WITI (UEDIN)

Untold user case: Being in Digital Design (UEDIN)

EWTC user case: "I am not the same person!" User study of a Women-Only Training Course (UEDIN)

Ardmore Network: Included women, Excluded Men: user and non-users of Rural Community Resource Centres (UEDIN)

Domestication: The role of computer courses in the domestication of the computer (DCU)

eVenos user case: Performing on the boards: Female users of an online discussion board (DCU)

Fun: 'Girls Just Want To Have Fun' (DCU)

Donna Moderna user case: Women and the media system in society. A case study: the Donna Moderna site forums. (Metis)

Lupus: The 'wolferines' discuss: the Lupus user case study (Metis)

Compa-users: Women in the digitalization of Public Administration (Metis)

The Gathering user case: The Gathering Experience: A User study of a Computer Party (NTNU)

The pupils case: Computing: excludingly boring at school, includingly cool at home (NTNU)

Women in Computing: Computer Science: Careers of Computing? Inclusion through "secularization" of ICT (NTNU)

Mobile phones: Diffusion as inclusion? How adult men and women become users of mobile phones (NTNU)

VVS user case: VrouwenVakScholen: user case Women's Vocational Training in the Netherlands (TWENTE)

WOW user case: Women on the Web user study (TWENTE)

Internet courses: 'I don't know how to fit in into my life; the gap between the inclusion initiative introduction courses computers and the Internet and the personal stories of the excluded (TWENTE)

SIGIS

A2. APPENDIX: POLICY AND PRACTITIONNER BRIEFINGS

This appendix contains short briefings for individual sectors and and issues that include basic analysis of issues, and guidelines derived from the case studies. they are available seperately and can be downloaded from the SIGIS website.

A. PROFESSIONAL WOMEN IN IT AND NEW MEDIA:

INCLUSION THROUGH STRATEGIES OF EMPOWERMENT

Lisa Pitt

A growing body of research has highlighted the under-representation of women in IT and New Media and as the Greenfield Report notes, the threat this poses "above all to our global competitiveness". The gender imbalances in these sectors have therefore become a concern for both government and industry. The SIGIS research has identified a number of private or grass-root organisations supporting women working in and around technology, and has produced detailed case-studies of the motivations, aims and user experiences of these initiatives:: Untold for female digital designers, WITI (Women in Technology International), for female professionals in IT business, and WOW (Women on the Web), for any women wishing to make use of the Internet.

These cases demonstrate the importance of support for women working in and with technology – and in particular of "empowerment strategies". These strategies depart from traditional ideas of positive discrimination for women, arguing instead that women should be offered choice and opportunity, facilitated through the creation of women friendly spaces. In short, empowerment strategies offer practical and personal tools which can enhance women's motivation, inspiration and confidence, and help to make the work environment more gender aware.

Why do we need strategies to support women working in IT and New Media?

- To enable more women to be part of the design process, and so increase the potential for products to be more gender-friendly or gender diverse at the point of design.
- To challenge gender stereotypes which undermine recognition of women's contribution to the field of IT and New Media, as well as women's professional development and career progression.
- To address the isolation many women feel and their exclusion from work social networks, so helping women remain "inside" and feel part of the technology work environment.
- To address the informal gender barriers within the work conditions and cultures which result from gender imbalances, so challenging existing 'jobs for the boys' gendered networks and practices.

Empowerment as an Effective Strategy of Gender Inclusion

There are concerns about the appropriateness of traditional strategies of gender *inclusion* aimed at *women only*. Many of the professional women interviewed in our research do not want preferential or differential treatment for women, on the grounds that this does little to recognise the qualities of individuals, and can damage morale and confidence. Furthermore, there is a problem in making assumptions of what women want; a strategy aimed at "women" might unhelpfully reinforce stereotypes.

The SIGIS case studies show how these important challenges can be addressed through the very notion of the empowerment of women and through broader engagement, by holding for instance public debates and discussions (see Untold case study).

This approach provides a better understanding of the key issues and avoids segregation and stigmatisation.

Forms of Empowerment for Professional Women in IT and New Media

Communities and networks

- to address feelings of isolation and exclusion from social and professional networks.
- to offer new avenues to get people together, share ideas, meet like-minded people, learn from one another's experience or find out about job openings.
- to facilitate discussions with all levels of industry, including designers and company directors, of issues critical to women in the field.

Visibility

- Initiatives to improve 'visibility' of women designers - providing opportunities for women to be heard and seen.
- To make women feel they are "wanted".
- The benefits of visibility initiatives result from the attention they bring to the issues surrounding gender imbalances and not just the spotlight they put on individual designers or IT professionals.
- Role models also contribute to the "power of inspiration" (see *WITI* Case).

Training and Education

- Core 'technical' skill acquisition is rarely an issue among the highly qualified women in the SIGIS research. Empowerment strategies providing training in non-technical skills which can help women feel confident and inspired.

- Additional sources of information, eg., websites and leaflets, are also a good way to keep up to date with events and training, especially for those who find it hard to attend training sessions.

