

TECHNOLOGY AND WOMEN'S EMPOWERMENT

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Chapter 3

WOMEN EMPOWERING THEMSELVES TO FIT INTO ICT

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WOMEN EMPOWERING THEMSELVES TO FIT INTO ICT

Hilde G. Corneliussen

3.1 Introduction

Norway and the Nordic countries are recognized for a high degree of gender equality, reflected in a high ranking on the World Economic Forum's Global Gender Gap Index, but still experience notable gender segregation in education and the labor market. The gender imbalance in the field of information and communication technology (ICT) seems to be particularly difficult to improve. In Norway in 2018, 24.2% of applicants to ICT education were women, and 20.3% of those working as ICT specialists were women (Simonsen & Corneliussen, 2020). However, women in ICT also work more than women in other fields, with only 13% of women working in ICT holding part-time positions, against 37% in all occupational fields, and the pay gap is below (only 93–96%) the average for all employees (87%) (Simonsen & Corneliussen, 2019; Statistics Norway, 2018, cf. EIGE, 2018). This confirms Hanna's suggestion that ICT represents an "opportunity window" (Hanna, 2010) also for women in Norway. The strong gendering of ICT indicates that women are at a disadvantage. Reflections of this are identified in low expectations of girls' interest in ICT (Corneliussen & Prøitz, 2016), challenges in identifying female role models in ICT (Corneliussen et al., 2019), and by ICT employers expressing doubts about women as ICT experts (Corneliussen & Seddighi, 2020). In this study we wanted to learn more about how young women overcome these barriers and consider pursuing a career in ICT, despite the abundant examples of ICT being less welcoming to women.

The study includes interviews with 24 women in Norway currently studying or holding academic recruitment or research positions at faculties of technology and science. In a previous analysis from this study we have documented that the women did not feel invited or encouraged to choose an ICT education, and their lack of knowledge about ICT in the transition between lower and higher education sends nearly half the group into a "penalty loop" – starting with another degree before "discovering" ICT, and subsequently starting all over again with an ICT degree (Corneliussen, 2020). This chapter analyses how these women, once they have entered ICT, find ways of empowering themselves in a field that they initially experienced as not very welcoming to women, asking how they succeed

in establishing their own sense of belonging in the field of ICT. The analysis explores how women negotiate to perceive themselves as fitting into the male-dominated field of ICT. In this process they mainly have to rely on their own efforts – their self-empowerment, employing strategies and practices for making women visible as they strive to identify ICT as a field where women, too, belong.

3.2 Literature review

The low proportion of women in ICT education and careers has been subject to continuous attention from scholars over the past decades. Researchers today agree that the imbalance has structural and contextual causes, unrelated to girls' and women's abilities to work with technology (Blum et al., 2007; Frieze & Quesenberry, 2015). Once women do enter the field of ICT, there are more similarities than differences between men and women working with ICT (Faulkner, 2000; Frieze & Quesenberry, 2015). Studies from Western countries have identified that young people lack an understanding of what ICT represents, a problem impacting girls more negatively than boys (Grover et al., 2014; Jethwani et al., 2016). This lack of understanding, combined with a strong link between ICT education and gaming and programming, has made ICT education a more attractive option for boys than for girls (Denning & McGettrick, 2005; Jethwani et al., 2016). In turn, this imbalance has given rise to stereotypes associating ICT competence more with men than with women (Blum et al., 2007; Cheryan et al., 2015). Such gendered stereotypes make it difficult for girls and women to associate with fields of ICT (Cheryan et al., 2009). One result is that girls to a lesser degree than boys identify with the field of ICT. They have less self-confidence (Jethwani et al., 2016; Margolis & Fisher, 2002) and it is less common that girls imagine themselves pursuing a career in ICT (OECD, 2016; Rommes et al., 2007). This often results in a sense of constituting a minority in ICT contexts, leaving these employees with a notion of being *visible as women* but *invisible as professionals* (Faulkner, 2009; Kanter, 1993 (1977)). This also challenges women's possibility of being recognized as role models in ICT (Corneliusson et al., 2019).

