Women working in ICT: situation and possibilities of progress in Catalonia and Spain

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ABSTRACT
The ICT sector is becoming a strategic and growing sector in our current societies and economies. However, gender inequalities persist and women's representation in ICT is still low in Catalonia and Spain. In this article, we introduce the situation of women working in ICT and seek to identify the main barriers and opportunities for their progress. We implemented a survey that was answered by 325 women working in ICT in Catalonia. Our results show that women in ICT do not always access ICT jobs from an engineering degree, are satisfied with their jobs and enjoy better salaries than in other sectors, and that some flexi-time measures and other working conditions may play in their favor. This needs to be highlighted in order to encourage many more women to work in ICT. However, our results also suggest that too many women still suffer gender-based discrimination, work-life balance conflicts, and serious difficulties in being promoted. This also needs to be addressed if we are to improve the numbers of women in ICT.

Introduction

Among European countries, we can find some of the most advanced digital economies and societies. Moreover, EU member states who lead in digital competitiveness are also leaders in women in ICT. However, Spain is still below the EU average in digital human capital and occupations, and just in intermediate positions regarding indicators of digital progress and women in digital occupations and, therefore, there is still much to be done. In 2019, 566,100 people were working in the ICT sector in Spain. Even if the share of ICT specialists in total employment increased over the last decade, Spain is still below the average (3.2% against the EU average of 3.9%). The share of ICT graduates in Spain also increased, but it just accounts for 4% of all graduates and women are still a minority among them (25% in Engineering and 13% in Computing). The share of female ICT specialists remains stagnant at a mere 1.1% of

Table 1. Overview of ICT indicators for the labor market and education in Catalonia, Spain, and Europe in %.

	Catalonia	Spain	European Union
Labor market			
Share of ICT specialists in total employment	3.3	3.2	3.9
Share of female ICT specialists	1.3	1.1	1.4
Education			
Share of ICT graduates	10	4	4
Share of women in engineering	22.7	25	20.4
Share of women in computing	11.3	13	

total female employment (EU Average: 1.4%) and women represent only 16% of ICT specialists (EU average: 17%) (European Commission, 2019, 2020). Catalonia is one of the most dynamic digital regions of Spain, with its capital Barcelona as a growing digital hub in Europe (Rissola & Sorvik, 2018; Acció, 2020). The population working in ICT has also increased and, in 2019, 114,300 people were working in the ICT sector and 30.9% of them were women. Despite 10% of all graduates being in ICT in Catalonia, women are still a minority of them (22.7% in Engineering and 11.3% in Computing), and ICT specialists are still low (3.3% of total employment) and too low in the case of women (1.3% of total female employment) (Zubillaga Rego & Peletier Espiga, 2020). For an overview of the aforementioned numbers see Table 1.

Even if all Spanish indicators show progress of the ICT sector and digital economies, we can observe a stagnation of the participation of women in ICT while, on the contrary, women show increasing employment rates. In Spain, despite women being the majority (55%) of university students, they are still a minority among Engineering students (25%), Computing students (13.3%), ICT specialists (16%), those employed in ICT services (29%), as well as in high and cutting edge technology services (32%). Moreover, even if the Spanish ICT sector shows better rates of employability, higher salaries for women, less unemployment and less temporality than in other sectors, discrimination against women working in ICT still persists (González Ramos et al., 2017; Mateos & Gómez, 2019). Women working in ICT still suffer wage discrimination, overqualification, and glass ceiling effects (Segovia-Pérez et al., 2020). Among other difficulties, too many are still related to their childbearing years and consequent opt-out effects that appear to be higher in ICT than in other sectors (Mateos & Gómez, 2019).

Therefore, our ICT sector does not seem to be able to incorporate, retain and promote women properly. Gender inequalities remain and generate equity and efficiency problems that hamper economic growth and welfare for all, especially for women (Cohoon & Aspray, 2006; Castaño, 2008; Gil-Juárez et al., 2012; González Ramos et al., 2017; Maceira, 2017). It is still necessary to carry out research and analysis to better understand women working in ICT and progress in their jobs (Trauth, 2017; Gorbacheva et al., 2019). Gender and ICT research has traditionally focused on explaining the exclusion of women from technological fields and this has contributed to the development of pessimistic accounts of exclusion and even crippling impacts (Cohoon & Aspray, 2006; Castaño, 2008; Gil-Juárez et al., 2012). Therefore, a shift of attention to the strategies of inclusion of women in ICT, which starts from their experiences, favorable conditions, and ways to improve them, is highly needed and, in fact, in recent

years it is being conducted intensively (Sørensen & Faulkner, 2011; Vergés et al., 2011; González Ramos et al., 2017).

In our research, we explored the situation and working conditions of women in ICT, and seek not only to identify the barriers to the inclusion and progression of women in ICT, but also aim to identify the factors that facilitate their access, retention, and advancement in those jobs. To do so, we took into account several dimensions that affect women's trajectories in ICT, such as family, education, use of time, the culture of work, and working conditions. In this article, therefore, we ask the following questions: What profiles women in ICT have and under what conditions are they working in ICT? What barriers and opportunities exist for them to access and progress in ICT? To answer these questions, we implemented an online survey that obtained 325 responses. We carried out a quantitative analysis that allowed us to visualize the socio-demographic profiles of ICT women, the conditions and environments under which they work, as well as to explore the main factors that have helped or hindered their access and progress in the ICT sector.

Therefore, our contribution is threefold. First, there is a research agenda for social inclusion in ICT and, especially, a need and opportunity to contribute to addressing the challenge of gender imbalance in the IT profession (Trauth, 2017; Gorbacheva et al., 2019). In this regard, we specially provide some answers to what individual factors have the most impact on women's ICT career persistence and advancement, as well as what factors hinder their advancement and what helps them to remain and progress in ICT. In doing so, we contribute to understanding why women are excluded from ICT work, but also provide encouragement for greater inclusion in the ICT sector.

Second, in our survey, we introduced several questions regarding family and care work, time use as well as work-life balance factors. This will allow us to deepen and, therefore, contribute to the scarce research that delves into the relationship between women's participation in ICT jobs and their lives outside ICT work (Hari, 2017; Holth et al., 2017; Lamolla & González Ramos, 2020), as well as to better understand their trajectories and possibilities for progress.

Finally, the literature studying women in ICT in international research has mainly focused on Anglo-Saxon and Northern contexts and new evidence is required for Southern and Latin contexts like Spain (González Ramos et al., 2017; Segovia-Pérez et al., 2020). Moreover, as we already mentioned at the beginning of this introduction, our results are especially relevant for the Catalan and Spanish ICT sectors. This sector is a growing and strategic sector gaining importance for the Spanish and South European economies and societies. However, without additional efforts to better include women in ICT and in higher numbers, these digital societies and economies might just remain underdeveloped.