Guidelines

We recommend the following guidelines to make New Media and IT more inclusive and more gender aware:

- It is important to distinguish and address both the more tangible barriers to women's participation in the field, (e.g. work/life balance) and the 'unwritten' problems such as how women's competence in doing the job is perceived or gendered work cultures. Initiatives need to address the practical issues which disadvantage women (childcare, better access to finance for women to set up digital design agencies), whilst not neglecting the importance of also building confidence, providing inspiration and building female friendly networks and spaces.

- Networks, visibility and training are all forms of empowerment which are necessary to achieving gender inclusion within New Media and IT.

- Empowerment strategies offer a good way to address the tensions emerging from other gender inclusion strategies, through the judicious use of women friendly spaces open also to men.

- Empowerment strategies need to be informed about the wants and needs of target users. Empowerment strategies flagging women's contribution to design also often touch upon their ability to 'listen to' and 'talk to' various users in an original and effective manner. These issues are raised in a separate leaflet [see SIGIS, *Methodologies to Enhance Gender Sensitive Design*].

- The empowerment of women in IT and New Media needs to be endorsed at industry and company level, as well as by individuals themselves. There is an important groundswell of support, for example amongst IT employers faced with labour shortages, which could be tapped more effectively.

In sum, empowerment strategies seek to combat the perceived 'chilliness' of the IT and New Media sector for women, which results from their low representation in these occupations and industries in many European countries. Empowerment and other inclusion strategies may promote further changes in gendered cultures and practices, and so create a more welcoming space for women.

B. THE DISTINCTIVE ROLE OF FUN AND PLAY

Design, marketing and use of New Media entertainment by and for women and girls

Helen Jøsok Gansmo

Information and communication technologies (ICT) are ever more important in our society, but it is often claimed that the image of ICT and of ICT professionals puts women off. A common argument is that women associate ICT with hackers and nerds, so view computers as boring, asocial and only interesting to men. By contrast, it is often claimed that men acquire skills in ICT from a long and playful experience with computers. Entertainment appears to be an important stepping-stone for (some) men to become skilled ICT users (and, potentially, designers), yet research shows that many women do not play with computers. Hence, it has been suggested that new entertainment ICTs which can appeal to girls are needed in order to attract more girls and women to become skilled ICT users.

Girls want to have fun too!

Girls and women interviewed for the SIGIS project enjoy their entertainment ICTs; they find them to be social and a good distraction from other activities. More generally, playing with ICTs enhances the benefits they get from other interests, and they enjoy the indirect learning offered by these technologies. Girls and women take pleasure from such interactive, informal learning – be it about a computer game, a cake recipe or how to make your own home page on the Internet.

The games women play and prefer do not fall into any simplistic categories of "traditional" or "feminine" tastes. For many women

gamers the pleasure of game playing emerges from elements of flexibility and freedom in the games. They like being able to explore the world in any order they liked, and they like being in control of the main character or creating their own character. Women frequently seem to enjoy games that are cross-gender, that allow them the flexibility to explore interesting imagined worlds, and to play with, or create, multiple femininities and masculinities in a game.

Several computer game designers voiced scepticism about designing games specifically for women, and see little or no market potential for women-only games. Other designers are trying to avoid what they see as the competitive and saturated market for games for boys, and are looking for new markets. Crucially, we found, it is not necessary to design for women-only in order to be women-inclusive. On the contrary, girls we spoke to claim they would be even more interested in the product if it were not positioned as a typical girl's product.

Successful design strategies for including girls and women through play

- Start from known girls' interests, such as popular music and pop stars, without labelling these as girly. "Girlishness" is a feature that women themselves may bring to the technology, but it is seldom welcomed if created by producers.

- Try to entice those girls without ICT experience to have fun through the use of ICT. Try to make them active learners of computing by focussing on an activity which interests them, leaving the computer as an almost invisible means to this end.

- Design more flexible, cross-gender and cross-generational games which tap into both women's and men's interests, also games targeted at new markets such as the family segment. Cross-gender designs can be a route to *better* games.

- Create products that girls actually want, and not what they "should" have, either in terms of being worthy and educational, or anti-traditional feminine interests. Although the themes can be "girly", they should not emphasise old-fashioned stereotypical female roles. Be careful with stereotypes!

- Emphasise interactivity and multi-user games where users can play together rather than compete. Even more, try to create flexible, multi-level products with content of equal interest to girls and boys, but which may be played and explored in many different ways depending on the various users.

When design focus starts with established interests (which might be gendered, but not necessarily or not explicitly), and when design aims at flexibility in the content of the technology, it seems easier to hit several playful targets. By these strategies also gender norms might change.

Unsuccessful design strategies

When design strategies for women-only entertainment products start with gender stereotypical assumptions, there are many pitfalls. When the entire group of different women are homogenised into one category, 'women', it is extremely difficult to hit the target, or to entice them to play. Unsuccessful design strategies thus tend to:

- Focus extensively on contrasts between boys and girls. These designs run the risk of reinforcing perceived gender differences rather than building on the flexibility of both gender and technology. Dualist stereotypes tend to be unattractive.

- Be based on the I-methodology, where men designers regard themselves as representative users. Thus, they design games they would like to play, rather than addressing the range of

potential users and their wide preferences.