Studies have documented that female students are positively influenced by female lecturers and by lecturers who do not reflect stereotypical notions of ICT, while male students are less responsive to the gender in this context (Master et al., 2014). Furthermore, research shows that women are more attracted to topics like technology's social aspects and social benefits (Jethwani et al., 2016). However, according to early studies, women felt that their preferences were treated as subordinate to those of the male students, who tended to prefer technical aspects of ICT (Håpnes, 1992; Woodfield, 2000). Many findings from previous research on women's absence in ICT studies point in the same direction: ICT is perceived as a field associated with boys and men. Still, conditions are not static. Programming, often perceived as the "core" of traditional ICT fields such as informatics, was previously perceived as women's work (Abbate, 2012), before increased institutionalization turned it into a realm of male dominance (Ensmenger, 2012; Hayes,

2010). Earlier explanations of women's low participation in ICT subjects are increasingly challenged, for instance, assumptions about access to ICT as a main differentiating feature, while today's youth in Norway have almost full access to ICT (Schiro, 2019). Similarly, computer games and technological toys have often been described as a door-opener to ICT studies for boys, while recent research is more reserved toward this explanation, as a majority of both girls and boys play computer games, and most also use ICT in their leisure time (DiSalvo & Bruckman, 2009; Peacock & Irons, 2017). As these previous explanations cannot be taken for granted, there is a need to develop up-to-date knowledge about how ICT is constantly shaped and gendered in a cultural context (Blum et al., 2007).

3.3 Theoretical framework

This study relies on social constructivist theories from feminist technology studies (FTS) emphasizing the constructed element in women's relationship with technology (Corneliusson, 2011; Lagesen, 2011) and with support in the "individual difference theory" (Trauth & Quesenberry, 2007; Trauth, 2002) that recognized individual differences between women. Gender is here seen as a socially constructed difference between men and women, developed through societal discourses and negotiated on many different arenas (Connell 2005). Also, technology is a construction involving a wide spectrum of artifacts, knowledge, competence, cultural perceptions, and stereotypes. The encounter between humans and technology does not take place in a vacuum, but in a cultural space loaded with meaning (Silverstone et al., 1997 (1992)). This includes an encounter between gender and technology, and researchers have documented how gender and technology co-construct each other (Cockburn, 1992). FTS has documented that many women find it challenging to enter ICT fields because the knowledge field, work, metaphors, and images of ICT are closely associated with men and images of masculinity (Adam et al., 2005; Corneliusson, 2011). Women risk becoming a "token" representing women (Kanter, 1993 (1977)), and simultaneously being invisible as experts (Faulkner, 2009) or even having their professional competence in ICT questioned (Corneliusson & Seddighi, 2020). For these reasons, being a woman in a male-dominated field may yield different experiences than being a man in the same field. However, Trauth and Quesenberry warn us against trying to understand women only as a "tightly knit group with common interests, backgrounds, values, behaviors, and mannerisms"; we should be aware that other factors also matter, as emphasized by the "individual difference theory" (2007). The analysis below explores how women experience and define themselves in the field of ICT, reflecting on what it means to be a woman rather than a man, as the cultural narratives about ICT are still strongly male-dominated in the Nordic countries (Chow & Charles, 2019; Simonsen & Corneliusson, 2019). This can make women's entry feel like a "bumpy road" (Branch, 2016) and the task of negotiating their belonging more challenging than for most men (Corneliusson, 2020). This

process of negotiating belonging is identified as women's empowerment in this chapter. Empowerment is a process that is situated in a context and through which certain patterns of critical reflection of an individual's own position and group identity has the effect of increasing her access to relevant resources. Or as Perkins and Zimmerman phrase it, empowerment is "simply a process by which people gain control over their lives, democratic principles in the life of their community" (Perkins & Zimmerman, 1995, p. 570). We apply this perspective to analyze how women negotiate a space for their participation in ICT, which is increasingly associated with tools and support for shaping and controlling society (Corneliussen & Prøitz, 2016). These ICT-based channels for social power, however, reside outside the traditional political and democratic arenas that are recognized for their high degree of gender equality in the Nordic countries (Borchorst & Siim, 2008). One result of these "silos" is that a widely recognized gender-equality ideal coexists with practices that simultaneously accept and undermine such ideals as *relevant, just not here, now, or for us* (Corneliussen & Seddighi, 2020). The analysis below will illustrate the patterns of how women still approach ICT as a highly masculine field that they receive relatively little support to enter, thus leaving it to women to empower themselves to gain a sense of belonging.