From exclusion to the inclusion of women in ICT

Since the late 1990s, much of the research on gender and technology has focused on showing and explaining the underrepresentation of women in ICT as well as the barriers they encounter in accessing and remaining in ICT studies and jobs (Turkle, 1998;

Cohoon & Aspray, 2006; Castaño, 2008; Castaño et al., 2011; Gil-Juárez et al., 2012; Vitores & Gil-Juárez, 2016).

These investigations point to a number of factors that have led to the exclusion and self-exclusion of women from ICT. Historically, women have been excluded from the study centers, research, and production of technological knowledge through legal and social norms (Lerman et al., 2003). This discrimination has hindered the generation of references for other women and rendered invisible their contributions to the development of technology. This has fostered an image and myths about ICT work that still alienates women from technologies and has fueled a stereotypical attribution of discriminatory gender roles for women (Kindsiko & Türk, 2017). Gender stereotypes are being attributed through the family, school, media, social networks, or work (Sáinz et al., 2012). Their influence defines for a society what is considered appropriate for women and men in a binary manner, besides marking the conditions of access to prestige, recognition, and value that discriminate against women both horizontally and vertically (Margolis & Fisher, 2003; Castaño, 2008). In this sense, technology is labeled as masculine, and this helped to build and maintain a masculine culture of technology, i.e., a technology associated with men and their values (Faulkner, 2009; Castaño & Müller, 2010; Gil-Juárez et al., 2012, 2018; Kindsiko & Türk, 2017). This implies, first, that the condition of ICT experts tends to assimilate men and the more masculinized job skills (Ruiz Ben, 2007; Seron et al., 2018) and, on the other hand, the ICT working and learning environments tend to be unfriendly for women. ICT companies still require high degrees of spatial and temporal availability of work and, often, do not consider the care needs of their employees to be their concern (Hari, 2017; Holth et al., 2017). This involves serious deficiencies in terms of the possibilities of balancing work and family life (Griffiths et al., 2007; Hari, 2017; Holth et al., 2017; Pérez, 2010). Several forms of additional discrimination against women persist, from wage inequality, overqualification, the glass ceiling or violence against women (Vergés, 2012; Vergés Bosch, 2015; González Ramos et al., 2017; Segovia-Pérez et al., 2020). Finally, it should be emphasized that the exclusion of women from ICT is often aggravated by other forms of social exclusion (Kvasny, 2006; Castaño, 2008; Trauth et al., 2016).

The results of these studies, which focused on the exclusion of women from ICT, have been crucial to reflect the situation of gender discrimination suffered by women in ICT, to shed light on the male dominance of technology, as well as to identify a need for public action, and thus the generation of indicators and data for its analysis (Margolis & Fisher, 2003; Castaño, 2008; Turkle, 1988). However, although investigating and taking action to address the exclusion of women in ICT is still necessary, it might not be enough to foster inclusion.

Therefore, a renewed interest in strategies for inclusion and self-inclusion of women in ICT is in place. This shift toward inclusion should focus on the presence and experiences of women in ICT and allow us to visualize both their contributions and their desires, but also the conditions of their ICT practice as well as the paths, opportunities, potential, and consequences of the full participation of women in today's technological development (Maceira, 2017; Gorbacheva et al., 2019). To place their inclusion strategies at the center is also more consistent with feminist research that departs from the experiences of women, places them at the center of our research and aims

to promote gender justice (Bartra, 1998; Ackerly & True, 2010; Vergés et al., 2014). In this sense, androcentrism is rejected and women's experiences in ICT take on value regardless of comparisons with men, and research and analysis aim to produce critical reflection and gender-transformative outcomes. In fact, previous research already initiated a process to investigate the processes of inclusion of women in ICT from their own experiences, as well as policy analysis and digital inclusion actions that seek a renewed relationship between gender and ICT (Faulkner & Lie, 2007; Trauth et al., 2009; Sørensen et al, 2011; Vergés, 2012; Castaño & Webster, 2014).

Several researchers on the inclusion of women in ICT have analyzed and proposed factors and mechanisms facilitating ICT inclusion. Following this line, they are recovering and making visible the role of women in ICT development with the consequence of encouraging new ICT motivations among women (Plant, 1997; Light 1999; Abbate, 2012; Lerman et al., 2003). In addition, major efforts to investigate and promote access to education and ICT use by women are highlighted, both formal and informal, i.e., from organizing Girls Days in Universities, to the removal of disciplinary barriers to access ICT studies or jobs (Cohoon & Aspray, 2006; Burger et al., 2007; Castaño et al., 2011; Vergés et al. 2021). Moreover, they recognize and explore other paths to ICT jobs, beyond the linear one (traditionally male), thus opening access to other profiles, including more women (Castaño & Webster, 2011; Vergés et al., 2011). In addition, it is proposed to continue with specific gender policies in relation to ICT and pay attention to these public policy discourses to foster empowering ones, as well as the availability of equipment and free training, also informally, to alleviate the difficulties of access to resources that mostly affect women (Cohoon & Aspray, 2006; Vergés, 2012). Research also analyzes and proposes measures to move away from stereotypes, myths about ICT work, as well as gender essentialisms (Kindsiko & Türk, 2017). So, they encourage active attraction and interest of women for ICT in their diversity, while increasing their chances of prior experience and improving perception skills (Faulkner & Lie, 2007; Griffiths et al., 2007; Sørensen & Faulkner, 2011). In turn, they propose and analyze a variety of actions to transform the masculinized culture of technology, i.e., from curricular reform and transdisciplinarity, to review the skills demands or propose a change in communication styles (Margolis & Fisher, 2003; Cohoon & Aspray, 2006; Lagesen, 2007; Vergés et al., 2009). Moreover, especially in the workplace, measures to improve work-life balance are explored and stressed in order to help to retain women in ICT careers (Simard et al., 2008; González Ramos & Vergés Bosch, 2013; Weisgram & Diekman, 2015; Hari, 2017; Holth et al., 2017), as well as demands to implement protocols, equality plans and other measures that may work against discrimination and gender-based violence that still persist in ICT environments (Kelan, 2009; Vergés, 2012; Mainiero & Jones, 2013; Segovia-Pérez et al., 2020). Finally, research suggests positive effects of labor reorganization and the implementation of mentoring and networking among women, and especially actively sponsoring women in ICT if they are to be promoted (Simard et al., 2008; Hewlett et al., 2014).

In this paper then, we seek to contribute to this growing body of research on exclusion, as well as the inclusion of women in ICT work. In the next section, we

introduce the methodology we have followed for our research to then delve into the main findings.

