

# *Portuguese research on Gender and ICT: The place of education*

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**Abstract - ICT/technologies are increasingly pervasive and embedded in everyday things and objects, constituting a relevant aspect of social identities. Furthermore ICT use continues to be a highly gendered area of life in all socio-economic and educational backgrounds, and a source of significant social inequality in enduring ways. Gender and ICT/technologies is an international growing field of research that explores diverse research issues, and the main objective of this paper is to characterize the Portuguese research on this topic, identifying the main areas of study and possible gaps. By analyzing institutional repositories of Higher Education in Portugal, conferences and journals on ICT and Education, this paper concludes that research on gender and ICT/technologies in Portugal is very limited and mainly on subjects related with education and occupation/jobs. To finalize the paper presents future research topics to foster knowledge on gender and ICT/technologies in Portugal.**

**Keywords – gender; ICT; technologies; academic research; education; Portugal**

## I. INTRODUCTION

Gender and ICT/technologies is an international growing field of research that explores diverse research issues, including self-reported attitudes, preferences and interests and the gender differences between them, as well as focusing on the relationship between individual activity and social norms, differences in power with respect to autonomy and self-determination, initiatives for addressing these, and the production of a gendered identity over time and across space [1]. The main objective of this paper is to characterize the Portuguese research on gender and ICT/technologies, identifying the main areas of study and possible gaps, with a particular focus on education.

The paper starts with a brief literature review on gender and ICT/technologies linking international research to the reality in Portugal by presenting results of national projects and some statistical indicators. Then it presents the methodology used to identify the Portuguese research on gender and ICT, its results and the items of analysis. The paper also reports on relevant initiatives developed in Portugal which are noteworthy contributions to this field of research. The conclusions summarize the findings and presents possible future research topics to foster knowledge on gender and ICT/technologies in Portugal.

## II. GENDER AND ICT

Information and communication technologies (ICT) are pervasive in every contexts and spaces and have revolutionized virtually every aspect of our life and work. To participate fully in the economic, social and cultural life people need the competences to navigate through a complex digital landscape [2]. Besides infrastructural barriers, as access to computers and the internet, there are intangible factors, such as cultural norms, which shape the opportunities for digital learning. The gender gap in computer experience is one of the evidences of these non-material barriers [3]. Nowadays, there are still differences between girls and boys in what concerns self-reported digital competences and experience with computers, even in countries where there is gender and socio-economic equality in access to school. These differences do not reflect material constraints, but rather students' interests and families' and educators' notions about what is suitable for them [3].

A recent research project, Net Children Go Mobile (NCGM), conducted in 2014 in six European countries, also identified gender differences [4]. Participating countries included Denmark, Italy, Romania, the UK, Belgium, Ireland and Portugal. The Net Children Go Mobile project investigated, using quantitative and qualitative methods, how the changing conditions of internet access and use – namely, mobile internet and mobile-convergent media – bring greater, fewer or newer risks to children's online safety (aged 9 to 16). The results of NCGM, in all 6 countries including Portugal, evidence that boys claim to have more digital competences and reveal more self-confidence in the use of computers and the internet. Other interesting data is the clear rise of girls' use of new mobile media, such as smartphones to go online. However, there is still a need for research to study if and how the increasing use of mobile devices by girls to go online affects their self-confidence in ICT and their digital competences.

Parents' safety concerns are often one of the reasons for placing more restrictions on girls' use of the Internet. In restricting girls' access to the internet more than they do for boys, parents may undermine girls' feelings of competence, which illustrates the potentially long-lasting consequences of such intangible factors [3]. There are about five times more men than women among those who study computing at the tertiary level [5], which may be related to feelings of

incompetence (low self-efficacy) of girls and women. For example, in Portugal, the statistics of the General Directorate of Education and Science Statistics (DGEEC) [6] show that the number of graduates (20 to 29 years) in higher education in mathematics, science and technology by sex from 2002 to 2012 have significant differences (Fig. 1).

