

# {reprograma}: A Preliminary Case Study on Gender and Technology

Silvia Rodrigues Follador<sup>1</sup>  0000-0001-8703-0875

<sup>1</sup>Fundação Getúlio Vargas, Escola de Administração de Empresas de São Paulo, São Paulo, SP, Brasil.



ref

**Abstract:** Based on a preliminary case study, this paper seeks to examine a social impact initiative whose focus is in the training of women in the programming area. {reprograma} is a non-profit organization dedicated to reducing gender inequalities in the Brazilian technology market by offering free programming bootcamps to low-income unemployed women. The main objective is to demonstrate the extent to which this program allows its alumnae to develop a gender awareness and how or if this is reflected in their professional experiences. The hypothesis is that gender inequalities in the programming area can be overcome by initiatives such as this one which encourage not only the development of capacities for a qualified professional work, but also the opportunity to bring about changes in this labor market.

**Keywords:** Gender; Gender Gap; Programming; Women; Technology.

## {reprograma}: gênero e tecnologia em um estudo de caso preliminar

**Resumo:** A partir de um estudo de caso preliminar, neste artigo analisa-se uma iniciativa de impacto social cujo foco é a capacitação profissional de mulheres na área de programação. A {reprograma} é uma organização sem fins lucrativos que oferece cursos gratuitos a mulheres de baixa renda desempregadas. Discute-se em que medida tais atividades permitem o desenvolvimento de uma 'consciência de gênero' e como o tema se reflete na experiência profissional das participantes. O artigo parte da hipótese de que as desigualdades de gênero na área de programação podem ser superadas por meio de iniciativas como a {reprograma}, que incentivam não apenas o desenvolvimento de capacidades para uma atuação profissional qualificada, mas também a oportunidade de promover mudanças neste mercado de trabalho.

**Palavras-chave:** gênero; gap de gênero; programação; mulheres; tecnologia.

## Introduction

Why are there so few women in the technology sector? Year by year, new publications reveal the fundamental role women had in the development of information technology and knowledge applied to the area of programming (Marie HICKS, 2017). Yet little is heard of the names of Ada Lovelace (1815-1852), creator of the first machine-processed algorithm, and Grace Murray Hopper (1906-1992), responsible for creating Flow-Matic, which served as the basis for one of the most popular programming languages in the world, Common Business Oriented Language (COBOL).

When the first computers began to be used it seemed clear that this would be an area of exclusively female activity, since it was up to women to 'compute', that is, to make calculations (Steven LUBAR, 1998). Juliana Schwartz *et al.* (2006) point out that the language and repertoire employed in scientific methodology have always tended to devalue characteristics considered as feminine, such as subjectivity, cooperation and empathy. However, as Clevi Rapkiewicz (1998, p. 215) demonstrates, one of the possible explanations for the effacement of female participation in the history of computer science refers to the fact that most of the contributions made by women have been in software development and, perhaps, "because this story is mostly told based on the evolution of hardware and its different generations".

After World War II, the changes brought about by the digital revolution were accompanied by a gradual disappearance of women in the field of technology and, in particular, in the field of programming (HICKS, 2017). Notwithstanding the rights and the breakthroughs gained by the work of activists and the various feminist movements, the common sense that persisted throughout the 20th century, and still nowadays, is that men and women had distinct and 'innate' vocations.

Based on a preliminary case study on gender and technology, this article seeks to respond to the restlessness that gave rise to it. Its object is the social startup {reprograma}, created in 2015, in the city of São Paulo, Brazil. {reprograma} is dedicated to teaching programming to low-income and/or unemployed women, in order to reduce the gender gap in the Brazilian technology market. Although it is the fastest growing sector in the world, there is a lack of trained professionals to fill the vacancies offered by the market. In 2017, the United Nations issued a global wake-up call warning that women are out of the main jobs generated by the digital revolution. In Brazil, data from the Census of Higher Education (BRAZIL, 2019) reveal that the female presence in science and technology courses is still extremely low. As a result, Brazilian women, as well as Latin American women, are under-represented in the programming area (Guillermina YANSEN; Mariano ZUCKERFELD, 2014; Peter MCKENNA, 2002).