Methodologies

In this paper, we present some results from a funded research project that explored the situation of women in the ICT sector in Catalonia. We specifically sought to identify opportunities for their access, retention and promotion, as well as the main barriers. In this regard, and taking into account the methodologies of feminist research (Ackerly & True, 2010; Biglia & Vergés Bosch, 2016; Domínguez Amorós et al., 2018), we explored the experiences of women working in ICT and included questions and variables to cover both, their personal and working lives. This also involved asking and reflecting on discriminations, possibilities for progress, working conditions, work-life balance, time use and care. We aimed at giving them visibility to allow future gender transformations, questioning the barriers and exclusions that still exist for women and, above all, showing ways to encourage greater and better inclusion of women in ICT. For this work, we asked the following questions: What profiles women in ICT have and under what conditions do they work in ICT? What are the barriers and opportunities to access and progress in ICT that they encounter?

To meet our research objectives and answer these questions, we designed and distributed an online survey for women in ICT and used quantitative methodologies for the analysis. We base our results on a univariate analysis using the SPSS statistical program, as well as some additional bivariate insights. We cross-checked our results with a bivariate analysis considering being in charge of children under 16, age and income and we noticed that the first one had the most impact. Actually, research indicates that care-work, especially related to children, is a key variable for analysis (Domínguez Amorós et al., 2018). That is why we decided to pay special attention to this variable which has been shown to be empirically and theoretically relevant. In the case of qualitative and ordinal variables, we worked with contingency tables, evaluating both the existence and degree of the global association as well as local associations measuring difference by chi-square and Phi (Domínguez Amorós & Simó Solsona, 2003). The difference of means was tested by a comparison of means and an analysis of the variance using *T*-Tests and ANOVA (López Roldán & Fachelli, 2015).

Our online survey was launched during the second quarter of 2016 and disseminated over 3 months. Our sample consisted of 325 Women in ICT that were reached through a snowball effect, departing from ICT business and governmental entities (Chamber of Commerce of Barcelona and Accio10), and the ICT sector NGOs (such as professional associations or women in ICT/STEM collectives), as well as through contacts of the two universities involved. With this survey, we generate new and valuable information on what is happening in ICT according to women who self-identified with being a woman in ICT, without restricting that to their formal education or current contract. Being unable to exactly determine the universe of the sample, our sample is not probabilistic and the differences in our findings with other data should be taken cautiously. This can be due to the specific attention women in ICT received here, but this can also be due to sampling errors. Its value lies in departing from self-identified

women in ICT, as well as reaching a considerable number of respondents if we take into account that between 20,000 and 30,000 women worked in ICT in our context in 2016 (depending on the indicator the quantities vary) and the sample may cover around 1.5% of the total women working in this sector in Catalonia in 2016.

The presentation of the survey and its results are structured in three thematic blocks. In the first one, we covered all the sociodemographics that included questions on domestic and care work as well as labor market-related questions, such as type of contract, company activity, or income level. In the second block, we sought to delve into the working conditions and the working environment of women in ICT. Finally, a third section focused on their career paths and situations that might have affected positively or negatively their careers. In the following section, we delve into the main findings with the intention of answering our main research questions.

Profiles of our women in ICT

As shown in Figure 1, a majority of our respondents hold college degrees. Only six people had no university degree and 19.28% had a Ph.D. This is considerably higher than in the case of surveys distributed only among people with degrees in IT Engineering, where just 10% hold a Ph.D., half of them in informatics (CCII, 2015). Taking into account their areas of study at the university, we find that those who studied engineering are a majority of our sample, 64.7% of respondents. However, the rest come from other disciplinary fields. Around 14.9% studied social and legal sciences, around 10% natural sciences, and fewer arts and humanities (5.9%) or health sciences (4.5%). This may suggest signs of new possibilities of access from other disciplines, as well as implications in terms of overqualification (Vergés et al., 2011; González Ramos et al., 2017).

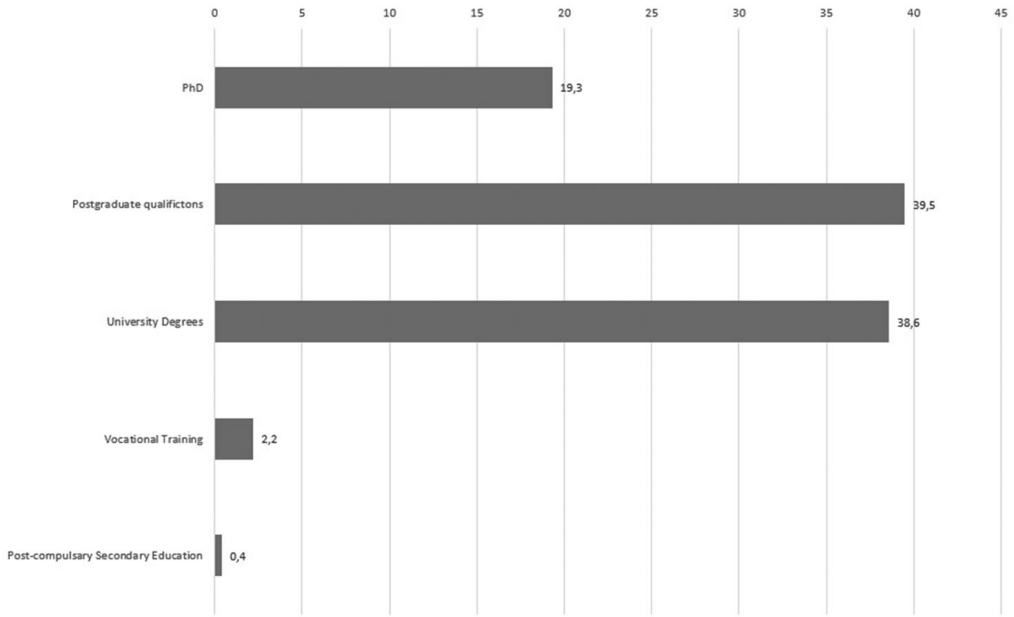

Figure 1. Levels of Education women in ICT in %.

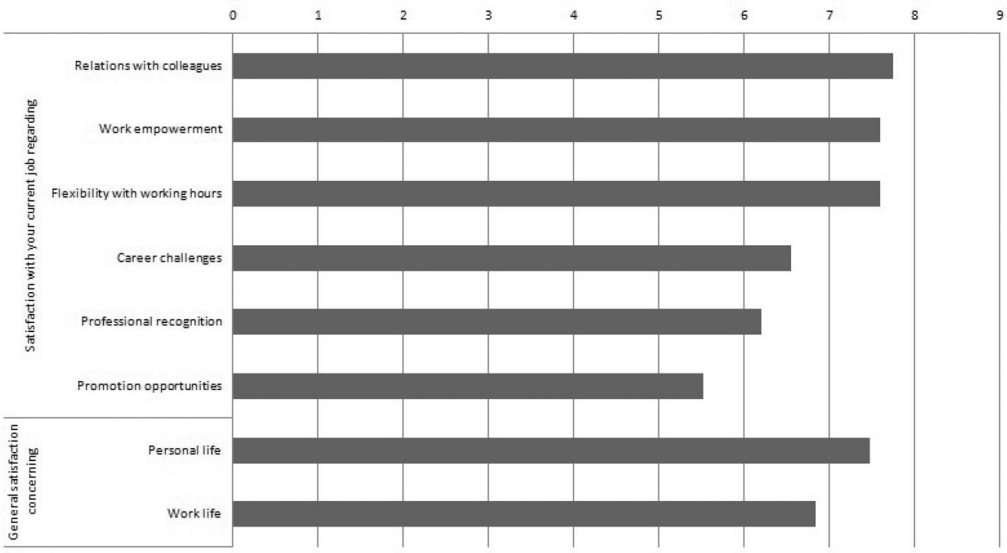

Figure 2. Degree of satisfaction with several items. (1–10 scale). Source: Own elaboration SPSS-Excel.