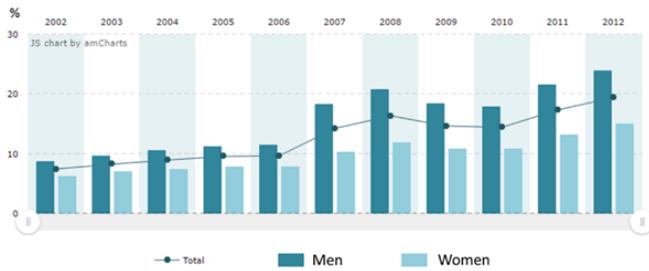


Figure 1 - Number of graduates in higher education in mathematics, science and technology per thousand young people (20 to 29 years) and by sex in Portugal (2002-2012)

Gender disparities in decisions to pursue further education and choice of career do not stem from innate differences in aptitude of girls and boys, but rather from different attitudes towards learning and aspirations for their future. For example, social contexts that influence how girls and boys choose to spend their leisure time, and gender stereotypes that affect how self-confident they are in their own abilities, are far more decisive in future career decisions [5].

In Portugal there have been some noteworthy projects that studied how children and youth use computers and the internet: E-Generation: Media Uses of Children and Youth in Portugal (2007) [7]; the multinational research network EU Kids Online (since 2006 with regular and updated reports) [8]; and Net Children Go Mobile (2014) [9]. All these projects present results by sex, which could support an analysis of gender and ICT, however this has never been a central line of work on these projects.

Gender and ICT is an important area of research identified in multiple international researches. The gender gap in ICT has concrete consequences restraining girls and women to achieve their full potential to contribute to the social and economic development of society and the quality of life of all of us. Considering the importance of this topic, our objective is to map the academic research on gender and ICT developed in Portugal, to characterize the publications on this topic, and to identify future research possibilities.

### III. METHODOLOGY

To search for academic research in Portugal related to gender and ICT, we explored the portal of the Scientific Open Access Repository of Portugal (RCAAP <https://www.rcaap.pt>) which collects, aggregates and indexes Open Access scientific contents from Portuguese institutional repositories. RCAAP portal is an aggregator (meta-repository) that collects the description (metadata) of documents deposited in the 97 institutional repositories in Portugal. It constitutes a single entry point for searching, discovery and recall of thousands of scientific and scholarly publications, namely journal articles, conference papers, thesis and dissertations, distributed by

Portuguese repositories. Although its name specifically mentions ‘open access’ the repository includes many documents that are not freely accessible, such as papers in journals, but their references and abstracts can also be included.

The RCAAP portal does not cover the entire Portuguese scientific production, given that some publications are not included in the institutional repositories, however it is a recognized and reliable source of information developed by FCCN ‘Fundação para a Computação Científica Nacional’ (Foundation for National Scientific Computing) in the context of the UMIC Knowledge Society Agency. We are aware that the results obtained from searching the RCAAP portal are not comprehensive of the entire Portuguese scientific production on gender and ICT, however the results can be considered representative of the academic research in Portugal considering the number of institutional repositories included.

Our search was conducted on April 2, 2016. We used the advanced search feature, and all possible combinations in the search fields: title and abstract, of the words: gender, sex, women, ICT and technologies (Fig. 2). We confined our search to the Portuguese repositories and did not include the Brazilian repository OASISbr also available on RCAAP. The words used in the search were both in Portuguese and English, considering that there is increasingly more Portuguese scientific production written in English.