From this standpoint, the article can be framed in the field of Information and Communication Technologies for Development (ICT4D), contributing to a theme still underexplored by the literature. {reprograma} presents an excellent opportunity to reassess the concept of gender in the ICT4D field and the capabilities approach (Amartya SEN, 1999) precisely because both are key elements in the institutional architecture and the projects developed by the organization.

Paschoal Russo and Reinaldo Guerreiro's (2017) research served as inspiration for addressing the following questions: How is the concept of gender used in the teaching of programming? Does {reprograma}'s institutional mission and the bootcamps offered promote a gendered appropriation of technologies and artifacts? How do participants observe the development of gender awareness? Does this 'awareness' relate to an intersectional and attentive perspective on the problems of racism and processes of exclusion? After taking part in the bootcamps, do women perceive a change in their professional performance?

## Objectives

To demonstrate to what extent the activities offered by {reprograma} enable participants to develop a 'gender consciousness' and how the topic is reflected in their professional experiences. As complementary objectives, it is intended to analyze the perception and trajectory of women participants of {reprograma} courses and the impact of a gendered education on their professional experience in the technology market.

## Justification

In the human sciences, and especially in the social sciences, a relevant research object is considered to be based on the identification of a 'theoretical problem' corresponding to a 'sociological problem'. In other words, it is a question of identifying in the literature an unexplored question that allows an original contribution. At the same time, it refers to a social phenomenon that has not yet been sufficiently investigated and known. In this way, gender refers here both as a 'problem' (when considering the gender gap responsible for wage inequality and disparate job opportunities between men and women) as well as to a set of ideas, demands and initiatives aimed at female empowerment.

From a preliminary research in the databases of academic journals, it was verified that gender, inequalities and the relationships marked by this category, have not yet been properly investigated with field research or case studies. This would allow a better comprehension of the entry and professional experience of women in the technology labor market. Moreover, there is a lack of studies aimed at understanding what has been termed "intersectionality" (Kimberlé CRENSHAW, 2002, p. 177; Carla AKOTIRENE, 2018, p. 87). That is, the convergence of race, class, gender, and sexuality in societies characterized by problems stemming from racism and other forms of violence and discrimination, which impact on the employability, income, and professional performance of women, especially black, indigenous, and transgender women.

The research, *The Network Skills in Latin America* (Evelyn PINEDA; Carlos GONZALEZ, 2016) commissioned by Cisco Systems, revealed that by 2019, it was expected to open around 500,000 jobs in the area of information technology and telecommunications in Latin America. However, despite its political and economic role in the region, Brazil is precisely the country with the greatest shortage of skilled labor, with a deficit of approximately 200 thousand professionals. In 2015, the National Household Sample Survey (PNAD/IBGE, 2015) identified that women represented only 20% of the contingent of workers in the area. A year earlier, the survey "Gender Statistics" (IBGE, 2014) showed that the percentage of white women with complete higher education was twice as high

as that of black women. In short, difficulties in access to education, violence, and racial/ethnic inequalities are reflected in the labor market.

Based on this situation, the Rio de Janeiro-based organization Olabi produced the report PretaLab (2018), which depicts the need to include black and indigenous women in the areas of innovation and technology. The data were obtained from a survey conducted with 570 women, aged 17 to 67, and reveal that the lack of encouragement, initiatives, and specific policies compromise the possibility that a more expressive number of women will become interested in these areas. Diagnosis that highlights similarities between the Brazilian situation and the international scenario (Pamela RANGEL, 2018; Susan MICHIE; Debra NELSON, 2006).