Issues beyond design

The price of ICT entertainment products does seem to put some girls off, but the image of the product and of its users seem to be more crucial than price in terms of gender inclusion.

Just as access to ICT equipment does not guarantee that women will make use of it, so lack of access does not preclude use or play. Several of the SIGIS studies reveal the importance of social networks in acquiring ICT skills. Thus, the existence of a local circle of friends or family, who play games and provide easy access to game platforms, games and advice, strongly influences initial enrolment of girls into playing digital games. Such networks are important in terms of informal learning, offering access to a network of skilled players, advice on new games and on how to overcome obstacles in the games, plus access to second hand games and consoles as well as informal game evenings. Also, when girls observe the varied ICT practices of others, the boring and "hackerish" image of ICT may be replaced with many different images.

Several of the SIGIS studies also observed that when girls found ICTs to be enjoyable and fun, they no longer thought of it as technology per se. In this way, technology is not regarded as fun, only the activity. Nevertheless, through the fun and enthusiastic use these women make of computers they implicitly learn more about the technology. However, this is not an automatic route into learning about computer systems, networks and programming or becoming computer specialists. Since they did not see their activities as technology, just fun, it might take some time until girls stop associating technology with something alien to their lives. Nevertheless, it is clear that girls do enjoy using ICTs and are able to use them proficiently.

C. GETTING MORE WOMEN INTO COMPUTER SCIENCE AND ENGINEERING

Vivian Lagesen Berg

The gender gap in access to and use of Information and Communication Technologies (ICT) has been reduced significantly. Still, however, the number of women who take a higher education in computer science and engineering is significantly smaller than the number of men. In fact, from the mid 1980s, the percentage of women professionals in computer science and engineering has actually decreased. In order to turn this unfortunate development and achieve a gender balance, action needs to be taken to recruit more women into higher ICT education.

The project Strategies of Inclusion: Gender in the Information Society (SIGIS), conducted in Ireland, Italy, Norway, The Netherlands and the UK, and funded by European Commission IST Programme, has analysed initiatives and efforts to recruit and retain more women in computer science and engineering in higher education. Based on the case studies conducted by SIGIS, we can suggest some efforts that appear to have been particularly useful to achieve successful enrolment of women.

As a general point, our research emphasises the importance of engaged and comprehensive inclusion projects, embedded in institutions of higher education, in order to achieve the goal of enrolling more women students to become ICT professionals. These projects need strong support from the board and leadership of the institution, as well as resources. It is important to combine several instruments in order to give inclusion efforts a high degree of visibility and to make them convincing. Finally, one needs to be concerned not only with the recruitment of women students, but also with how they may be retained

Why more women into computer science and engineering?

There are several reasons why it is important to recruit more women into computer science and engineering. Computer science and engineering is a growing industry with notable influences on society. Four arguments support the need for such recruitment efforts:

- The *justice* argument point to the fact that women may be deprived of an opportunity to contribute to and influence a growing and important technology in all parts of the society.
- The *equal opportunity* argument points to women's rights to the benefits offered by the ICT industry labour market.
- The *resource* argument refers to societal losses when the scientific and technological talents and experiences of women are not utilised.
- The *labour market* argument highlights women's potential role in contributing to the supply of computer science educated labour to the industry

How to design instruments to recruit women students

It is no easy challenge to design instruments that serve to make more women apply to higher education in computer science and engineering. Our research suggests that the following actions may bring good results:

- *Allocation of quotas*. The experience from SIGIS research shows that a quota of admittance reserved for women only is a good way to signal that women are really wanted. This instrument may be very important to secure a sufficient

number of women students to achieve for them a peer-supportive community that is so crucial to their experience of the social environment. Also, it makes the education appear as more gender neutral or cross-gender; in fact, to have many women changes the gendered image of computer science and engineering in a very significant way (at least for the student in computer science)

- *Extensive advertising campaigns* to inform and encourage women to apply may be highly effective. The use of humour and irony helps to gain attention among young people. Advertisements may also benefit from having a fashionable and trendy style. A lot of media attention about the efforts to recruit women may also be helpful, because it reinforces the message that women are particularly wanted as computer science and engineering students and makes women more aware of the programme.

- *Role models* are important for making more women perceive computer science as an attractive education. Role models can be women students as well as women faculty and professionals. One way of making role models visible is by focusing on women in advertisements or using women to promote computer science programmes in media or schools. However, it is above all important to provide role models through the appointment of women faculty and to use women students as teaching assistants as much as possible.