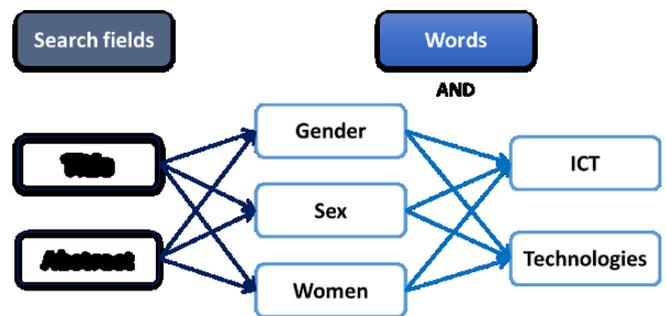


Figure 2 – Search fields and words

To further extend the scope of our research we analyzed the call for papers of three major conferences on ICT in education in Portugal: Challenges – International Conference on ICT in Education, organized by the Competence Centre for ICT of the Education Institute, University of Minho; International Symposium on Computers in Education (SIIE) organized by diverse institutions from Spain and Portugal, and TIC Educa - International Congress ICT and Education, organized by the Institute of Education, University of Lisbon.

In addition we aimed to explore the contents of Portuguese journals related to ICT in education, however there are not many Portuguese scientific journals specifically focused on ICT. It is possible to find papers on ICT in diverse journals on education topics, but we only identified one explicitly aimed at the dissemination of research and reflection on the use and integration of Information and Technologies Communication in Education and Training: Educação, Formação & Tecnologias EFT (Education, Training & Technologies) <http://eft.educom.pt>, produced by the EDUCOM - APTE [Portuguese Association of Educational Telematics] <http://www.educom.pt>.

## IV. RESULTS AND ANALYSIS

### A. RCAAP

After the search in the RCAAP portal we had 24 lists of publications, 12 using the search words in Portuguese and 12 in English. On these 24 lists of publications there were several papers that were identified in more than one list, for example, if in the title the paper has the words gender and ICT, most probably these words will also be found in the abstract. In the final count of unique publications there were 146 papers listed, however only 23 papers were related to the topic gender and ICT/Technologies. One of the reasons for such a significant reduction is that the words genre and gender in Portuguese are the same 'género'. For example, there were many papers on genre of movies that talked about technologies. Also many papers on health issues used the words women and technologies and were identified on the search.

Although we acknowledge that the RCAAP portal does not cover the entire scientific production in Portugal, given that not all authors update their academic production on their institutions repositories, it is significant that in 97 Portuguese institutional repositories with 307853 publications (at the time of our search in the portal) only 23 publications are about issues related with gender and ICT/Technologies. Master and PhD thesis are important contributions and opportunities to advance knowledge, and it is noteworthy that in 101770 Master thesis and 15454 PhD thesis registered on the RCAAP portal, there are only 11 (7 Master and 4 PhD) about gender and ICT/Technologies (Table 1). Furthermore, unlike conference or journal papers, all Master and PhD thesis are registered on the institutions repositories.

TABLE 1 – TYPE OF DOCUMENTS

Type of document	N
Master Thesis	7
Conference paper	5
PhD Thesis	4
Paper in international journal	3
Paper in national journal	3
Book chapter	1
<b>Total</b>	<b>23</b>

The earlier year of publication on the results of RCAAP search is 2005 and more recent years (2011-2015) have more publications (Table 2). This evolution is similar to international research publication, however in the late 1990's and early 2000's there has been a boom of publications on gender and ICT/technologies, mostly in Anglophone countries, that did not have a visible impact on Portuguese academic research at that time. In the early 2000's there were already international comprehensive literature reviews of research on this topic [10] [11] [12] [13].

TABLE 2 - YEAR OF PUBLICATION

Year of publication	2005-2010	2011-2015	Total
N	9	14	23

Some publications are coauthored and the authors are affiliated with different institutions, which is why the total number of institutions is higher than the number of publications. Universidade do Minho and Universidade de Aveiro stand out as the institutions where more research is produced on this topic (Table 3). It is important to note that the 3 out of the 5 papers of Universidade de Aveiro were co-authored by researchers from ESEV, IP VISEU.