{reprograma} was created as a response to this conjuncture. According to Mariel Reyes Milk, founder and director of the organization, "{reprograma} aims to raise awareness, empower and educate Brazilian women in programming", in addition to showing that "this is a possible and very prosperous market also for them, who can – and should – contribute to the development of new technologies" (RME, 08/31/2016). The startup's goal "is to change the mindset of students, reprogram the way they perceive themselves as contributors to the IT space," which is promoted through "mentoring sessions with women leaders from companies such as IBM, Thought Works, and Nubank, who share with the students their experiences as women in technology" (Dimitria COUTINHO, 2018).

Carla de Bona, cofounder and head of education at {reprograma}, says that, since the beginning of her career, she always found herself in the condition of being the only woman in technology settings and events, such as World Skills. After completing her undergraduate studies and master's degree in semiotic communication, she started teaching and says she was surprised that the classes remained mostly male. In her view, "the more you go up the technology ladder, the more you are able to see the gender gap" (personal communication, 04/20/2019). It was based on this type of experience that she felt compelled to work as a volunteer in projects such as the "Minas Programam" and to create, in partnership with other women professionals, the pilot project that gave rise to {reprograma}.

## Methodology and data collection

The article consists of a reflection about the data obtained in a research that is currently under development. The option for a "case study" is justified by the fact that {reprograma} represents an initiative that articulates the themes of gender and technology. Furthermore, it favors the development of an approach that approximates the theoretical and conceptual analysis of these themes in light of an empirical case. The selection of {reprograma} as the object of this case study also derives from the pioneering nature of the initiative, which is the first and only one in Brazil to offer professional training courses (on-site and distance learning) aimed exclusively at women, in a continuous manner and in different areas of programming: front-end developers (people who design and implement what you see in your web browser) and back-end (those responsible for the programming that operates behind the scenes).

In the first stage of the research, a literature review was conducted in journals recognized for their high "impact factor" and that are listed on the ICT4D Journal Ranking Table portal. The timeframe of the review focused on the last ten years (2009-2019), although references considered relevant by the specialized literature, whose publication dates are prior to this period, were included.

In the database search, the following search words were used in English and in Portuguese: gender; gender studies; gender gap; gender related issues; women's empowerment; career development; information technology; communication technologies; information and communication technology; ICT4D; ICT; ICT for development; ICT4D field research; programming; employability; Latin America; Brazil. At first, the search words were used only in the abstracts field of the databases of the periodicals consulted, simultaneously inserting all the search words with the "and/or" tool activated in the advanced search services. For example: gender and/or gender studies and/or gender gap. After this first search, a combined search was made with the abstracts and keywords field.

In the second stage of the research, a survey was carried out by sharing, via e-mail, an online questionnaire, which was answered by 118 women who participate – or have participated – in the activities and courses offered by {reprograma}. The questionnaires were composed of 25 questions, of which 24 provided multiple choice answers and 1 open-ended. The nominal identification of the participants was not required, so the anonymity would guarantee the expression of opinions in a spontaneous way and without eventual embarrassment. The questionnaire contained a comments section, where the respondents shared criticisms, testimonials, and suggestions about policies to encourage the entry of women into the technology field, as well as to continue the research. In general, it sought to trace the socioeconomic and ethnic/racial profile (self-declared) of the women and to investigate their perceptions on the themes of gender and technology, with a focus on the experience of participating in {reprograma} courses and on their professional trajectories. For the

organization and qualitative analysis of the open answers (discursive) the NVivo software was used, as a support tool to cross-reference data and to identify the most recurrent words and themes.

## Literature review: why does gender matter?

The concept of gender has been used to emphasize the cultural dimension in which the differences between men and women are inserted. These differences can translate into asymmetries which, in turn, reveal inequalities or forms of discrimination that can be justified, legitimized or made consensual in a given society. This process of "naturalization" of the differences and social roles of men and women is related to the understanding that there would be certain socially accepted conduct and prerogatives considered as valid, according to a distinction based on the sex of a given individual. In the early twentieth century, two publications that became classics (Marcel MAUSS, 1936; Margareth MEAD, 1935) questioned the Western understanding of the differences between men and women by demonstrating, based on research in indigenous societies, that corporality and behavior patterns do not depend on a supposed "human nature" but on the ways in which individuals are socialized within their cultures and societies. In short, instead of nature, culture. Instead of biological determinism, the historical and social construction of human differences.