3.4 Methodology

The main research question is how women succeed in establishing their own sense of belonging in the field of ICT. This requires a research methodology that can explore in-depth women's experiences and how they articulate the ongoing process of trying to become part of ICT. Data collection involved in-depth qualitative interviews based on a semi-structured interview guide and analytical tools from grounded theory were chosen as an open explorative method.

3.4.1 Sample

In-depth interviews were performed during January and February 2020 with 24 women studying or working in academic recruitment or research positions (PhD, postdoc, researcher). Fields of ICT were limited to faculties of sciences and technology, ranging from programs in informatics (computer science), information systems, cybersecurity, and several other programs combining informatics with other fields, such as biology, business administration, and more. The women were recruited mainly through educational institutions across Norway and partly through snowballing where one informant forwarded the invitation to other women. Thirteen women were studying for a bachelor's degree, six for a master's degree, and five had recruitment and research positions in academic institutions. The average age was 27. The study has been approved by the Data Protection Services at the Norwegian Centre for Research Data. All informants have been anonymized.

3.4.2 Interview

The interview aimed to explore factors affecting women's choice of ICT educations, including questions about family background and support, ICT in leisure and school activities, and preferences for subjects at high school. Aiming to learn more about the women's experiences, perceptions, and attitudes toward ICT from childhood until present, they were asked to sketch their route from childhood and until they decided to apply for an ICT education chronologically. The drawing then became a reference for further exploring how the women experienced and defined themselves in ICT through questions about their participation in ICT-related contexts and activities; cultural discourses and stereotypes; experience from ICT education, environment, and support systems; expectations of a future career in ICT; identity and belonging in ICT. The interview was based on an interview guide, but we also encouraged the women to share their narratives (Kvale & Brinkmann, 2009). The interviews were recorded and later transcribed.

3.4.3 Analysis

The interviews were analyzed using grounded theory (GT) method (Glaser & Strauss, 2009; Strauss & Corbin, 1998) inspired by Charmaz (2006), as this allows an explorative analysis particularly open to new findings. GT is a deductive method representing a systematic and simultaneously flexible scientific method with the goal of constructing theory that is "grounded" in the empirical data. The process is reminiscent of a dialogue where the researcher poses questions to the empirical material and codes the data with descriptive labels. Next, the codes are sorted and analytical notes (memos) and categories are developed and elaborated into scientific texts. GT is particularly relevant for exploring how individuals construct their perception of reality and it creates an openness which stimulates the discovery of new connections and insights.

While other aspects of this study have been presented elsewhere (Corneliusson, 2020), this chapter focuses on how women in ICT self-empower by developing their sense of belonging. The most important categories developed in the GT-based analysis for this chapter are "making a space for myself", exploring what the women are contributing to ICT; and "empowering myself in ICT", exploring which qualities the women find most relevant for their belonging in ICT.

3.5 Findings: negotiating a gendered field

When researchers engage with a new field, they rely on a "pre-understanding" based on their current knowledge about the field. After collecting further information and data, a "post-understanding" develops based on the new knowledge (Haavind, 2000). This image of a pre- and a post-understanding gives a good

description of how women's perceptions and attitudes to ICT develop over time and with experience. Their self-empowerment is entangled in their *post-understanding* of the field of ICT and their own position and role in it. It is, however, their *pre-understanding* that gives direction to their self-empowerment. Below, we start by exploring this pre-understanding, before looking at how and what makes this understanding change.

3.5.1 A field occupied and defined by boys and men

A common theme among the women was that they knew very little about the field of ICT when they left high school for higher education. Thus, most of the women had to navigate the educational landscape based on their pre-understanding of ICT, which, for most, identified ICT as a masculine field: "It has become more like a boy's subject and it seems like only guys do computing and stuff like that". The male characters women expected to find in ICT programs were labeled "gamers", "geeks", or "hackers" and assumed to have a narrow interest limited to video games and programming: "I really expected it to be a little more monotonous and the typical nerd and hoodie and the 'gaming all day long'". This combination of nerd, hoodie, and gamer dominates women's pre-understanding of ICT, and this had made it difficult for them to imagine themselves in ICT: "I associate it with people who like to game a lot, who sit like that in their rooms [...] So I thought it wasn't for me at all".