Discrimination based on	Many times	Sometimes	Never
Gender	16,07%	49,55%	33,03%
Age	10,71%	41,07%	48,21%
Ethnicity/culture	4,91%	17,86%	77,23%
Functional diversity	4,46%	21,88%	73,66%

Figure 3. Discrimination was observed along the working trajectory of women in ICT. Source: Own Elaboration SPSS-Excel.

Moreover, when asked about skills needed for ICT work the majority of our respondents considered that they held the right degree and had the ability to work in teams, to adapt, to relate to others, to generate a good working atmosphere, to organize/manage, to learn, to speak languages and to communicate. However, only 50% of them or below considered that they had an appropriate postgraduate degree, as well as skills for leadership, creativity, innovation, negotiation, and intercultural communication.

Considering their current job many of the respondents were working on something related to programming (26.5%), manufacturing of computer products (15.2%), bio-technology (9%), and telecommunications (8.5%). The vast majority of our respondents work in the private sector (70.3%), which appears to be very similar to surveys only distributed among ICT specialists (CCII, 2015). Moreover, 47.1% of our respondents work in big companies with over 250 workers. 40% of them in multinationals, although we find all kinds of business types.

We included some questions to better cover work-life dynamics. The majority of our respondents indicated they had dependents and 42.4% of our respondents were mothers of children below 16 years. All contribute monetarily to their households, 22.4% as the only contributor and 24.7% as main contributors. As in Spain and many other contexts

(Holth et al., 2017; Domínguez Amorós et al., 2018), our respondents do more domestic work than their partners in all items included in the sample. Our women in ICT still perform twice as much cooking, shopping, cleaning, and picking up children than their partners, and three times more in time managing, education of the children, the discipline of the children and affective support. As for the memberships in other entities, our respondents participated in professional associations (22.8%) followed by women's associations (7.1%) and trade unions, business associations, and others with residual values.

In terms of age, we observed a normal distribution for the employed population, with the only difference that it is slightly oriented to the younger ones. The average age of our respondents is 40 and the range goes from 23 to 63 years old. Regarding the place of origin, the percentage of women with Spanish nationality is very high (90%). This could be related to the distribution of the survey, which was distributed only in Catalan and Spanish languages and via Catalan organizations.

Working conditions and environments of our women in ICT

A high percentage of our respondents were employees (45.5%), some others performed management jobs at different levels (30.5% for middle managers or similar and only 3.7% as directors), while 7.4% were self-employed and the rest in other positions. Again, data is quite similar with the data on ICT specialists (CCII, 2015) and ICT salaries are higher than in other sectors (González Ramos et al., 2017; Segovia-Pérez et al., 2020). This was also reflected in revenues with a slight tilt toward higher salaries. Thus, in the salary group between 1201 and 1800 Euros, we found 32.3% of the cases, followed by the group between 1801 and 2400 Euros (26%) and the one between 2401 and 3000 Euros (13.2%). The group with earnings between 900 and 1200 Euros per month (11.6%) had a lower percentage. The vast majority of the respondents had a full-time contract and 71.72% worked under a permanent contract while the rest were on a temporary contract, which might be related to the high temporality of the Spanish labor market.

If we take a look at the satisfaction with several items the majority of them are valued over 7 (on a 1–10 scale) by our respondents. Actually, in Europe, ICT and knowledge workers are more satisfied with their working conditions and jobs than in other sectors, but still, women are less satisfied than men (EIGE, 2018). However, some items score under 7 and show the need to pay attention to them in order to better include women in ICT. In this regard, women are not very satisfied with their possibilities to be promoted, with the professional recognition they receive, with their wages, with their professional challenges, with the work-home distances, with the care leave they can enjoy as well as the proximity of work to other basic services.

Regarding time flexibility and work-life balance, 33.2% of our respondents said that their companies apply time reduction for family care, and 33.5% feel flexible to make changes in a schedule due to an illness or unforeseen circumstances. 24.9% of the sample said that they have flexi-time, even without having to give justification. This can be read as positive but might not always be. This flexi-time is flexible to workers' needs, but also requires availability toward the company (Holth et al., 2017). In this sense, it is quite worrying that 11.6% and 30.4% of registered responses confirm that

Main Facilitators and Barriers for women's promotion in ICT jobs	%
Having networks and contacts influences positively	71.4%
Having relationships with my superiors influences positively	60.6%
Having a mentor influences positively	54.2%
Time availability to undertake new responsibilities influences positively	51.1%
Being always there influences positively	46.8%
Availability for mobility influences positively	41.8%
Availability to work more hours influences positively	39.1%
Lack of job security has influenced negatively	75.6%
Care work (for children or elderly) influenced negatively	68.3%
Starting a family influenced negatively	51.1%
Being a woman influenced negatively	45.4%
Balance family and work responsibilities influences negatively	31.7%

Figure 4. Main facilitators and barriers for women's promotion in ICT jobs.

they never, or rarely, can take a break in times of high workload; pointing in the same direction 35.7% and 32.1% of respondents never or rarely have enough time to do the tasks assigned to them. It is noteworthy that comparing the means of satisfaction with working life and satisfaction with life in general, they are clearly more satisfied with life in general though very different answers are given: working life receives a good approval rating (6.85 points on a scale 1-10), while personal life achieves a remarkable score (7.48 points).

Women's perceptions suggest that gender discrimination still persists. In this sense, only 33% of our respondents never observed gender discrimination, 16.1% declare that they observe that often and 49.6% sometimes. Therefore, as shown in Figure 4, a great majority of the women surveyed have observed gender discrimination at work during their careers. These numbers are higher than for the Spanish total population. There, gender discrimination is perceived as one of the most frequent forms of discrimination by women (49.1%), 13.7% of women suffered gender discrimination at work and 20% of women have suffered gender discrimination at least sometimes elsewhere, toward 3% of men (Laparra, 2014). Our women in ICT also observed age, functional diversity, and ethnic/cultural discrimination to a lesser extent and the youngest ones, especially, perceived the most discrimination because of age. Therefore, future efforts should also concentrate in considering gender intersectionality.