- Inviting women applicants to *pre-visit the institution* in order to encourage them to accept their place of study may also have a good effect. For example, one university that we studied organised what they called the Women's Day. Women who had applied to the computer science programme, was invited to come to the university to get to know each other, learn more about the programme and take part in social events. The university covered travel costs. In this way, they got to

Guidelines

In general, a broad encompassment has to be made in order to achieve the best possible effect of such inclusion efforts. This means:

- Combining different efforts are particularly effective to achieve a notable result and to be sure to reach as many potential and current women students as possible.
- Take into consideration that women are by no means a homogenous group. Thus, heterogeneous actions are required in order to reach as many women as possible. Stereotyping, drawing upon traditional images of women and femininity, is a bad strategy. First, it narrows down the segment of women, since few women actually fit such stereotypes and consequently will not feel targeted by the initiatives. Second, being constructed in a particular and non-fitting way often provokes women and makes them feel less appreciated.
- Women students in computer science usually are quite resourceful. They refuse to be treated as if needing "crutches". It is important to emphasise that inclusion efforts should as much as possible be presented as not directed explicitly toward women only. On the contrary, they preferably should be seen as an offer to all students, men and women, even if they are motivated by a concern for women students.
- Relative numbers are crucial to avoid marginalisation of women students. In order to create and maintain a peer-supportive environment among women, there is a strong need to be beyond a certain 'critical mass' of women. Our case studies show that if one reaches a significant number of women students, computer science no longer appears as a particular masculine domain, but rather as an education just as suitable for women as for men.

In cases where women are in a marginal position or

underrepresented, it is a good strategy to facilitate the creation of networks in order to contribute to community building among women students or faculty.

D. GENDER-SENSITIVE DESIGN METHODS

Els Rommes

This briefing considers how ICT design may better cater for women and other users. Companies often only accidentally find out that women are an important and (financially) interesting potential target group for their products and services. Those companies who do recognise this market often consider designing for women to be a high-risk activity, as the wishes and demands of female users of websites, electronic games and projects are relatively unknown. Such issues were raised in a number of SIGIS case studies.

We do not intend to give an answer to the question 'what do women want from their products?', but rather offer advice on how to take into account the wishes of specific groups of women and integrate these better in the design process, thereby reducing the risks involved in designing for women. Understanding current design methodologies and how they can be improved, will benefit not only potential female users, but all end-users and therefore the companies selling these products.

Avoiding sterotypes, understanding specific groups.

Products are more successful when they take into account the specificities of the target group. Attempts to design technologies 'for everybody' and 'for all women' simply cannot work for every individual or for all women. After all, the 'female audience' is not a fixed or universal category, but extremely diverse with respect to its interests, technical enthusiasm, capabilities and experience, location and social networks. In short:

- It is important to identify and define more precisely the

target audience and their interests, (technical) capabilities and contexts of use. A product could for example be specifically aimed at game playing horse enthusiastic children, at unemployed low skilled single parents with school aged children, or at female designers who work in a rural community and who have a good social network. Effective services or products must identify and address the specific needs and wants of the target users in their content, technical features and sets of functions and applications.

- Even when a specific group is targeted within seemingly homogeneous groups, differences in ICT interest, confidence and skill need to be accommodated. The SIGIS case studies found that successful products aimed at particular groups had often based their interface design on the needs of users with the lowest levels of technical competence

Potential Pitfalls of Gender Sensitive Design

The statement that the wishes of end-users, including women, need to be taken into account during the design of products and services may seem obvious. However, looking at the prevalent current design methodologies, this seems to be far less obvious in practice. Often designers are tempted to design according to their own preferences and personal experiences, the so-called 'I-methodology'. This is an easy, cheap and time-friendly method, however, it bears the danger these preferences and experiences do not match those of the target group.

We also found in our SIGIS case studies that when organisations develop products geared at female audiences, the design is often based on existing stereotypes and widespread beliefs about women. Research into end-users does not get a high priority. Moreover, methods to find representative end-users are not well developed and designers often prioritize the demands of investors, who are not always end-users themselves. And even if potential end-users are directly involved in the design process,

these 'test users' are hardly ever representative of the target end-user, and are involved in the design process at a point in time when all the relevant choices have already been made.

The following steps can be taken to reach women without resorting solely to stereotypes or the 'I-methodology'.

Guidelines for Gender Sensitive Design

- Do not apply a dichotomous and fixed gender perspective but rather start with the established interests of the target group, i.e. enthusiasm for horses or pop-bands. Do not magnify gender differences, but rather try to combine both masculine and feminine elements. These types of products are more likely to be successful.

- When designing for (specific groups of) female users, it is important to involve female designers, preferably in decision-making positions. Gender diversity in the design team clearly enhances gender sensitive design practices. This can be stimulated by attracting more female ICT designers (see also the SIGIS leaflet 'Getting more women into computer science and engineering') and by empowering those women who are already working in ICT design (see also SIGIS leaflet 'Professional women in IT and new media: inclusion through strategies of empowerment').

- Stimulate the involvement of the target group of end-users in the design process. This is an important way to empower end-users and it helps to create a more nuanced image of 'what women want'.

- The earlier potential users are involved in the design process, the more influence they can have on the design of the product, which reduces the risk that designers find out too late that they are on the wrong track.

- Pay attention to the selection of potential users on which

user tests are performed. It is relevant to take care that the tests groups represent the diversity within the target group. The test results will provide more and richer information on potential mismatches.

- Computers and the Internet can provide a new way of giving end-users influence in the design process, for instance by creating forums on the Internet where users can discuss with each other and with designers desirable features of the product. However, it is important to bear in mind that –at the moment at least –Internet users are not representative of all segments of the population.