This highly gendered pre-understanding is recognizable as a "storyline" in the women's narratives, following a certain pattern (Søndergaard, 2002): boys play games, gamers need to program, boys develop programming knowledge before entering higher ICT education. Seen from the women's perspective, it is not only that girls and women do not fit the visual image of boys in hoodies, but without this background, they do not see themselves as correctly equipped to enter ICT: "I had never programmed before in my life". This image scares the women: "there are probably more women who think it is difficult because of that", and challenges their entry: "When it is mainly dominated by men, you will ask: 'what am I doing here?'"

This widely shared pre-understanding demonstrates that ICT is still perceived as a highly gendered field in Norway. Combined with the women's lack of previous introduction to ICT, this meant that when finally entering, they did so with a weak dedication: "I don't know if I'm going to like this or not, but I'll just give it a try". This uncertainty is often expressed together with a readiness to move on to something else if they were to encounter difficulties.

This also suggests that the interviewees of this study are the resilient ones, those who entered ICT *despite* the cultural images describing this as a field for men. Below we further explore how they develop their understanding of ICT in ways that make them start seeing it as a place where also women can belong.

3.5.2 Identifying women's presence, defining their strengths, and redefining ICT

The process by which the women define their own belonging in ICT targets the pre-understanding negotiating the male-dominated storyline in several ways; by claiming a space for women in ICT, defining their strengths in ICT as different from the stereotypical male qualities, and by redefining ICT in ways that reflect their own strengths, interests, and competences. Below we will see how these three processes contribute to challenging the hegemony of the male storyline.

3.5.3 Making women visible

For some of the women, their first meeting with ICT still seemed to confirm the pre-understanding, giving them a feeling of being an outsider: “When I showed up the first day, I didn’t feel like I fit in [...]. There were a lot of typical gamers there, and I’ve never played videogames in my entire life, right, so I didn’t really feel at home at that point”. For most of the women, this image gradually changed as they entered the ICT program, and a first step was to identify other types of people than the gamer among their fellow students, like “normal people that you can talk with” and “people like me”:

When I started, I was a bit like “no, these are computer people, they are not the ones I hang out with, I am not a gamer”. Because I imagined a bunch of gamers, but it was rather like “I can actually fit in here”. People are so different here. So yes, it was completely different from what I expected.

While the hooded gamers were still there, there were also other types of people. For nearly all the women, a notable presence and visibility of other women was important for them to feel welcome: “When I started studying, it was very important for me to see other women. When I saw them here, I felt that I could be there too”. The presence of other women meant that “you do not have to feel like you’re a complete outsider even if you’re a girl”. It also contributed to normalizing being a woman in ICT. Most of the women participated in this community of girls:

The first day we had a “girls” day where all the girls got to meet and to know each other the day before everyone was supposed to meet. [...] From day one I felt like I was almost going to class with only girls. Because they are the ones I talk to mostly and sit with. I can’t say I think much about it really, that there are mostly boys here.

The high visibility of women reduced the visibility of the male dominance: “We don’t notice [that there are few women], since the girls here are the ones that you see at the study room, so it doesn’t feel like there are fewer girls than boys here”.

Most of the women appreciated how the community among women and the visibility of female students justified their presence. The same was not the case for the staff at the ICT departments and several women expressed disappointment about the lack of women among lecturers, student assistants, and group leaders. One was “a little upset about how few female group leaders or seminar leaders there are” while another was proud to be a student assistant “because a girl has never been a student assistant before”. This type of visibility makes a difference for the women as it says something about who is qualified in the field:

It was very important for me to see that others with whom I could identify, people similar to me, achieved things here. Because if you only had the stereotype of these men, then I don't think I had felt that this was suitable for me, because my subconsciousness would have been like “no, perhaps you don't fit here”.