Labor trajectories, progress and promotion of our women in ICT

In this section, we discuss women's career paths in ICT, from their access to ICT jobs, and specifically, we deal with the issue of promotion. Regarding access, 25% of respondents said that their access to their current job was through personal contacts

and networks (24.9%), followed by online advertisements (10.5%), sending a CV (9.5%), and the job bank for university students (8.3%). This means that even in a sector as internationalized as ICT, many current processes to access ICT jobs continue to rely on informal channels which, in turn, become more arbitrary, subject to discrimination against women, and even less effective (Perrault, 2015). When asking about interruptions it is worth noting that the majority of our respondents (52%) never interrupted their ICT careers, just 13.8% interrupted their career voluntarily and 34.2% did it involuntarily. Therefore, we can confirm that these women are professionally oriented and have a strong will to remain in the ICT sector as shown in previous research (Lamolla & González Ramos, 2020). Then, when we ask about the difficulties of rejoining the ICT sector, the lack of job offers, followed by age and being female, which were mentioned as major difficulties encountered. To a lesser extent, our surveyed answers list working hours or the lack of training or languages as obstacles to returning to the ICT labor market.

If we take a look at how the three most important labor changes in the careers of the women surveyed occurred, we have to note that as they go through their careers, we observe more changes within the company and a reduction of mobility to different companies. In this sense, the first time they change jobs, only 19.5% of the cases happened in the same company, while for the third job change, 30.5% of the cases occurred within the same company. We can also observe that while the first job change usually involves an increase in wages, the second and third job change may mean just maintaining or even reducing the salary in many more cases. In this regard, for 70.1% of the women surveyed the first job change involved an increase in salary while in the third job change an increase was only experienced in 54.3% of the cases. When we consider the improvement of labor conditions we observe that in the first job change this is very relevant (66.5%), in the second it diminishes in importance (48.8%) and regains ground in the third job change (60.5%). Over time, work-life balance gains importance (3.3% for the first job change to 5.2% for the third job change) and the development of personal life decreases in importance (from 9.9% to 5.5%).

Signs of gender discrimination may also be reflected in the responses when women indicate the obstacles encountered in their careers. 45.4% of the women surveyed considered that being a woman has been a negative influence on their professional development. Moreover, regarding work-life balance, 68.3% of respondents believe that taking care of their children or other dependents has impacted negatively on their careers. In the same vein, 51.1% of them consider that building a family has negatively affected their working career, while in a survey from 2010 considering the whole labor market only 25.4% of the interviewed women thought that their maternity negatively affected their career (Subdirección general de Estadística y Análisis Sociolaboral, 2010). There are very few women who attribute these two facts as having a positive influence on their careers. Apart from that, the lack of job stability for 75.6% negatively affected their career. This might be specific to the Catalan and Spanish labor context but job instability still affects women to a greater extent than men. Therefore, it is not surprising that 55.1% of those we surveyed would change jobs for better working conditions or to improve their quality of life (52.6%). Finally,

Table 2. Negative, positive, or without effect over my career path.

	N	Chi-square	Phi
Form a family	218	6.14*	0.169*
Divorce	190	1.729***	0.095***
Care of dependent family members	211	8.145*	0.196*
Professional decisions of the partner	201	1.5***	0.86***
Geographic mobility	205	7.458*	0.191*
Contractual instability	202	1.474***	0.085***
Being a woman	219	2.589***	0.109***

***$p > 0.05$, **$p < 0.00$, *$p < 0.01$.

Table 3. Positive, negative, or neutral impact over the professional trajectory.

	N	Chi-square	Phi
Networks	223	2.621***	0.108***
Mentoring	217	4.166***	0.139***
New opportunities	218	0.288***	0.036***
Work-Life-Balance	221	23.092**	0.323**
Disponibility to travel	215	12.950*	0.245*
Schedule	219	4.481***	0.143***
Required competences	217	2.776***	0.113***
Required requisites	217	1.958***	0.095***
Face-to-Face presence	219	3.296***	0.23****
Relation with superiors	215	1.111***	0.072***
Time disponibility	219	3.420***	0.125***

***$p > 0.05$, **$p < 0.00$, *$p < 0.01$.

48.3% would change jobs to meet new opportunities in the sector and 38.8% to get a better life-work balance.

From our bivariate analysis, we observe that having children has an important impact on the evaluation of different items such as conciliation, travel, founding a family or having children (Tables 2 and 3). Here the tendency is clear, women with children under 16 evaluate these items more negatively, less positively, and as definitely mattering. And in terms of satisfaction, they rate worst the fact that basic services are not close enough to their work, as well as the amount spent on equality policies (Table 4). Instead, they evaluate the relation with their colleagues more positively (Table 4). Concerning material conditions, women with children under 16 are the only ones who interrupted they career because of care. On the other hand, they are better off in terms of contract stability.

More than half of the companies where our respondent's work had no promotion plan, nor an equality plan. If there was an equality plan sometimes our respondents considered it had no effect (15%) or the effect was unknown (12.3%) (Table 5). If we take into account job satisfaction in relation to different issues (1–10 scale), dissatisfaction with the difficulty of promotion only scores 5.53 points, which received the worst assessment of all items. Professional recognition scored quite low (6.2 points) as well as professional challenges (6.55 points). This makes sense taking into account that 12% of our respondents claim that they can never influence company decisions and 31.4% of respondents only rarely, while only 6.5% always and 19.1% most of the time.

Finally, it is worth looking in more detail at the views on promotion and access to management positions. They see having networks and contacts, especially, as positive, followed by having the skills required and a good relationship with superiors.

Table 4. Comparison of means concerning satisfaction with different items.