E. WOMEN-ONLY COURSES IN VOCATIONAL ICT TRAINING

Wendy Faulkner

With the rise of the information society, computer knowledge and skills are gaining more and more importance for one's possibilities on the labour market. Therefore it is of eminence importance that all economically vulnerable groups have good access to ICT skills and knowledge. Discussions on the so-called 'digital divide', where ICT is seen as widening rather than diminishing social inequalities, illuminate that this ideal is far from reality.

This briefing analyses how vocational training in ICT skills and knowledge can be organised to be effective for specific groups of economically vulnerably women. It will end with specific recommendations for the didiactics and organization of vocational ICT training that takes account of the needs and circumstances of this specific target group.

Why women-only courses?

"The theory is basically, that we work with women, with women as role models as trainers. And that we therefore build up the skills and the confidence of women who have had bad learning experiences or no learning experiences, in a non–competitive environment. And they are then enabled to make choices about where they go and what they do and gain the skills to take them there." Trainer of the Edinburgh Women's Training Course.

Women-only courses in ICT started in the 1980s combining educational ideas from the feminist movement aiming to empower women with the need for skilled personnel in the burgeoning IT sector. After a flourishing period in the 1990s

nowadays women-only courses are less often practice today. However, diverse SIGIS case studies on vocational ICT training showed that women-only courses are highly effective in meeting their goal, that is provide the trainees with good jobs. For instance, the study of the Dutch Women's school for vocational training showed that 80% of the graduates in ICT related courses find a job within one year.

The important rationale behind women-only courses is that groups of women are likely to share specific attitudes and problems rising from their specific socio-economical position. One can think for instance of middle-aged women returners who often lack self-confidence and still have images of computers being masculine; low educated unemployed single mothers share time and financial problems, often have low self esteem related to paid work and in some cases they even have become socially isolated; low-educated ethnic minority women or refugee women, share language and cultural barriers.

Often these women have for various reasons lack of confidence and self esteem related to these courses, implying that their dropout rate in general training is often rather high. Women only courses have the possibility to taylor the didactics and the organization of the courses towards their envisioned trainees.

For example, the somewhat elder women returners, often still see computers as a 'man's thing' and feel a certain anxiety. Some of these women even report resistance from husband or brothers in that they argue that computers are "too difficult for her". This imposes even more stress to master ICT: A women-only situation offers for many women a safer and more reassuring environment for learning then a mixed situation.

Guidelines

The SIGIS research found successful, effective women-only vocational training to consist of a heterogenous package of

measures tailored towards the specific needs of the target group. Below we will elaborate on the most relevant dimensions of these measures.

Successful organizational and didactical elements of women-only vocational training:

- *Let women feel welcome.* Often the envisioned target groups perceive themselves as 'outsiders' of labour market. To lower the threshold it is psychologically relevant to let them feel welcome. A women-only course is a very clear message that women are welcome, especially in a sector that is not normally associated with women.
- *Take the context of the participants in account.* Often the envisioned trainees are women living on social security or taking care of children. To lower thresholds for this group it is relevant to take into account:
    - low or free course charges
    - organise the course timetable geared to the school calender
    - provide free or cheap child care
    - provide flexible part time courses
- *Provide a safe learning environment.* Most important is to provide a safe learning environment of (re)building self confidence. Trainees value a supportive and non-competitive environment. Central in such an environment is:
    - an atmosphere of co-operation where trainees are stimulated to support each other.
    - experienced and committed trainers, preferably women, with are stimulating didactical style
- *Female trainers.* Supportive female trainers are important as positive role models, but they often are also good in speaking technical language on the trainee level, and can

better explain. One female trainee phrased this as follows: "women's logic is something different to men's logic [....] female teachers explain things more clear, we are in tune with each another"

- Supportive trainers. Next to didactical and cognitive aspect, trainers have to take the social side of their trainees seriously. Trainees are not only seen as learning persons, but trainers have also keep an eye out for their life outside the course. One trainee with a problematic private life said: I think she understood my situation and I felt she really knew me" This support stimulated the trainee to continue her course, despite her personal problems. Trainees find it important that they are validated as a 'whole person'.

- *Take individual differences into account.* A key feature of the training didactics is that the trainees should be able to progress at their own pace. The training format and environment must be able to accommodate different levels of prior education and different paces of learning. A modular system with self-working as point of departure works well. The written material should be step-by-step guiding. Trainers can be called for help when necessary.

- *Celebrate achievement.* This proved to be an effective way of improving the self-esteem of trainees.

- *Stimulate community building*. As many of the trainees find themselves in similar positions, they tend to develop a strong sense of solidarity. This led both inside and outside the course to a sense of community building (helping each other, having meals together, etc.)

- *Prepare trainees for a position in the labour market.* Many women are out of the labour market for a long time. These women have difficulties in seeing themselves as valuable workers of see difficulties in combining motherhood and work. They often have limited aspirations, not in accordance to their

potentials. Therefore it is relevant not only to learn these women ICT skills but also to stimulate them to mentally "redefine" themselves as a valuable female worker. One trainee phrased this change at her graduation: "I am not the same person anymore".