Most of the women identified *female* role models as important because it proves that women can succeed in ICT: “you feel that if they can make it, then maybe I can make it too”, and also because they found it easier to associate themselves with women. But it is also challenging to identify female role models in ICT: “I haven't really had a role model, such a female role model, because it hasn't existed”. When the women cannot find suitable role models in their everyday life, they find them in films or in social media:

After I began at the programming education, I sought out some role models online. For example, on Instagram there have been several female programmers [...] When I see that they are doing so well I have been inspired to continue [...] So whenever I've felt insecure about my choice then I've kind of looked at them and felt a little more confident.

Even for the women who could partly identify with a typical male trajectory to ICT, growing up with gaming and programming, it was important to identify someone “like her” to support their feeling of belonging in ICT.

Women also take on the task of making women visible in ICT themselves. Different from Kanter's notion of women as a “token” representing women, rather than a profession (cf. Kanter, 1993 (1977)), several of the women in this study used their visibility in a more assertive way, as an advantage: “If I am the only woman in a conference hall, then everyone knows who I am, even though I do not know who they are. But if I say something then, I will be heard, in a way”. It was also a tool for making women visible:

I'm one of those who raise their hands in class [...] then I make up nearly 20% of all the girls in the hall, whereas you never see 20% of the boys speaking in class. [...] So I take on that task; I raise my hand even though it may be a little unnecessary sometimes.

The visibility of women in ICT study rooms and lecture halls, as lecturers and role models, contributes to a collective feeling of empowerment, justifying women's presence and participation.

3.5.4 Defining their strengths, redefining ICT

While the women's experiences paved the way for a wider notion of participation in ICT, the hooded gamers did not go away. They might have diminished in numbers in the women's post-understanding, but their competence was still considered important and challenging to women without a similar background of gaming and programming. This is particularly critical for the women's perception of programming as a core field in ICT, because it made them think that they could not compete with men in this field: "There are two or three boys in my class who had a lot of experience from before. They are not the majority, but they are so skilled that it feels completely unattainable to be as good as them". Paradoxically, it was programming that made many of the women fall in love with ICT: "I can't explain the joy I got from my first programming class. [...] For me, it has been one of the best things about joining this program". Many of the women expressed pleasure, fascination, and becoming "hooked" on programming, as well as sadness for not having learnt it before: "If I had known about the possibilities before, I would have sat down and started programming right away".

In the interviews we asked why they considered themselves suitable for working with ICT. None of the women identified being good at ICT or programming as their main strength. Their answers indicate that they responded to the male storyline in several ways:

I think I fit here because I like learning new things all the time. Without really knowing when I was a kid, I was really into everything that was technological and, in a way, doing a little bit myself. [...] So I feel I fit in because I'm motivated [...]. Not because I'm the best at programming or the best in math, but I just feel that I have the motivation that is needed, in a way. And I am very fond of creative problem-solving.

Her emphasis on being motivated and her childhood interest in technology resembles many of the other women's descriptions of their interest and motivation – exactly the things that the male storyline ascribes to men rather than to women. However, their interest is not primarily in ICT – some even reject having an interest in ICT: "I am interested in the world, and [technology] is a large part of the world". They are motivated to learn about ICT because they want to prepare for a "digital society", to participate in decisions to contain and limit the effects of digital technology, and also to be able to solve societal challenges.

A similar picture emerges when they explain their professional strengths; very few of them identify any background in ICT, while most of them identify their professional strengths in sciences and mathematics, or even in social

sciences or business, and this produces a safe platform for entering ICT: “Math was probably my strongest subject ever since I was young. So, then I thought I had something I could feel confident about while learning something new”. This platform allows the women to recognize that they do have strengths and competences that are relevant for ICT, without competing with the male image. Others rather see the connection to yet other skills, like languages, or a combination of competences:

I have always been very good at science. I kind of felt it was the same type of thinking. And I am very good at languages. [...] I think in a way that programming is just learning a new language, really. [...]. So I really like the combination. In a way, it's like writing a text that you have to write in the best way possible. At the same time there is very hard logic, somehow.

While many of them compare ICT to creative tasks, one had considered a career in creative arts, but when learning about ICT, she saw that as an alternative “I like to create things. I was very fond of writing my own texts earlier. But being an artist can be very exhausting, because it is not economically secure. Programming, however, ticks all the boxes I made for myself”. Others again emphasize that ICT can be “anything”, seeing it as relevant whether you work in a store or in a hospital, using recognizable female-dominated workplaces as examples.