	Total				Women in charge of children under 16			Women who are not in charge of children under 16		
	N	Mean	SD	*N*	Mean	SD	*N*	Mean	SD	*t*
Satisfaction with the working day	225	7.36	2.031	95	7.58		129	7.19		1.405
Satisfaction with flexibility	225	7.6	2.266	95	7.61		129	7.59		0.069
Satisfaction with holidays	223	7.39	1.967	94	7.54		128	7.27		1.035
Satisfaction with permits for care	214	6.8	2.302	94	6.52		120	7.02		−1.528
Satisfaction with stability	224	7	2.427	94	7.05		129	6.95		0.302
Satisfaction with the loan	225	6.22	2.112	95	6.21		129	6.22		−0.023
Satisfaction with the relation with colleagues	225	7.75	1.816	95	8.02		129	7.53		1.991*
Satisfaction with the relation with superiors	222	7.08	2.277	92	7.01		129	7.11		−0.313
Satisfaction with the autonomy at work	220	7.6	2.003	94	7.64		125	7.56		0.285
Satisfaction with promotion possibilities	220	5.23	2.482	91	5.37		128	5.1		0.799
Satisfaction with challenges	223	6.55	2.43	94	6.78		128	6.38		1,216
Satisfaction with acknowledgement	224	6.2	2.388	95	6.23		128	6.16		0.232
Satisfaction with mobility	220	6.77	2.67	92	6.52		127	6.94		−1.135
Satisfaction with the proximity of services	221	6.98	2.251	92	6.53		128	7.28		(−2.367)*
Satisfaction with measures for Work-Life-Balance	223	7.17	2.437	95	7.15		128	7.18		−0.098
Satisfaction with the joint composition of commissions	216	6.54	2.539	90	6.32		126	6.7		−1.074
Satisfaction with the equality departments	216	6.25	2.685	90	5.97		126	6.44		−1.291
Satisfaction with the endowment of resources to equality	214	6.14	2.77	89	5.72		125	6.44		(−1.888)*
Satisfaction with the measures supporting maternity/paternity	220	7.09	2.416	93	7.12		127	7.07		0.143
Satisfaction with mentoring	211	5.74	2.955	86	5.38		125	5.99		−1.473
Satisfaction with the support of leadership	215	6.04	2.979	88	5.78		127	6.21		−1.037
Satisfaction with the support of mobility	210	6	2.963	87	5.77		123	6.17		−0.965
Satisfaction with working life	225	6.85	1.847	95	6.86		129	6.84		0.104
Satisfaction with personal life	224	7.48	1.792	94	7.71		129	7.31		1.66

***$p > 0.05$, **$p < 0.00$, *$p < 0.01$.

Table 5. Awareness of the existence and effectiveness of an equality plan.

	Frequency	Percentage	Valid percentage
We have an equality plan and it has impacts	26	8	11.8
We have an equality plan but it doesn't have any impact	33	10.2	15
We have an equality plan. but I don't know it	27	8.3	12.3
We don't have an equality plan	79	24.3	35.9
I don't know if we have an equality plan	55	16.9	25
Total	220	67.7	100

However, several issues related to time use are seen as negative in order of importance: work-life balance, availability after the regular schedule, availability for travel and being more present at work.

Discussions and conclusions

After more than 20 years of research and policies to encourage girls and women to study and work in ICT, their numbers do not seem to be increasing. Yet, still too many companies, academics, institutions, and managers claim there is nothing they can do because girls do not want to study ICT. However, there is still a lot to be done. Future research and new policies can be implemented if we really want to develop our digital societies and economies. We need to find ways to open the doors of ICT to women, make them feel more comfortable working in that sector and let them reach the positions they deserve.

As we have shown, our women in ICT are still playing in a loaded game. As previous research has found, the ICT sector is not a gender-neutral place to work (Faulkner, 2009; Scott-Dixon, 2004; Gil-Juárez et al., 2018). Even if they are women committed and satisfied with their jobs and despite knowing they can enjoy better salaries and stability than in other sectors, their work trajectories are affected by their gender. Gender normativity tends to play against them. As we have shown, they still observe too much gender discrimination and they still have many difficulties to progress and climb the work ladder. Their companies still offer the minimum possibilities for work-life balance and emancipation for them. Moreover, their are still expected to do at least twice as much domestic work. Observing some of the barriers that women in ICT are currently facing we can find part of the solution just by turning them around. Similarly, if we carefully observe what they do and what they care about, we can find other ways to increase their numbers and improve their situation.

There are more women working in the ICT sector than women studying ICT (European Commission, 2018; Mateos & Gómez, 2019). Many of the women in our survey did not initially study engineering and yet now consider themselves women in ICT (and they are probably doing very good jobs there). As previous research has shown (Margolis & Fisher, 2003; Castaño & Webster, 2011; Vergés et al., 2011), companies and institutions within the ICT sector need to find ways to unlock the clubhouse to other profiles. Women are a majority among the highly-skilled, even if they are still working in other disciplines. Many improvements can be made to better attract women to ICT, from avoiding making engineering a requirement in job offers to providing additional training pre or post recruitment.

Another way to increase women in ICT might be just to make them feel comfortable enough so they can stay. As previous research has shown (Castaño & Webster, 2014; Segovia-Perez et al., 2020), women still experience too much gender discrimination and, as we have shown, they see too little attention being paid to the development of equality plans where they work. Equality plans include objectives to reduce gender pay gaps, combat sexual harassment, and avoid the glass ceiling and sticky floor effects, as well as paying attention to work-life measures. In this regard, our results also showed that women cannot assume certain demands of time and spatial availability (Holth et al., 2017) and they feel less satisfaction with work-home distances and work-life balance, while they report difficulties relating to travel, taking breaks or having enough time to perform all the tasks assigned. Employers need to care about their workers. This entails caring about what they worry about and finding ways to enrich and emancipate both their working and personal lives which, in turn, will enrich their companies. In this regard, recent research on workers' discretionary remote working gives us some clues on flexi-time possibilities without penalizing working mothers (Sherman, 2020) while future research is still needed on work-life balance in ICT.

Finally, our results show that women in ICT are facing difficulties in regard to promotion, even if they know what could help. However, too many of the items they think would work are still too gendered to work for them. Many of the requirements to be promoted involve an availability that they might not be able to give without extra work-life balance support. Others, like having contacts, networking, and a good relationship with superiors, still remain informal and in the old boys' networks (Perrault, 2015), which might be translated into fewer opportunities for women to be promoted. In this regard, sponsoring policies might work (Hewlett et al., 2014), but still, further research is needed. At the end of the day, if women reach the top and become more visible to girls, perhaps then many more will try to work in ICT like them.