F. GENDER INCLUSION WITHIN THE ICT WORKFORCE

Tackling the 'Chilly Culture' for women in the ICT Workforce

Carol McKeogh and Paschal Preston

Women have significantly increased their share of jobs within many knowledge-intensive industries and occupations over the past 20-30 years, but not in the ICT supply industries and related occupations. Indeed, women's share of jobs in this sector has declined in some European countries in that time – challenging the myth that such 'high-tech' sectors are conducive to women succeeding, because they are new and rely on 'brain not brawn'.

Women's under-representation is much more serious within the core ICT producing sectors than in application sectors (such as Internet/Web based magazines and web design services), with women accounting for between 25% and 35% of core ICT jobs across EU countries. This is particularly worrying, given that ICT sector lies at the heartland of an emerging information society and knowledge-based economy, developing new ICT products, systems and services with important economic and social implications. Social justice considerations suggest that women should have 'a fair share' of the high-status, high paid and influential jobs in this sector.

In addition, governments and industry increasingly argue that improving gender inclusion in ICT is necessary in terms of economic performance. Women are seen as a largely untapped resource to overcome the skills shortage in core ICT occupations. There is also a growing perception amongst ICT executives that greater gender (and other) diversity in the workforce is crucial for future success in the market place.

Many believe that the more their workforce reflects their customer base the more it is likely to generate the imaginative 'leaps' on which cutting edge technology depends. In particular, companies with a more diverse workforce will be better able to meet the needs of female customers, and to increase growth in products where women are a largely under-exploited market, such as games.

This leaflet addresses barriers to, and measures for, improving the retention of women working in the core ICT sector. It draws on case studies from the European research project Strategies of Inclusion: Gender in the Information Society (SIGIS). It complements the SIGIS leaflet on 'Inclusion through Strategies of Empowerment' which addresses the importance for women in ICT of role models and networking.

Retention: the 'leaky pipe' challenge

The under-representation of women in the core ICT industries points to some very significant challenges. One striking feature of the sector in many EU states (e.g., the UK) is the sizeable losses of experienced, mid-career women workers. This indicates that the key challenges for gender inclusion in the ICT industry are not simply those of recruitment, the 'feeder pipe' aspects. The retention of those women workers who have been recruited to core ICT roles – the 'leaky pipe' syndrome – is a particular problem in the sector.

Employers and policy makers often assume that the 'feeder pipe' is the key to understanding women's career paths within ICT, that women are not coming forwards with the skills and experience to occupy core functions and key management roles. This explanation is only half the story. While skills obviously can be an important factor in such leading edge industries, there is evidence that women 'vote with their feet' because they experience the work culture within ICT as decidedly 'chilly'.

A 'Chilly Culture' in the ICT industries

SIGIS research confirmed the following barriers to women's career progression within the ICT supply sector:

- *Inadequate commitment to gender inclusion.* Absence of coherent or robust (Board-level) gender inclusion strategies within the ICT sector. Where gender or 'diversity' policies are in place, this tends to be in theory only. In practice, such policies are not consistently thought-through, specified or implemented at all layers of managerial decision making.

- *Poor work-life balance.* An industrial culture which requires long working hours and frequent over-time, and sometimes travel demands necessitating stretches of time away from home.

- *Lack of flexible, care-supportive policies*. Limited provision for temporary reductions in working hours and paid parental leave. Although 'flexibility' of working practices and processes has long been celebrated as a defining feature of the ICT sector, SIGIS case studies indicate that in practice the prevailing notions of 'flexibility' are highly firm-centred or project-centred rather than employee-centred. Where flexible working arrangements exist, procedures are often not in place to make the process of applying for these evident, transparent and accessible. And resources are often not in place to cover workers on leave. Because fellow workers are expected to take on the extra work, peer pressure is a strong impediment to the uptake of flexible working arrangements.

- *Stereotyped notions of jobs for men or women.* In some instances, where women have entered into male-dominated jobs, their skills and abilities are stereotyped so that they tend to be allocated particular types of tasks such as designing web sites for children. It is frequently assumed that women have better 'relational' skills than men. SIGIS research shows that

this assumption is not always supported in practice, and that 'people skills' are not always facilitated or rewarded in the ICT sector in spite of their importance to innovation.

- *Lack of role models and opportunities for networking.* The scarcity of women working in ICT means that most are isolated from other women in similar jobs. They lack the solidarity to survive working in the 'chilly' work environments, which can make them feel very marginal and overlooked. Because they are not seen as 'belonging' in the work culture, they may also, in practice, be excluded from the informal networks through which male colleagues may support one another's career progression.

- *Discrimination.* Many women experience 'insidious sexism' and claim that discrimination against women is more common in the ICT industry than elsewhere.

- *Image problem.* The ICT industry has an image problem, as not 'women-friendly', that reflects all of the above-mentioned issues. In addition, because men dominate the workforce of the industry, it appears masculine.

The 'leakage' of mid-career women from core ICT roles is due to a combination of interacting factors. For example, decisions to leave work for family reasons tend to be weighed against the advantages of continuing in a job where there are perceived impediments to promotion and self-development for women. Leaving may represent an 'informed' refusal to play the competitive game of upward mobility, based on a calculus of the downside costs of promotion in terms of factors such as work-life balance.