The women's description of their strengths “talk to” the male storyline by confirming that also they have interests, motivations, and competences necessary within fields of ICT; however, these are different from the image of the hooded gamer. Many of the women love programming, but it still remains a male domain where they cannot compete with the men who “have been programming since they were young”.

Different from the narrow interest associated with the male storyline, the women are expanding the image of what ICT really is, making space for themselves because it fits their strengths rather than (only) the male gamer image.

The women also challenge an assumption of the pre-understanding suggesting that ICT, and programming knowledge in particular, is a prerequisite for entering ICT education. Their post-understanding has taught them that you can start from scratch. Furthermore, this serves as a form of discursive protection against such stereotypical assumptions:

It [programming] is not similar to any subject I've ever studied before. [...] It was sort of completely new. And you had all the prerequisites to make it, because it was just completely new. It is not a subject you can say “no, I will not understand this because I am not so good at math”. Or “no, I will not manage this because I am not so good at English”. You really can't say anything like that because it doesn't resemble any of those things. So programming is really great.

Several of the women use this technique of identifying ICT as completely new, one citing Astrid Lindgren's children's book character Pippi Longstocking: "I have never tried that before, so I think I should definitely be able to do that".

The women not only refuse to be judged by their earlier experience; they also point out that their lack of interest was really a lack of knowledge: "At secondary school, we did not even have an IT class. There was nothing. So, it's no wonder that I didn't become interested in it, when there was nothing available". Facing the challenge of not having a background in ICT like the male storyline, this is a way of justifying and empowering their position without the male background.

3.6 Discussion: from a pre-understanding to a post-understanding of ICT

The pre-understanding associating ICT with a male storyline of gamers who learn to program early and who later populate the field of ICT is recognizable down to details in the Norwegian women's narratives, suggesting it has become a hegemonic discourse. This creates a gendered barrier to ICT, not only by suggesting that men dominate the field of ICT but also by describing the pathway to what is perceived as a core competence, programming, as closely tied to men's way of achieving ICT competence. Against this pre-understanding of ICT as a field populated by men, women were surprised to find a high visibility of women.

Contrary to the predictions of the male storyline, the women could identify their own interests, motivations, and competences as relevant and important for ICT. The women's networks, community, and visibility are important tools for the women's processes of empowering their own and other women's participation in ICT. For many of the women it is a highly conscious act to make themselves visible by participating in social and professional arenas that produce positive images of women in ICT. Their active contribution to defining a wider notion of ICT is a response to their pre-understanding of ICT, and their self-empowerment is entangled with their new understanding of ICT, developed as they have found ways around the male storyline. This, however, does not question the male image, but rather adds other images as they identify other people, interests, and competences that are relevant for ICT. Thus, the women's post-understanding of ICT produced by their self-empowerment opens a more spacious ICT field that is populated by "normal people" and "people like me". Belonging in this new ICT field can be claimed, not only on the basis of early interest in gaming and programming, but also based on an interest in mathematics and sciences, social challenges, languages and creativity, and more, all of which are defined as relevant once a wider image of ICT is recognized.

The one aspect of ICT that is still left to men is the male storyline itself: learning to program early. This appears to be an "unbridgeable gap" in the women's narratives by defining men's experience going back in time and therefore impossible to compete with. Although the image of boys and men remains a part of this post-understanding, it no longer dominates the field, and it has less power

to challenge women's participation, perhaps even less importance for ICT. This also suggests an explanation to the women's emphasis on having their strengths not primarily in ICT, but in mathematics and sciences, and their interest targeting society rather than technology. This way the women find a platform in ICT that they identify as "safe and familiar" without competing with the male image.

While the male storyline had occupied the entire field of ICT, leaving little room for other (non-male) characters, the post-understanding also includes the gamer in the male storyline. However, in this version, ICT is defined more widely to include different types of people; it accepts and requires a variety of competences and strengths, and it serves a wider spectrum of goals. This transition opens ICT to both men and women who do not share the characteristics of the male gamer. The values the women define as relevant in ICT are not uniformly gendered, like society, sciences, languages, creativity. Thus, the work done by these women also represents a collective empowerment to welcome values that are different from the male stereotype, but not thereby limited to women.