However, a common sense remains about a supposed natural difference between men and women, which would justify the existence of different vocations, social roles, remuneration, conduct, clothing, etc. In contrast, the beginning of the twentieth century was marked by a wave of women's movements, mostly white, mobilized in the struggles for the right to vote, education, divorce and private property. In the mid-twentieth century, feminism ceased to be just a political movement and gradually became an academic and literary movement with the publication of books such as the classic *The Feminine Mystique* (1963) by writer and activist Betty Friedan (1971), and *Le deuxième sexe* by Simone de Beauvoir (1967). The re-reading of this history has restored to black women activists and intellectuals, such as Sojourner Truth (1797-1883), a fundamental and indispensable role in the critique of the essentialization of gender. This opened the way for the development of works by other black women thinkers, including in the Brazilian context, such as Sueli Carneiro (2003) and Lélia Gonzalez (2011).

In the wake of these developments, philosopher Judith Butler unravels the conventional distinction between sex and gender by suggesting that the bodies of all subjects are 'gendered' from the first moment of their existence. Gender would be a particular kind of process, a specific mode of performativity: "It is the repeated stylization of the body, a set of repeated acts within a highly rigid regulatory structure, which crystallizes over time to produce the appearance of a substance, a natural class of being" (BUTLER, 2018, p. 191).

In its performative sense (BUTLER, 1996), gender is understood as a process of "becoming," of coming to be, which is permeated by power relations and by efforts at autonomy and emancipation of individuals and social groups. In other words, gender depends on acts that bring into existence what it names: "In this case, a 'masculine' man or a 'feminine' woman. Gender identities are constructed and constituted by language, which means that there is no gender identity that precedes language" (Sarah SALIH, 2002, p. 46). The "gender consciousness" derives, in turn, from the perception that each individual has about her or his condition and social position as a woman or a man. This awareness implies the recognition of the inequalities present in each society (Ineke BUSKENS; Natasha PRIMO, 2010). As in the Brazilian case, where the realities experienced by women result from hierarchical and racially determined gender relations (Salette SILVA, 2015, p. 32; Susana GAMBA; Tania DIZ, 2007). The critique of heteronormativity does not imply, however, the idea of a 'moral nihilism'. The questioning of social norms is not aimed at their destruction, but to reflect on which norms are appropriate to the present time and the subjects who live in it.

Gender is also an analytical category that can connect the experiences of Latin American countries (Ernesto GANTMAN *et al.*, 2015; Caroline STRATTON; Diane BAILEY, 2015; Arturo ESCOBAR, 2010; Chrisanthi AVGEROU, 2008) to those from the 'Global North', as data on the gender gap reveal that this is a problem of transnational reach (Helen ODAME, 2005; Nisreen AMEEN; Robert WILLIS, 2018; Amy ANTONIO; David TUFFLEY, 2014; Victoria ENGLUND, 2019).

However, this 'connection' is not restricted to gender issues, since, from social movements in the 1970s and 80s, Black American feminists demonstrated how perspectives of race, class, gender, and sexuality, in what would come to be known as intersectionality<sup>1</sup>, interact as intersecting systems of power and oppression in the struggle for freedom and social justice. Aspects that are also experienced by women from the 'Global South' and described in Brazil by the pioneering work of Lélia Gonzalez. As some of these activists made their way into academic life, they brought with