TABLE 3 - AUTHORS' INSTITUTIONS

Authors' Institutions	N
Universidade do Minho	7
Universidade de Aveiro	5
ESEV, IP VISEU	3
FCH - Universidade Católica Portuguesa	2
ISCTE	2
Universidade da Beira Interior	2
ESEIG, IPP	1
ISEC	1
ISEG	1
Universidade Aberta	1
Universidade Portucalense	1
<b>Total</b>	<b>26</b>

Analyzing the content of the 23 papers, the research main topic of 4 papers is not the interrelations of gender and ICT/technologies, although they also explore this topic. We classified the type of subjects addressed by each one of the 23 papers (each paper may address more than 1 subject), and concluded that Education and Occupation/Jobs are the most frequent subject (Table 4). Alongside with education, occupations/jobs are one of the most relevant areas of the gender gap, and ICT/technologies are closely interrelated with both [14]. One might say that notwithstanding the limited scope of Portuguese research on this topic, it addresses key issues.

TABLE 4 – PUBLICATION SUBJECTS

Subject	N
Education	10
Occupations / Jobs	8
Equality Policies	4
Specific devices or programs	3
Digital practices and society	1

On the subject Education: 6 are on Higher Education, 3 on Elementary School, and 1 on Special Educational Needs. The specific device mentioned in 1 of the papers is mobile phone and 2 papers explore social networks. The other subjects do not subdivide in sub-subjects.

The 23 publications were authored by 31 different authors, since it is common that papers have more than one author. What is more interesting when we analyze the authors of the publications it that 4 out of the 31 authors are responsible for 11 papers, which means that almost half of the 23 publications identified in the RCAAP portal were published only by 4 authors. This information further supports the evidence of the “deserted landscape” of research in Portugal on gender and ICT/technologies.

### B. Conferences

We analyzed the two last call for papers of three major conferences on ICT in education in Portugal: Challenges – International Conference on ICT in Education, organized by the Competence Centre for ICT of the Education Institute, University of Minho; International Symposium on Computers in Education (SIIE) organized by diverse institutions from Spain and Portugal; and TIC Educa - International Congress ICT and Education, organized by the Institute of Education, University of Lisbon. The calls for papers analyzed were from the conferences: Challenges 2013, Challenges 2015, SIIE 2015, SIIE 2016, TIC Educa 2014 and TIC Educa 2016 (Table 5).

TABLE 5 – CONFERENCES’ WEBSITES

Conference	Websites with call for papers
Challenges 2013	<a href="https://www.nonio.uminho.pt/challenges2013">https://www.nonio.uminho.pt/challenges2013</a>
Challenges 2015	<a href="https://www.nonio.uminho.pt/challenges2015">https://www.nonio.uminho.pt/challenges2015</a>
SIIE 2015	<a href="http://siie15.ese.ips.pt/osiie.html">http://siie15.ese.ips.pt/osiie.html</a>
SIIE 2016	<a href="http://siie2016.adie.es">http://siie2016.adie.es</a>
TIC Educa 2014	<a href="http://ticeduca2014.ie.ul.pt">http://ticeduca2014.ie.ul.pt</a>
TIC Educa 2016	<a href="http://ticeduca2016.ie.ulisboa.pt">http://ticeduca2016.ie.ulisboa.pt</a>

The word ‘gender’ is never mentioned in the texts of all the 6 call for papers of the aforementioned conferences. We acknowledge that although the call for papers does not specifically mentions gender issues, participants may have presented communications on the topic. However, it is noteworthy that these conferences do not include this topic in the call for papers, although the importance of gender issues in ICT and technologies is highlighted by diverse worldwide researches and reports, as for example OECD reports,. The conference call for papers guide and frame the content of the submitted communications, and certainly influence the process of decision to accept or reject a publication, thus promoting or hindering certain topics.

