

Gender Gap in Digital Skills in Greece

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ABSTRACT: Inequalities between men and women exist not only in the economy and society but also in education all over the world. Many initiatives are launched to empower women with advanced skills in many countries. This paper describes the policies and initiatives to foster gender equality in Information and Communication Technologies (ICT)-related education and employment in Greece. National and European Union (EU) statistics show that there exists a wide gender gap in ICT-related higher education participation, employment, and salaries in Greece. Various policies and initiatives aim at empowering women with digital skills. The paper suggests a framework to fight gender discrimination in ICT across four (4) dimensions (ICT education & training, digital tools & infrastructure, people networking, ICT jobs) and three (3) levels (access, use & participate, create). The resulting framework consists of twelve (12) areas. The paper gives example strategies for some of the areas. Finally, the paper presents conclusions and suggestions for future research.

KEY WORDS: digital skills, digital competence, employment initiatives, equality policies, gender differences, gender gap, gender inequality, ICT skills, equality policies

Introduction

The proliferation of Information and Communication Technologies (ICT) in everyday life brought up the need to equip all people with digital skills. This is even more pronounced during the COVID-19 period since distance isolation dictates that most activities (e.g., communication, shopping, education, work) should be done from a distance using computers and the Internet. However, in most countries there are gender inequalities in using ICT across all sectors of society. Countries have taken actions to overcome such inequalities but more drastic interventions should be enforced.

According to European Unions (2020), although women count for 54% of all tertiary students in the EU in 2017, they are particularly underrepresented in the digital professions. Women hold only 17% of tech sector jobs. Although girls generally perform better than boys in the Programme for International Student Assessment (PISA) and International Computer and Information Literacy Study (ICILS) international skills tests, they do not prefer ICT jobs. Even though 53% of companies who are trying to recruit ICT specialists report difficulties in finding qualified people, only 1 to 6 ICT specialists in the EU is a woman. That means that only 17% of the almost 8 million employees in ICT are women. Reasons that discourage women to follow a digital career include their low digital skills and the female-unfriendly working conditions. The European Council (2018) called on the EU Member States and the Commission to prevent and combat gender stereotypes, to reduce gender segregation in the labour market, to promote the participation of women in ICT jobs, and to promote the development of basic digital skills for both women and men.

EIGE (2019) found the following: i) although young women and men have similar digital skills, young men indicate higher confidence in their digital skills; ii) digital spaces are male-dominated spaces which obstructs young women to participate; iii) political activities online are more fraught for girls and young women; iv) exposure to online harassment has far reaching effects on young women's online engagement; v) gender norms are intensified online. The study on Women in the Digital Age (iclaves 2018) reports that there is a growing gap between men's and women's participation in the digital sector in

education, career, and entrepreneurship. More specifically, the study found the following: i) There are four times more men than women in Europe having ICT-related studies. There is a decrease in women following ICT-related higher education when compared to 2011; ii) The share of men working in the digital sector is 3.1 times greater than the share of women; iii) The annual productivity loss for the European economy of women leaving their digital jobs to become inactive is calculated to be about EUR 16.2 billion; iv) Although female-owned start-ups are more likely to be successful, there is a decrease in participation, leadership, and investment in the entrepreneurial digital sector. The recent study *Women in Digital Scoreboard (2019)* reports that only 17% of ICT specialists are women. The same ratio for STEM graduates is 34%. Women in the information and communication sector earn 19% less than men. In digital skills, there is a gender gap of 11%. The gap is higher for “above basic skills” and especially for those above 55 years. The proportion of women among doctoral graduates in the fields of ICT is 21% (European Commission 2019b, *She figures 2018*).

So, the European Union’s (2020) top priority is to ensure that girls and young women are equally represented in digital studies and careers. Therefore, the European Commission aims to support the development of higher education curricula which attracts women to engineering and ICT. Recently, CEOs of European tech firms signed a CEOs Declaration (2019) expressing the intent to achieve gender balance and provide equal opportunities in their companies. The *European Network on Women in Digital (eurogender.eige.europa.eu)* aims to promote greater participation of girls and women in digital studies and careers across the EU. Connecting organizations that work to combat gender stereotypes, encourage ICT related studies and promote diversity in digital professions can help pool efforts and create critical mass.