Inclusion Strategies: Beyond 'Image' Approaches

This evidence of a chilly work culture within the core ICT industries suggests that the key challenges here are not simply those of 'image'. Yet, a major emphasis in many current efforts

to improve the recruitment of women to ICT is on changing the public image of working life and practices in the sector. These initiatives seek to represent work in core ICT industries as 'cool', fashionable and consistent with contemporary self-images of women's identities and roles. Whilst such measures may well have some limited effects, they are unlikely to have a significant long-term impact on gender inclusion in the sector unless they are linked to more fundamental changes in workplace practices – precisely because they neglect the 'leaky pipe' syndrome and this has little to do with the public image of ICT work.

Guidelines: From a 'Chilly' to a 'Cool' Culture for Women in ICT

There is still a great deal that policy makers and employers can do to facilitate greater gender inclusion in the ICT supplying industries. In particular, companies who have recruited women to core ICT roles now need to consider how they will retain those women, and enable them to progress up through the ranks and across the range of functions, if they are to realise the full benefit of having them in the workforce. Relevant recommendations arising from the SIGIS research include:

- *Establish coherent and robust Board-level policies and related implementation strategies*. These policies Should include appropriate measures related to performance criteria, work-life balance and gender inclusion goals and provide specific steers to line and departmental management

- *Develop more flexible work conditions in terms of time and place – where and when work is carried out.* This may mean, for example, evaluating the potential new modes of employee-centred e-work, and tackling the tendency some women report for 'working from home' to be demeaned and under-valued.

- *Expand employee-centred flexible working arrangements to*

all functions and at all levels. This would entail examining whether greater flexibility really is 'impossible' in core functions and in higher management. Many very successful women in the sector report that the equation of job status with 'presentism' (being physically present) is exaggerated. It will be necessary to strengthen forms of representation in order to articulate workers' interests in the design and implementation of 'work flexibility' regimes.

- *Strengthen care-friendly work contracts such as job sharing, leave, etc*. Such alternative work arrangements should be encouraged for men as well as women. Further, time spent working under flexible arrangements must be given due credit so that skills and experiences are fairly acknowledged in relation to pay and promotion. Other skills gained during leaves of absence could be explored and credited.

- *Examine the work culture at all levels*. Remarking on sexist practices can be difficult if the culture is also one where people may be accused of 'political correctness'. A strongly individualistic work culture may inhibit discussion of gender inequalities in recruitment and promotion. Employers should question whose interests are served by such silencing. Ways could be found to challenge stereotyping in decisions about job allocations and promotion.

- *Increase the quality of training and mentoring*. Women in the industry want to increase their level of competence and be more competitive in the performance of their work. To achieve these goals, they need high-quality support in terms of mentoring, supervision and training. While the quality of such offerings is important to all employees, it can be particularly influential in relation to women.

- *Support women's self-help groups and networking*. This works as a means of reducing women's felt isolation, enabling women employees to pinpoint areas needing change, and empowering women in terms of leadership roles.

- *Change must be spear-headed by executives and senior men.* Gender issues have too long been left to women, despite the strong economic rationale for the organisation as a whole to take action.

G. PRIMARY AND SECONDARY EDUCATION

The Distinctive Role of Schools in the Inclusion of Girls in ICT Professions

Helen Jøsok Gansmo

Information and communication technologies (ICT) are ever more important in our society, yet there continues to be a gender digital divide – at least in terms of the proportion of men and women in higher education in computer science. Primary and secondary schools may have an important role as an equalising force, securing access to and knowledge about computers for all irrespective of gender and socio-economic status. The project Strategies of inclusion: Gender and the Information Society (SIGIS), conducted in Ireland, Italy, Norway, The Netherlands and the UK and funded by the European Commissions IST programme, has investigated public and commercial initiatives to include women as users and designers of ICTs. Educational policy plans, teacher education and training, school implementation and pupils' reactions have all been studied as part of the SIGIS project.

What can be done through policy?

Policy awareness of the potential of ICT as an educational tool, and the potential contribution of schools in equalising digital inclusion, is needed. Within this, policy awareness of potential gender differences related to ICT is also needed given the manifest gender differences in the past.

Realising the potential of school education to improve digital inclusion implies more funding for schools, curricula changes, better software, and developments in teacher training. Easy access to high quality equipment – for teachers and pupils alike

– is vital. However, the common belief that access to computers is sufficient to facilitate competent use of computers is a serious mistake. There is no automatic link between access and use. Similarly, the full integration of ICT into classroom education implies something more profound than allowing pupils to look things up on the Internet.

Teacher education and training in ICT is clearly a vital element in furthering both the integration of ICT into education and digital inclusion amongst children. This training must do more than merely transmit ICT skills. It must seek to enhance confidence, and provide practical ideas about how to apply the technology in the classroom. In particular, it should provide practical education in ICT use, which is geared to the teaching of each subject in the curriculum. The point is not to create ICT experts, but to diffuse the ability to effectively use ICTs in the teaching of subjects and literacy across the whole teaching community. This means ICT training must be for all teachers, including those who previously lacked experience in ICT use. Only then will responsibility for implementing ICT strategies be carried by the school as a whole, rather than by a handful of ICT enthusiasts on the staff. And only then will all pupils benefit. Of course some teachers will be more innovative and confident with the use of ICTs, male and female local experts in individual subject groups should be formally supported to provide knowledge and role models to other teachers and pupils alike.