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References

Abbate, J. (2012). *Recoding gender: women's changing participation in computing*. MIT Press.
Acció (2020). The ICT industry in Catalonia. Generalitat de Catalunya. Strategy and Competitive Intelligence Unit. http://www.accio.gencat.cat/web/.content/bancconeixement/documents/pindoles/ICT_Sector_Snapshot.pdf
Ackerly, B., & True, J. (2010). *Doing feminist research in political and social science*. Palgrave Macmillan.
Bartra, E. (1998). *Debates en torno a una metodología feminista*. Universidad Autónoma Metropolitana–Xochimilco.
Biglia, B., & Vergés Bosch, N. (2016). Cuestionando la perspectiva de género en la investigación. REIRE. *Revista d'Innovació i Recerca en Educació, 9* (2), 12–29.
Burger, C. J., Creamer, E. G., & Meszaros, P. S. (2007). *Reconfiguring the firewall: Recruiting women to information technology across cultures and continents*. CRC Press.
Castaño, C. (2008). *La segunda brecha digital*. Cátedra.
Castaño, C., González, A. M., Müller, J., Palmen, R., Rodríguez, A., Sáinz, M., Vázquez, S., & Vergés Bosch, N. (2011). *Quiero ser informatic@*. Editorial UOC.
Castaño, C., & Müller, J. (2010). Capítulo VI Cultura de género en las escuelas de informática y telecomunicaciones. In C. Castaño (Ed.), *Género y TIC. Presencia, posición y políticas*., (pp. 217–250). Editorial UOC.
Castaño, C., & Webster, J. (2011). Understanding women's presence in ICT: The life course perspective. *International Journal of Gender, Science and Technology*, *3*(2), 364–386.
Castaño, C., & Webster, J. (2014). *Género, ciencia y tecnologías de la información*. Aresta.
CCII. (2015). *Estudio Nacional sobre la Situación Laboral de los Profesionales del Sector*. Consejo General de Colegios Oficiales de Ingeniería en Informática (CCII).
Cohoon, J. M., & Aspray, W. (2006). *Women and Information Technology: Research on Under-Representation*. MIT Press.
Domínguez Amorós, M., Muñiz, L., & Rubilar Donoso, G. (2018). El trabajo doméstico y de cuidados en las parejas de doble ingreso. Análisis Comparativo entre España, Argentina y Chile. *Papers. Revista de Sociologia*, *104*(2), 337–374. https://doi.org/10.5565/rev/papers.2576
Domínguez Amorós, M., & Simó Solsona, M. (2003). *Tècniques d'Investigació Social Quantitatives*. Editorials Universitat de Barcelona.
EIGE. (2018). *Women and men in ICT: A chance for better work–life balance Research note*. Publications Office of the European Union.

European Commission. (2018). *Women in the digital age. luxembourg: European comission directorate general for communications networks content and technology*. Publications Office of the European Union.

European Commission. (2019). *Women in digital scoreborad 2019, Spain*. Publications Office of the European Union.

European Commission. (2020). *Índice de la Economía y la sociedad digitales (DESI) 2020) Country report Spain*. Publications Office of the European Union.

Faulkner, W. (2009). Doing gender in engineering workplace cultures. I. Observations from the field. *Engineering Studies*, *1*(1), 3–18. https://doi.org/10.1080/19378620902721322

Faulkner, W., & Lie, M. (2007). Gender in the information society: Strategies of inclusion. *Gender Technology and Development*, *11*(2), 157–177. https://doi.org/10.1177/097185240701100202

Gil-Juárez, A., Feliu, J., & Vitores, A. (2012). Género y TIC: En torno a la brecha digital de género. *Athenea Digital. Revista de Pensamiento e Investigación Social*, *12*(3), 3–9. https://doi.org/10.5565/rev/athenead/v12n3.1137

Gil-Juárez, A., Feliu, J., & Vitores, A. (2018). Mutable technology, immutable gender: Qualifying the "co-construction of gender and technology" approach. *Women's Studies International Forum*, *66*, 56–62. https://doi.org/10.1016/j.wsif.2017.11.014

González Ramos, A. M., & Vergés Bosch, N. (2013). International mobility of women in science and technology careers: Shaping plans for personal and professional purposes. *Gender, Place & Culture*, *20*(5), 613–629. https://doi.org/10.1080/0966369X.2012.701198

González Ramos, A. M., Vergés Bosch, N. V., & Martínez García, J. S. (2017). Women in the technology labour market. *Revista Española de Investigaciones Sociológicas (REIS)*, *159*(159), 73–89.

Gorbacheva, E., Beekhuyzen, J., Vom Brocke, J., & Becker, J. (2019). Directions for research on gender imbalance in the IT profession. *European Journal of Information Systems*, *28*(1), 43–67. https://doi.org/10.1080/0960085X.2018.1495893

Griffiths, M., Moore, K., & Richardson, H. (2007). Celebrating heterogeneity? A survey of female ICT professionals in England. *Information, Communication and Society*, *10*(3), 338–357. https://doi.org/10.1080/13691180701409945

Hari, A. (2017). Who gets to 'work hard, play hard'? Gendering the work–life balance rhetoric in Canadian tech companies. *Gender, Work & Organization*, *24*(2), 99–114. https://doi.org/10.1111/gwao.12146

Hewlett, S. A., Sherbin, L., Dieudonne, F., Fargnoli, C., & Fredman, C. (2014). *Athena factor 2.0: Accelerating female talent in science, engineering & technology*. Center for Talent Innovation.

Holth, L., Bergman, A., & MacKenzie, R. (2017). Gender, availability and dual emancipation in the Swedish ICT sector. *Work, Employment and Society*, *31*(2), 230–247. https://doi.org/10.1177/0950017016651378

Kelan, E. K. (2009). Gender fatigue: The ideological dilemma of gender neutrality and discrimination in organizations. *Canadian Journal of Administrative Sciences*, *26*(3), 197–210. https://doi.org/10.1002/cjas.106

Kindsiko, E., & Türk, K. (2017). Detecting major misconceptions about employment in ICT: A study of the myths about ICT work among females. *World Academy of Science, Engineering and Technology International Journal of Social, Behavioral, Educational, Economic, Business and Industrial Engineering*, *11*(1), 107–114.

Kvasny, L. (2006). Let the sisters speak: Understanding information technology from the standpoint of the'other. *ACM SIGMIS Database: The DATABASE for Advances in Information Systems*, *37*(4), 13–25. https://doi.org/10.1145/1185335.1185342

Lagesen, V. A. (2007). The strength of numbers: Strategies to include women into computer science. *Social Studies of Science*, *37*(1), 67–92. https://doi.org/10.1177/0306312706063788

Lamolla, L., & González Ramos, A. M. (2020). Tick-tock sounds different for women working in IT areas. *Community, Work & Family*, *23*(2), 125–140. https://doi.org/10.1080/13668803.2018.1483321

Laparra, M. (2014). *Los perfiles de la discriminación en España: análisis de la encuesta CIS-3000" Percepción de la discriminación en España"*. Ministerio de Sanidad, Servicios Sociales e Igualdad. Centro de publicaciones.

Lerman, N., Oldenziel, R., & Mohun, A. (2003). *Gender and technology. A reader*. John Hopkins University press. pp. 425–451.

Light, J. S. (1999). When computers were women. *Technology and Culture*, *40*(3), 455–483. https://doi.org/10.1353/tech.1999.0128

López Roldán, P., & Fachelli, S. (2015). *Metodología de la investigación social cuantitativa*. Universitat Autònoma de Barcelona.

Maceira, H. M. (2017). Economic benefits of gender equality in the EU. *Intereconomics*, *52*(3), 178–183.