---

<sup>1</sup> For the purposes of this article, which is preliminary and diagnostic in nature, the discussion about intersectionality will not be further developed here. At this stage of the doctoral research, it can be indicated that intersectionality appears as a concern of the women participants of {reprograma}, requiring a greater ethnographic investment for the apprehension of the meanings and uses that they make of this concept. For readers interested in a more comprehensive overview of the history and uses of the concept of intersectionality, it is recommended the reading of the article "Se perdeu na tradução? Feminismo negro, interseccionalidade e política emancipatória" by Patrícia Hill Collins (2017).

them their ideas and political activism to race, class and gender studies. It was with the publication of the article *Mapping the Margins: Intersectionality, Identity Politics, and Violence against Women of Color* by Kimberé Crenshaw (1991) that the term intersectionality gained ground and recognition in the academic field. These efforts show that by observing and recognizing the articulation between different forms of oppression, the struggle for freedom is not something abstract, but rather something that gains shape from the way in which the struggle for social justice incorporates the multiple systems of oppressions present in our societies (Patricia Hill COLLINS, 2017; Carla AKOTIRENE, 2018; Caroline TOLBERT *et al.*, 2007).

The assessment that women are excluded from the digital revolution requires the formulation of practices and projects of social impact, capable of transforming not only the lives of individuals, but also environments, organizations, everyday and work relationships. This understanding is supported, for example, in the "2030 Agenda for Sustainable Development," adopted by the United Nations General Assembly in 2015 (UN, 2015), which states precisely the 'sense of urgency' involved in the problem of gender inequality. At first glance, it may seem contradictory that "one of the main changes in the relations between gender and work in the new economy [has been] the appraisal of characteristics associated with the feminine" (Barbara CASTRO, 2010, p. 383), such as flexibility, sociability, and promptness. It happens that the "feminization of skills" does not necessarily imply that women will be encouraged to enter the technology labor market, because the ideal worker is still a man. To understand how this phenomenon occurs, Elisabeth Kelan (2009, p. 144) argues that it is necessary to demonstrate how skills are performed and negotiated, because, "the self-entrepreneurial knowledge worker is constructed as gender neutral but the lived experience of knowledge workers is gendered".

However, the figure of an entrepreneurial, experienced and neutral worker reveals yet another dimension of the relations between gender and technology. As Donna Haraway (1995) has well stated, all knowledge production is situated and, by recognizing this partial view, it is possible to work for an objective science. In this way, the search for knowledge becomes a political practice. The author argues that the notion of objectivity, based on impartiality, on the production of universal knowledge, has been employed to be an instrument of domination: "Feminist objectivity is about limited location and situated knowledge, not about transcendence and splitting of subject and object. It allows us to become answerable for what we learn how to see" (HARAWAY, 1995, p. 21).

## **Gender and the Information and Communication Technologies**

Odame (2005) traces the origin of the Information and Communication Technologies for Development field to the 1970s, when economies and societies were revolutionized by new theories about modes of production, concurrently with the emergence of the UNESCO agenda for global collaboration in dissemination of information and knowledge. At that time, the concept of digital divide appeared as a way of describing the asymmetry of relations between the Northern and Southern hemispheres in terms of telecommunications structures and access to Information and Communication Technologies (ICTs).

References to gender and themes associated with it appears in three fields. The first consisted of initiatives in the academic field based on the interrelationship between gender, science and technology, through which training courses were offered in scientific and professional education for women (youth and adults), thus allowing the emergence of the first group lobbying for women in ICT. The second was made up of multilateral organizations such as UNESCO and the World Bank. The third referred to the social movements of women and feminists in various countries.

Geoff Walsham (2017) proposes an alternative time frame: 1) 'Early Beginnings', from 1980 to 1990, with emphasis on the traditional themes of information systems applied to developing countries; 2) 'Expanding Horizons', from 1990 to 2000, moment of diversification of themes, methods, theories and concepts, such as gender; and 3) 'Proliferation', from 2000 to the present day, when the literature and research on ICT4D has been consolidated, concomitantly with the emergence of new technologies and interdisciplinarity propositions, as well as criticism regarding the nature of social and economic development.