What can be done by schools?

Schools across Europe are attempting to integrate ICTs into their teaching and other activities, with varying levels of resources, support and training. SIGIS investigated cases in the UK and Norway, where we found considerable variety, both in how far schools have progressed in integrating ICT into education and in the measures they are adopting. Lack of resources is often used as an excuse for not implementing an ICT strategy. Still, some schools manage to be visionary and imaginative in turning

this problem around. For example:

- Instead of buying new books, they develop interactive and flexible books on the Internet.
- Evening courses in ICT use for mothers of pupils at the school.
- Access to ICT for the pupils after hours.
- Computer slumber parties in school over a weekend.

In Norway, the following measures have been successful in including more pupils as ICT users:

- Developing an interactive and updated home page for the school.
- Providing basic ICT skills for all.
- Making the ICT teaching relevant to specific subjects.
- Actively encouraging and giving teachers opportunities to make use of ICT within their subjects.
- Making sure all pupils get equal access to the school computers.
- Starting from the interests pupils have (e.g. pop stars) and letting the pupils explore their interests using ICT. Learning a foreign language can be more interesting if you are allowed to read about your favourite topics in this language on the Internet. Learning natural science can be more interesting if you are allowed to communicate and collaborate with pupils in other countries about the specific topic.

Some schools are applying their ICT strategy more or less as a universal remedy against a range of endemic problems:

- Being innovative in their ICT strategy is one way of attracting good teachers.

- An innovative ICT strategy can also make the school more attractive to parents and be used to include them as active stakeholders. When parents are happy with the school and feel they have a say, they may more readily contribute when the school needs their help.
- By letting pupils use the computers in their breaks and after hours, the school gives them both responsibility and an opportunity to pursue their own interests using ICTs. This can also help reduce the likelihood of pupils engaging in anti-social or destructive behaviour.

Digital inclusion outcomes

Interviews with school pupils in Norway indicate that these measures do help digital inclusion; computers are equally accessed and used by boys and girls. Still, it seems school computing mainly involves learning to type with some occasional Internet searches, although the pupils say they would like ICT to be a basic part of all subjects. Significantly, pupils report that they find school computing boring. By contrast, many pupils report extensive and varied use of computers in their leisure time. This computing is seen as fun and interesting but, ironically, not as computing per se.

To some degree, then, girls seem to be included as basic users of computing through school. However, as long as school computing is perceived as boring, and more enjoyable leisure use of computers is not considered technological, these school inclusion efforts are unlikely on their own to induce more girls to go on to computer science in higher education.

The need for greater gender awareness … at all levels

A key issue to emerge from the research is the limited extent of any reflection by teachers on how classroom use of ICTs might impact positively on girls' entry into computer specialisms in later life.

The presence of 'state feminism' in Norway means that a concern for equal opportunities for women and men are included in most public policies. Accordingly, there is a strong awareness, within education policy on ICTs, of gender as a potential dimension in the digital divide. However, this in principle policy level awareness does not always translate into gender aware classroom practice by teachers – partly because *there is little or no awareness of how apparently gender neutral actions and arrangements can actually work to the disadvantage of girls and women.*

In the UK, and probably most other European countries where there is less explicit and comprehensive attention paid to gender inequality, gender is absent from discourses about the digital divide. Thus, there is not even a government-level awareness of gender (or other) factors which might shape unequal access to and confidence in ICT amongst school pupils. The nation-wide policy to provide in-service ICT training to all school teachers provided no orientation or encouragement for teachers to challenge stereotypes around gender and ICT in the classroom, or to particularly support girls in this subject. Yet, other parts of the UK Government back a range of initiatives designed to get more girls interested in becoming computing specialists. *This indicates a serious lack of 'joined up policy' with respect to gender and ICT.*

In sum, our research highlights a profound need for greater gender sensitivity and awareness in all plans concerning ICT use in school education, and at all levels, including teacher education and training around ICT. It is vital that such gender awareness is not based on binary or stereotyped understandings of gender

since this is likely to be counter-productive. Assumptions that girls are only interested in functional or communicative uses of ICT while boys only are interested in playing with the computer, for example, can act to limit children's choices. Indeed, it should be part of an inclusion policy to alert schools, teachers and parents to the problems created by invoking gender stereotypes. Such policies need to offer ample possibilities for diverse practices for both boys and girls. SIGIS research indicates that, in this area as in others, images of both ICT and gender need to change. By facilitating a range of uses of ICT which are relevant and interesting to both girls and boys – and by encouraging playful encounters with computers for both girls and boys – the image of ICT as an all-male interest may be diminished.

What strategies to include women in the information society actually work?

How should such strategies be analysed and planned?

What are the key dimensions of inclusion?

What strategies are relevant to product design, education or human resource management?

This booklet draws on the findings of a major European Commission-sponsored research project into strategies of inclusion and gender in ICTs, summarising the latest experiences from accross Europe and offering guidelines for practitioners and policy makers.

Strategies of Inclusion:
Gender and the Information Society:
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