Mainiero, L. A., & Jones, K. J. (2013). Workplace romance 2.0: Developing a communication ethics model to address potential sexual harassment from inappropriate social media contacts between coworkers. *Journal of Business Ethics*, *114*(2), 367–379. https://doi.org/10.1007/s10551-012-1349-8

Margolis, J., & Fisher, A. (2003). *Unlocking the clubhouse. Women in Computing*. The MIT Press.

Mateos, S., & Gómez, C. (2019). *Libro Blanco de las mujeres en el ámbito tecnológico*. Secretaría de Estado para el Avance Digital. Ministerio de Economía y Empresa.

Pérez, O. (2010). Capítulo III Mujeres, innovación y políticas de conciliación e igualdad en las empresas TIC españolas. In C. Castaño (Ed.), *Género y TIC. Presencia, posición y políticas* (pp. 107–148). Editorial UOC.

Perrault, E. (2015). Why does board gender diversity matter and how do we get there? The role of shareholder activism in deinstitutionalizing old boys' networks. *Journal of Business Ethics*, *128*(1), 149–165. https://doi.org/10.1007/s10551-014-2092-0

Plant, S. (1997). *Zeros + Ones. Digital women + the new technoculture*. Doubleday.

Rissola, G., & Sorvik, J. (2018). *Digital innovation hubs in smart specialisation strategies (No. JRC113111)*. Joint Research Centre (Seville site).

Ruiz Ben, E. (2007). Defining expertise in software development while doing gender. *Gender, Work & Organization*, *14*(4), 312–332. https://doi.org/10.1111/j.1468-0432.2007.00346.x

Sáinz, M., Pálmen, R., & García-Cuesta, S. (2012). Parental and secondary school teachers' perceptions of ICT professionals, gender differences and their role in the choice of studies. *Sex Roles*, *66*(3–4), 235–249. https://doi.org/10.1007/s11199-011-0055-9

Scott-Dixon, K. (2004). *Doing IT. Women working in information technology*. Sumach Press.

Segovia-Pérez, M., Castro Núñez, R. B., Santero Sánchez, R., & Laguna Sánchez, P. (2020). Being a woman in an ICT job: an analysis of the gender pay gap and discrimination in Spain. *Work and Employment*, *35*(1), 20–39. https://doi.org/10.1111/ntwe.12145

Seron, C., Silbey, S., Cech, E., Rubineau, B. (2018). I am not a feminist, but … ": Hegemony of a meritocratic ideology and the limits of critique among women in engineering. *Work and Occupations*, *45*(2), 131–167. https://doi.org/10.1177/0730888418759774

Sherman, E. L. (2020). Discretionary remote working helps mothers without harming non-mothers: Evidence from a field experiment. *Management Science*, *66*(3), 1351–1374. https://doi.org/10.1287/mnsc.2018.3237

Simard, C., Davies, A., Girlmartin, S. K., Schiebinger, L., & Whitney, T. (2008). Climbing the technical ladder: Obstacles and solutions for mid-level women in technology. Michelle R. Clayman Institute for Gender Research, Stanford University, Anita Borg Institute for Women and Technology.

Sørensen, K., Faulkner, W., et al. (2011). A room of their own? Inclusion through women-centred ICT spaces. In Sørensen. (Eds.). *Technologies of inclusionl. Gender in the Information Society*. (pp. 191–213). Tapir Academic Press.

Sørensen, K. H., Faulkner, W., & Rommes, E. (2011). *Technologies of Inclusion: Gender in the Information Society*. Tapir Akademisk Forlag.

Subdirección general de Estadística y Análisis Sociolaboral (2010). *Encuesta de Calidad de Vidaen el Trabajo 2010*. Ministerio de Trabajo, Migraciones y Seguridad Social.

Trauth, E. (2017). A research agenda for social inclusion in information systems. *ACM SIGMIS Database: The DATABASE for Advances in Information Systems*, *48*(2), 9–20. https://doi.org/10.1145/3084179.3084182

Trauth, E. M., Cain, C. C., Joshi, K. D., Kvasny, L., & Booth, K. M. (2016). The influence of gender-ethnic intersectionality on gender stereotypes about IT skills and knowledge. *ACM SIGMIS Database: The DATABASE for Advances in Information Systems*, *47*(3), 9–39. https://doi.org/10.1145/2980783.2980785

Trauth, E., Quesenberry, J. L., & Huang, H. (2009). Retaining women in the US IT workforce: Theorizing the influence of organizational factor. *European Journal of Information Systems*, *18*(5), 476–497. https://doi.org/10.1057/ejis.2009.31

Turkle, S. (1998). Computational reticence. Why women fear the intimate machine. A Hopkins, P (Ed.) (1998) *Sex/Machine. Readings in Culture, Gender and Technology*, 365–381. Indiana University press.

Vergés Bosch, N. (2015). Moving towards accommodating women with ict: paying attention to self-inclusion mechanisms. In Interacción'15 *Proceedings of the XVI International Conference on Human Computer Interaction* (pp. 1–8). https://doi-org.sire.ub.edu/10.1145/2829875.2829903

Vergés, N. (2012). De la exclusión a la autoinclusión de las mujeres en las TIC. Motivaciones, posibilitadores y mecanismos de autoinclusión. *Athenea Digital-Revista de Pensamiento e Investigación Social*, *12*(3), 129–150.

Vergés, N., Cruells, E., & Hache, A. (2009). Viejos Retos y Nuevas potencialidades para las mujeres en la participación del desarrollo de la sociedad de la información. *Feminismo/s*, *14*(14), 163–182. https://doi.org/10.14198/fem.2009.14.10

Vergés, N., Hache, A., & Cruells, E. (2011). Indagando en la relevancia de Internet en el acceso, uso y deseos de las TIC por parte de las mujeres en las TIC. *Teoría de la Educación. Educación y Cultura en la Sociedad de la Información*, *2*, 105–121. 7.

Vergés, N., Hache, A., & Cruells, E. (2014). Ciberfeminismo de investigacción con y entre tecnoartistas y hackers. *Athenea Digital: revista de Pensamiento e Investigación Social*, *14*, 153–180.

Vergés Bosch, N., Freude, L., & Camps Calvet, C. (2021). Service learning with a gender perspective: Reconnecting service learning with feminist research and pedagogy in sociology. *Teaching Sociology, 49* (2), 136–149.

Vitores, A., & Gil-Juárez, A. (2016). The trouble with 'women in computing': a critical examination of the deployment of research on the gender gap in computer science. *Journal of Gender Studies*, *25* (6), 666–680. https://doi.org/10.1080/09589236.2015.1087309

Weisgram, E., & Diekman, A. (2015). Family friendly STEM: Perspectives on recruiting and retaining women in STEM fields. *International Journal of Gender, Science and Technology*, *8*(1), 38–45.

Zubillaga Rego, A., & Peletier Espiga, C. (2020). Economia i societat digitals de Catalunya. *DESI 2019. Cuadernos Orkestra*, *73, 1–35.*