In this article, dialogue is held with the ICT4D literature related to the "Expansion" and "Proliferation" periods, drawing primarily on Sen's (1999) "capabilities approach". Although the author pays little attention to the topic of technology, several researchers have recognized the potential of the capabilities approach for analyzing the impact of Information and Communication Technologies for Development (Mmabatho TSHIVHASE *et al.*, 2016; Matthew SMITH *et al.*, 2011; Yingqin ZHENG, 2009). It is worth noting that the use of Sen's (1999) approach must be accompanied by the understanding that technology alone will not solve basic gender equity issues related to capabilities and opportunities (Reena PATEL; Mary PARMENTIER, 2005; Kentaro TOYAMA, 2015).

Adriana Quinaud (2018) further highlights that the researchers who develop studies on new technologies and social practices found in the concept of "affordance" an analytical alternative to explain why people using the same technology can engage in similar or different communication

practices and work relationships. In this approach, "resources are not exclusively properties of people or artifacts – they are constituted in the relations between people and the materiality of things they come into contact" (QUINAUD, 2018, p. 93). Therefore, "the focus is not on how ICT artifacts can be used, but on the actors' goals and capabilities related to potential ICT artifact use." (Ann MAJCHRZAK *et al.*, 2016, p. 272).

As Karen Dale (2005, p. 652) suggests, "materiality is imbued with culture, language, imagination, memory; it cannot be reduced to mere object or objectivity". A similar argument is made by sociologist Manuel Castells (2001, p. 155), when he highlights that "the type of technology that develops and spreads in a given society decisively shapes its material structure". And, one could add: it also has repercussions on its social structure. Wanda Orlikowski's (2007) proposal on the recursive entanglement between the material and social domains, combined with Sen's (1999) capabilities approach, allows for a deeper understanding of the relationships between gender and technology and their cultural, economic, and socio-material implications. As examples, see below some studies developed in dialogue with this literature.

Ameen and Willis (2018) investigate the gender gap in Iraq from the analysis of the different ways in which men and women use smartphones. The research was carried out with the application of questionnaires among women aged 18 to 29 years. Cultural factors were more preponderant than the economic factor to understand the gender gap. Iraqi women's access to smartphones is seen as an important mechanism of female empowerment by allowing them greater autonomy in their professional interactions and relationships. The research showed that Iraqi women prefer technologically mediated relationships to those that take place in direct contact with people outside the family environment. Considering that the female population corresponds to around half of the national population, their entry into the telecommunications market as customers and potential professionals, would positively affect the national economic development.

Antonio and Tuffley (2014) present a review of the literature focused on the studying of the relationships between women and technologies in developing countries. The authors point out that women living in this context have a much lower participation in the use and development of technologies than men, which can be explained by the fact that in these societies traditional considerations about the appropriate social roles for women persist. However, as the female portion of the population gains access to information technologies such as the Internet, the benefits are quickly noted in their personal, family, and community relationships.

Indian economist Ashima Goyal (2011) explores the concept of household production technology by demonstrating the potential of such technologies for increasing the equity and efficiency of women's participation in the labor market. According to Goyal, South Asia, the Middle East and North Africa have the lowest rates of female participation in the formal labor market, which does not mean that women do not play a fundamental role in maintaining their families and homes, through different forms of occupation and work. The modernization that has reconfigured labor relations and production processes on a global level has not been accompanied by a significant improvement in female participation in technology.

Sen (1999) had already shown that the disrespect for women, their rights, and well-being impacts the ability to earn income, jobs outside the domestic environment, access to and recognition of property rights, and literacy opportunities. Sen emphasized the importance of considering, in development studies, the freedom individuals have to achieve well-being in terms of their personal capabilities. That is, of their actual opportunities "to do and be" what they plan and value for themselves. This "capabilities approach" has been widely used in the ICT4D literature and in the conceptualization of initiatives such as {reprograma}.