### C. Journal EFT

Educação, Formação & Tecnologias EFT (Education, Training & Technologies) <http://eft.educom.pt> is published since 2008 and has 17 numbers published. The last number

available at the time of our search (April 2016) was Vol 8, No 1 (2015). We searched all the 17 numbers of the journal for the word ‘gender’ in the search fields: title, abstract and full text. Only 5 papers included the word ‘gender’:

- 1 paper is about Brazilian teachers and the authors are Brazilian researchers;
- 1 paper although including the word ‘gender’ in the full text of the paper does not analyze any specific gender issues;
- 1 paper was already identified in the search of the RCAAP portal;
- 2 are about gender and ICT/technologies.

After 8 years publishing on education, training and technologies it is significant that only 4 papers address the topic gender and ICT/technologies, of which only 3 are from Portuguese researchers [15] [16] [17],. This is another indicator of the lack of research in Portugal on this topic.

### V. RELEVANT INITIATIVES ON GENDER AND ICT IN PORTUGAL

Besides academic research produced in Portuguese Higher Education Institutions, there are some noteworthy projects on that brought significant contributes to the study of gender and ICT/technologies in Portugal. We will present 3 projects which have significantly contributed to disseminate knowledge on gender and ICT/technologies in Portugal: ‘CIAO! Women’, SACAUSEF, and the publication of education guides on gender and citizenship.

The research project ‘CIAO! Women’ (2005-2007) involved 5 partner countries: Italy, Portugal, Latvia, Bulgaria and Denmark and was carried out with the financial support from the Commission of the European Communities: DG Education and Training - Programme Socrates - Action Grundtvig. One of the 2 papers identified in the Educação, Formação & Tecnologias EFT journal [15] was the result of this project. ‘CIAO! Women’ addressed the specific lifelong learning needs of adult women in relation to Information and Communication Technology (ICT) and their perception of Information Technology, using a qualitative approach based on narrative interviews. On November 8, 2007, at the University of Évora it took place the final event of the project: ‘Ciao Women - International Conference Gender and Technology’ <http://www.minerva.uevora.pt/ciaowomen>. Besides the results of the project two of the plenary sessions were specifically on gender and ICT: Gender (in)Visibility and the Use of ICT in Education, by Maria João Duarte Silva, Professor and Researcher from ESE: School of Education, IPP, Porto, and EX.I.T.E.: girls and careers in science and technology, by Conceição Zagalo - Head of Communication & External Programmers from IBM. The combination of academic research and enterprise initiatives was an important contribution of this conference.

SACAUSEF - System of Evaluation, Certification and Support of Software for Education and Training - was an initiative of the General Directorate of Curriculum Innovation and Development of the Ministry of Education in partnership with the Institute for Quality Education and the Commission

for Equality and Women's Rights. The main objective of this initiative was to provide an evaluation system of software for education and training, and to collect and disseminate information about the quality of educational digital media in Portugal. This initiative started in 2004 and published 8 books that are available online (<https://itunes.apple.com/us/itunes-u/estudos-sacausef/id563247618?mt=10>). In the first book, published in 2005, the dimension of gender equality was clearly identified as one of the items of the evaluation system of software for education and training [18]. In the second book of SACAUSEF, published in 2006, there was a chapter on 'Equality, non-discrimination and the perception of the gender dimension: problems and perspectives in the field of Information and Communication Technologies in Education' [19]. The third book 'The gender dimension in educational multimedia products' [20], published in 2007, and the eighth book 'Gender and Digital Educational Resources' [21], published in 2011, were both specifically on gender and ICT. The SACAUSEF initiative was one of the most important contributions to disseminate scientific information on gender issues in ICT in education.

Another initiative in the area of education that addressed gender and ICT was the publication of education guides on gender and citizenship, organized by CIG – Commission for Citizenship and Gender Equality (<https://www.cig.gov.pt>). There are four guides, for pre-school [22], 1st cycle (1st to 4th grade) [23], 2nd cycle (5th to 6th grade) [24] and 3rd cycle (7th to 9th grade) [25]. However, only the Education guide for the 3rd cycle has a specific chapter on gender and ICT [26]. These guides provide theoretical framework on gender and citizenship, and practical activities that teachers can use in their classes. This could have been an opportunity to further disseminate knowledge on gender and ICT, given that these guides were used as support material of in-service teachers' training courses all over Portugal. ICT is pervasive in everyday life contexts of children, since pre-school, and it would be significant to include ICT in all cycles and not only on the 3rd cycle.