The women had not been able to articulate their belonging in ICT before entering the ICT programs. They had not entered because they felt invited, but rather despite the male-dominated image of ICT, and the women were instrumental for the process of self-empowerment that developed their feeling of belonging in ICT: making themselves and other women visible, searching for female role models, raising their hands and presenting their alternative interests, competences, and motivations. This is in line with previous research which has found that girls and young women are often left to themselves in their struggle to break through the barriers of the gendered stereotypes of ICT (Corneliussen & Prøitz, 2016; Corneliussen & Tveranger, 2018).

3.7 Conclusion: self-empowered women vs. self-recruited men

The analysis above has documented that ICT is still perceived as a highly gendered field in Norway. We have seen how the women start from a pre-understanding identifying ICT as a male-dominated field, before developing a post-understanding that involves a wider notion of ICT with room for women and other less stereotypical male characters. Thus, the findings suggest that women can indeed empower themselves in such a way that they will begin to see ICT as a place where they may belong. This shows that the concept of computing is quite elastic in the women's narratives, but also that it requires hard work and resilience to "stick to it" in a field still strongly associated with men. The main challenge identified is a hegemonic cultural discourse reflected in the women's pre-understanding that creates a gendered barrier for girls and women. The pre-understanding requires the women's self-empowerment for successful participation in ICT. The same discourse, however, creates a door-opener for boys and men by suggesting that men somehow fit in ICT. This tells us is that there are clear gender differences regarding entry into the field of ICT. Because ICT is not neutral, but rather gendered, women have to engage in *self-empowerment*, while men can rely on the

hegemonic discourse to do this work for them. The first involves discursive resistance, the second, discursive support, which can also result in a form of men's *self-recruitment* to ICT as some men perceive an expectation that they, as men, are interested in ICT (Corneliusson, 2011).

The discursive resistance suggests that the women analyzed here are not afraid of challenges. They are ambitious and brave when entering what appears not only as a field unknown to them, but also one they did not feel invited into. Although they might find support in the motto of “the strongest girl in the world”, Pippi Longstocking, they also feel constantly watched and subject to doubt *because* they are women, a phenomenon also recognized among ICT employers and organizations (Corneliusson & Seddighi, 2020). However, this narrative needs to be recognized as a cultural construct, as illustrated by one of the women of Middle Eastern origin. She told a different story, of being encouraged and motivated to study ICT *because* she was a woman. Her narrative about ICT as “one of the most suitable educations for women” in her home country puts the Norwegian discourse into perspective.

This study suggests that reaching a gender balance in ICT in Norway will require a major effort to change stereotypical attitudes, not only among girls and women, but also among those who should have been the girls' supporters, pushing them, encouraging them, and making them feel welcome in ICT. An important part of this effort is done by the women who do enter ICT; as Gutierrez suggests, “individual empowerment can contribute to group empowerment and [...] the increase in a group's power can enhance the functioning of its individual members” (1990, p. 150). The women interviewed in this study are living examples of, and role models for, women in ICT for a long-term perspective, but their more inclusive post-understanding of ICT has less impact on young girls if it does not reach young, potential female ICT experts – a task that this study suggests has not successfully been achieved by Norwegian schools.

The challenge ahead is to provide girls and young women with the more inclusive post-understanding of ICT, to build on and support girls and women in ways that this analysis has identified as helpful, which includes, for instance, recognizing other interests and competences than ICT alone as relevant entry points to the field of ICT and to identify ICT as relevant for nearly every aspect of society. One of the most harmful assumptions created by the male storyline is that you need ICT competence *before* entering ICT education, while one of the most effective measures identified is to make women visible. The presence of women creates a valid entry point for women by proving that they can also belong in ICT.

The positive message from this study is, however, that while women might start *despite* the male storyline, they develop a feeling of belonging in ICT also when they had not previously recognized their interest in ICT. This is good news that needs to be taken seriously by educational institutions, employers, and others that too often respond that in order to increase women's participation in ICT “it's necessary to start with young girls” (Corneliusson & Seddighi, 2020). Though this is an ideal that most likely will ease the entry of future generations, the women

in this study serve as living examples that it is indeed possible to recruit women who lack the experience of childhood engagement with ICT and an early interest in programming.

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