Digital Skills and Greek Women

In Greece, a variety of authorities promote gender equality in all society and economy sectors. For example, the Greek law protects working women with respect to discrimination before, during and after employment. Furthermore, the law protects maternity, motherhood, child care and nurture, treatment of sick and/or special needs child, as well as other cases.

In Greece, there are various authorities that promote equal treatment with respect to gender (among others). For example, the “Greek Ombudsman” (www.synigoros.gr) investigates cases of violation of the law against gender discrimination either in the private or in the public sector. Specially, the “General Secretariat for Family Policy and Gender Equality” (www.isotita.gr) plans, coordinates and implements policy and projects for gender equal treatment. Its research division “Research Centre for Gender Equality” (KETHI, www.isotita.gr) implements interventions for eliminating gender discrimination.

Regarding Internet skills, 68% of women are regular Internet users (versus 71% of men); 27% of women have never used the Internet (versus 23% of men); 33% of women use online banking (versus 42% of men); 7% of women use professional social networks (versus 9% of men); 7% of women are doing an online course (versus 7.2% of men); 4.8% of women use online consultations or voting (versus 5.5%); 33% of women use e-government services (versus 40% of men) (Women in Digital Scoreboard 2019).

Furthermore, 44% of women have at least basic digital skills (versus 49% of men); 20% have above digital skills (versus 23% of men); and 50% have at least basic software skills (versus 55% of men). According to the recent Gender Equity Index 2020 (EIGE 2020), among Greek people aged 25-29 year, women have above basic digital skills at 46% (versus men at 37%). Among Greek scientists and engineers (aged 25-64 years) in high-technology sectors, there are 21% women (versus 79% men) (similar to the average EU gender gap). The gender pay gap in ICT in Greece is 12% (similar to the average EU which is 11%) (EIGE 2020).

According to EIGE (2019), less women than men use computers daily (a gap of 16%). Also, fewer women than men post opinions on civic or political issues or take part in online voting. More specifically, the gender gap is over 10% regarding youth who in the last 3 months had posted opinions on civic or political issues online, or participated in online consultations or voting, for example, to decide or express their opinion on urban planning, or signing a petition.

Gender differences in Informatics Education

In Greece, gender inequalities start appearing even at the lower secondary education, where less female students than male students engage in coding/programming activities, and this trend continues in upper secondary education since 85 % of female students never or almost never engage in coding/programming in comparison to only 66 % of male students (European Commission 2019a). During EU Code Week, a total of 368 coding activities were held throughout Greece, covering 37.200 participants whose average age was 11, and 44.4 % of participants were girls or women (DESI – Greece, 2019). In a national activity to promote the inclusion of coding in school curricula, organized by the Greek Coalition for Digital Skills, females were 52% of the participants (108 children aged 8-11, and 27 ICT teachers from primary schools all over Greece).

Berdousis and Kordaki (2014) found that more male than female students studied in Informatics departments at Greek Universities in the decade 2003-2012, while there were more female students in the Universities. Furthermore, this gender gap widens over the years. Kordaki and Berdousis (2017) found that there were fewer female students than male students in computer science and engineering university departments (freshmen, graduates, master's degree graduates, and Ph.D.s) during the decade 2002–2012 in Greece. Similar result hold for informatics teachers in secondary education. Investigating the views of Prospective Computer Engineers (PCE) regarding gender issues in computer science and engineering (CSE), Tsagala, and Kordaki (2005) found that one out of three male PCEs do not trust women as University Professors in CSE while half of the female PCEs feel uncomfortable with the absence of female faculty members; one out of three male PCEs would prefer a job in Industry, while the same percentage of female PCEs expressed that they would prefer a job in the Public Sector. Another study involving Greek computer science students, reported that female university students preferred courses focusing on theoretical computer science, and social and human aspects of CS, while males preferred courses concentrating on hardware and software engineering (Berdousis and Kordaki, 2018). The proportion of women among doctoral graduates in ICT dropped

from 23.2% (2013) to 13.6% (2016) (She Figures, 2018). The compound annual growth (%) of women doctoral graduates is -25.8.