Although the above mentioned initiatives were noteworthy contributions to the study of gender and ICT/technologies interrelations, in particular SACAUSEF, one might wonder why they did not originate more research on this topic.

## VI. CONCLUSIONS

Research on gender and ICT/technologies in Portugal is very limited and mainly focused on subjects related with education and occupation/jobs. The relevance of education and occupation/jobs is in line with international research and reflect main areas of the gender gap in society [14]. However, notwithstanding some relevant initiatives in Portugal that produced significant and groundbreaking literature on gender and ICT/technologies, the academic production, namely Master and PhD thesis do not significantly address this topic. Conferences on ICT do not promote gender related issues, thus contributing to the "deserted landscape" of Portuguese research on gender and ICT.

One important conclusion is that Portuguese researchers should make their academic production more widely available,

sharing it on their institutions repositories. Even in the case when the publications are not open access it is possible to reference them and share the abstracts. This sharing practice would significantly improve the access to knowledge produced in Portugal increasing opportunities for research networks.

The characterization of the Portuguese research on gender and ICT/technologies in this paper, did not identify some of the most significant topics that are being studied in international academic production. As such, this paper also proposes possible future research topics to foster knowledge on gender and ICT/technologies in Portugal.

ICT/technologies are increasingly pervasive and embedded in everyday things and objects, constituting a relevant aspect of social identities. Furthermore ICT use continues to be a highly gendered area of life in all socio-economic and educational backgrounds, and a source of significant social inequality in enduring ways. Often research on the gender gap in ICT turn women into the 'problem', isolating their ICT usage from broader social factors which shape their social opportunities and social identities. Focusing on women ICT preferences and skills research can contribute to reinforce power inequalities, overlooking the more complex and substantive reasons why women do not choose to enter technological professional sectors [1]. Gender equality in ICT is not only about equal numbers of men and women, boys and girls, using technology, but it is also about using it purposefully, meaningfully and productively, in ways which enhance individual well-being as well as democracy [27]. Since education is a key area in promoting change in society, schools are powerful instruments of gender policy and workforce equity and it is of the outmost importance that they do not reproduce social inequities. Further measures and instruments of gender policy and workforce equity in society are required more widely. The emphasis should not be mainly on how schools and their ICT usage can contribute to bridge the ICT gender gap, but rather on trying to avoid ways of reproducing inequities in schools [1]. Moreover, it is also known that technology might be a driver to obtain more gender equity in society and, accordingly, ICT is "both a tool and a goal" [1].

ICT design strategies should acknowledge the diversity of 'real' people, using the gender concept as a continuum rather than a set of binary oppositions [28], avoiding the risk of exacerbating gender inequality by stereotyping women [29]. Instead of ghettoizing girls as a population that needs 'special help' in their relation to technology, we should encourage boys and girls to express aspects of self-identity that transcend stereotyped gender categories [30], broadening the range of available options in order to open up new space for a diverse range of experiences and identities for both girls and boys [31].

Research should explore the relationship between gender and ICT, based on the understanding that both gender and ICT are social constructions, focusing on how gender relations are materialized in technology and how gendered identities and discourses are produced simultaneously with technologies. In order to improve ICT products quality in terms of usability and usefulness for both female and male users, research projects could focus on identifying factors that produce gender inequalities in ICT uses. Research can contribute to explore the

interrelations of gender and technologies in an educational context acknowledging that young people's gendered identities have an impact on future educational and career patterns, particularly in relation to science and technology, improving the understanding of the co-production of gender and technologies, and advancing ways to promote gender equity.

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