Gender differences in ICT Professions

According to Women in Digital Scoreboard (2019), 0.4% of total employees are women ICT specialists (versus 2.5% men). In 2019, there were 17,900 Greek women and 47,400 Greek men employees with ICT education (Eurostat, 2019). Women counted 27.4% of all Greek employees with ICT education compared to an EU average of 17.3% (Eurostat, 2019). A significant gender gap is also observed with only 10.9 % of employed people in the ICT sector being women (DESI - Greece, 2019). Pappas et al. (2017) found that there are large gaps and mismatches between the supply and demand for ICT skills in Greece. Women believe that they are under-represented in the ICT sector, and there is a gender gap in ICT-related professions. The “Greek Chapter of the ACM-W” (ACM’s Council on Women in Computing, acmw-gr.acm.org/index.php/en) association strives to promote the role of ICT women in society, education, research, and professions in Greece.

Gender differences in ICT professorships in Greek Universities

Berdousis and Kordaki (2018) reported that women represent only a small percentage of Greek university faculty in Informatics for every year during the decade 2003-2013. Furthermore, this gender gap was even wider at the highest rank positions of professorships.

Public policies and initiatives to support Greek women in ICT professions

During the last years, the Greek government recognized the importance of empowering women with digital skills and enabling their integration in men-dominated sectors. The “National plan for gender equity 2016 - 2020” (NPGE 2017) issued as Objective 5 ‘Motivating women to use ICT’ urging for immediate implementation of actions to raise awareness, motivate and train the female population in ICT and digital skills.

The “*National Action plan for Digital Skills and Jobs in Greece*” (GNAP 2018) initiative aims at fostering the dialogue between Greek women and companies by promoting the attractiveness of ICT careers among women and strengthening the trust of ICT companies, especially SMEs, in women as employees. One of its objectives is to increase the digital skills of girls and women in order to integrate the female talent into the workforce. It also sets up the following two priorities to promote gender equality: i) Priority 11: Empower Women & Girls to Go Digital (WGGD) in Greece; ii) Priority 12: Better Employment Conditions for Female Talent with Digital Skills. In addition, it sets up the following three Strategic Objectives (SO): i) SO 16: Re-starting for the WGGD Pledge; ii) SO 17: Upskilling Female labor force with Targeted Training activities; iii) SO 18: Innovation Hub for Women in Technology.

The “*Women and Girls Go Digital initiative*” (WGGD), coordinated by the General Secretariat for Family Policy and Gender Equality, brings together 22 Greek and 4 European stakeholders desiring to support women during all steps in their career enhancing their digital skills and jobs, and strengthening the women’s role in the digital economy. It organizes workshops and training, promotes women’s involvement in digital activities and employment, transfers knowledge from best EU practices, and participates in related projects. For example, in the e-Women project, European Centre for Women and Technology (ECWT) provides knowledge-transfer based on best practices from Norway with the goal to promote, in Greece, women’s new employability paths through digital skills, support tech startups and prepare a new business innovation center (hub) in Athens.

More specifically, with regards to “SO 17: Upskilling Female labor force with Targeted Training activities”, “Action 30: Targeted Training activities a Digital Upskilling of Greek Female labor force” plans the following activities: 1) ICT training; 2) Exploiting the Internet to find information and work; 3) Updating existing public digital services and exploiting e-learning; 4) Exploiting ICT software and applications in the culture sector; 5) Creation of workshops to produce ideas and proposals for the creation of innovative tools tailored to the needs of vulnerable populations; 6) Training in e-entrepreneurship and social

networking tools; 7) Provision of certifications which would be very useful in finding a job.

With regards to “SO 18: Innovation Hub for Women in Technology”, “Action 31: Development of an Innovation Hub for Women in Technology” aims at: i) Monitoring the use of ICTs by women and men in the framework of the “Gender Monitoring Observatory” and the preparation of a relevant newsletter on a yearly basis; ii) Specialized actions for the development of digital skills for special population groups. Also, “Action 32: e-Leadership promotion for women in the public sector” aims at: i) promoting e-Leadership for women in public sector; ii) Developing Career Days for Women in the Public Sector in the context of which women will encourage to design a carrier path based on digital skills and e-Leadership.

Besides the aforementioned public initiatives to support Greek women in ICT professions, many more projects which had similar objectives have been launched such as the following:

a) The “*Innovation and Employability for Women*” (“*ie-Women*”, iewomen.iit.demokritos.gr): This project organized educational programs in entrepreneurship and social media for improving employability of women and female entrepreneurs in digital economy. It aims at ICT training accompanied by the development of women self-confidence and the breaking of negative attitudes towards computer use. It promotes ICT professions to be made more attractive as a career choice for women, and encourages the strengthening of collaboration across relevant stakeholders;

b) The “*women4it*” project (www.women4it.eu): The project’s goals include the following: i) To create attractive employment opportunities for young people in the digital economy; ii) To provide access to an online employability profiling tool for individual testing; iii) To ensure free and available digital training and opportunity so as to help individuals access a community of leading European digital workforce; iv) To promote IT jobs for women as a source of economic growth and role models;

c) The “*eSKILLS4ALL*” project (www.eskills4all.eu): This project aims at empowering unemployed adults (with a focus on women) through training. The project supports low-skilled unemployed adults (with a focus on women) to increase their digital literacy, and helping them in their search for employment.

A Proposal for Gender Digital Equity Strategy

Analyzing the various policies and initiatives, it is clear that most of them plan and provide to women ICT training, Workshops, Career Days, Marketing, Awards, People Networking, Hubs and similar actions. Organizing all these activities under a common framework, could be helpful to anyone interested in this area. This paper proposes a framework for Gender Digital Equity Strategies (Table 1) which encompasses four (4) dimensions: 1) *ICT Education & Training*; 2) *Digital Tools & Infrastructure*; 3) *People Networking*; 4) *ICT Jobs*, as well as three (3) Activity Levels: 1) *Access*; 2) *Use & Participate* and 3) *Create*.

More concretely, at the first level, having *Access* means that women can only find and watch opportunities for *ICT Education & Training*; *Digital Tools & Infrastructure*; *People Networking*; *ICT Jobs*. For example, they can only read a book about computer networks, or watch a video lecture on artificial intelligence, or know that there are digital tools, e-communities, and jobs (and their requirements, obligations, roles, salaries) on specific ICT areas (e.g., cybersecurity). The fact that they can have *Access* to resources does not mean that they are also free to use, participate or even create new ones.

The next level proposes to give women the opportunities and tools to *Use & Participate* in *ICT Education & Training*; *Digital Tools & Infrastructure*; *People Networking*; *ICT Jobs*. For example, they should be able to fully participate in a class (i.e., interact, communicate with teachers and peers, make assignments & projects, take exams, etc.), in an e-community (interact, communicate, and collaborate with others in the community) or in a business environment/job (work).

Finally, the third level proposes to provide women with the opportunities and tools to *Create* *ICT Education & Training*; *Digital Tools & Infrastructure*; *People Networking*; *ICT Jobs*. For example, an initiative could give women the ability to *Teach ICT subjects*, or to develop new *digital tools*, or create *networks* of professionals and businesses in specific ICT areas, or even create new *ICT businesses* as e-entrepreneurs.

In each of these 12 areas (3 levels times 4 dimensions), the proposed strategies promote and propose appropriate activities for the benefit of the women. For example, in the area of *Create ICT Education & Training*, women should be given the opportunities, resources, and tools to develop

new educational material and teach them to others. In the area of *Create ICT Jobs*, women should be given the opportunities, resources, and tools to create new businesses and ICT jobs.

Table 1. Framework for Gender Digital Equity Strategies

	ICT Education & Training	Digital Tools & Infrastructure	People Networking	ICT Jobs
1. Access	√	√	√	√
2. Use & Participate	√	√	√	√
3. Create	√	√	√	√

Conclusions and future research

This paper describes policies and initiatives to decrease gender inequalities in ICT-related education and employment in Greece. Various studies show that there exists a wide gender gap in ICT-related higher education participation, employment, and salaries in Greece. In addition, the paper proposes a Framework for Gender Digital Equity Strategies across 12 areas (3 levels X 4 dimensions) (Table 1). Future research may consider comparing the female participation in various ICT sectors (e.g., ICT user support, digital marketing, software development, managing networks, cloud computing, databases, artificial intelligence, business analytics, security). Also, future research may examine the relationship between women holding an ICT degree and their job type, their job level as well as their employment sector (e.g., commerce, finance, education, research, telecommunications, transportation, logistics, energy, utilities).

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