Patel and Parmentier (2005), in a research on women engineers in India, show that despite government efforts and policies dedicated to combating the gender gap in technology, the underrepresentation of women in the Indian labor market persists. For this reason, and in accordance to Toyama (2015), the authors warn that technology alone will not solve basic gender equity issues related to capabilities and opportunities. Tolbert *et al.* (2007) emphasize an additional aspect that refers to the need to consider the intersectional dimension of the gender gap in the technology sector, since African American and Hispanic women suffer the consequences of being discriminated in addition to having their personal and professional trajectories marked by poverty and the lack of or inadequate education.

In an article entitled "Why don't women program?", Yansen and Zukerfeld (2014) develop their research from an issue that directly concerns this research and can be summarized as follows: why, in an activity that seems similar to those in which women have gained space and recognition, we do not find an analogous process of incorporation and female action? The authors propose an analysis based on the socialization process, from childhood to adulthood, and how the trajectory of women is impacted by the inequality of opportunities and incentives for participation in the technology sector in the city of Buenos Aires, Argentina. Among the possible measures to reduce the gender gap, the authors point out the need for schools and educational institutions to encourage girls and women to participate in courses and events focused on technology development, the

creation of research grants and assistance to women enrolled in university courses and projects, and the establishment of incentives and possible punishments for companies that do not strive to hire women in job opportunities in this area.

## Preliminary case study

### Gender and Technology in the {reprograma}

Since 2015, the founding year of {reprograma}, 7 courses have been held, with a completion rate of 96% and the training of 179 women. The speed hiring partnership with companies in the technology area made it possible to hire 80% of the class of front-end developers (graphic environment and website interface, in HTML, CSS and JavaScript languages).

Regarding the profile of the 118 women who answered the online questionnaire, it is worth noting that 95.8% of them are between 16 and 39 years old. Most of them are single and have a monthly income between R\$ 999.00 and R\$ 4,990.00. As for the ethnic-racial profile, 68.6% declare themselves as white, a percentage that was higher at the beginning of the program's activities (Carla de Bona, personal communication, 04/21/2019). For this reason, measures have been adopted to encourage the participation of black women both in the selection processes of new students and in the training of the teaching staff. These measures have proved successful, since 28.8% of the respondents declare they are black. However, some of them defend the need for more effective measures, so that the Brazilian ethno-racial diversity is reflected in the composition of the classes.

*A space with white women, cis<sup>2</sup>, with high school diploma, complete higher education, pre-university courses, private schools and a good family is NOT diversity. It is pure elitism, wrapped up as "diversity". There is no RESISTANCE in privileged women, who had all the necessary conditions to occupy the space they are in. Diversity must be in the color and social class of these women (Respondent N°. 116, question N°. 25. Highlights in the original).*

What is referred to as intersectionality (CRENSHAW, 2002; AKOTIRENE, 2018), the articulation between the social markers of race, class, gender, and sexuality, as well as how these oppressions are imbricated, appears frequently in the answers. Thus, the challenge of promoting a project for women that is, at the same time, sensitive and effective in addressing the issue of ethno-racial inequalities, in a country where race is a determining category in everyday relations, is evidenced. One of the statements summarizes the issue:

*We need to improve training for women and consider diverse racial and gender issues. Invest in knowledge training for the market, with lectures, contracts and agreements to maintain healthy work environments for vulnerable groups (Respondent N°. 28, question N°. 25).*

Nevertheless, as the PretaLab report (2018) points out, in the case of black women, the scenario is rendered invisible in a way that there is a lack of accurate data to measure their participation. Which also imposes limits for a more detailed analysis of the profile of the {reprograma} participants, concerning the reality of black women in Brazil.

Regarding education, the data show that 96.7% of the respondents are attending or have already completed higher education, in the most varied areas of knowledge. Despite a slight concentration in the areas of communication (13.6%) and computer science (13.6%), it is worth noting that the humanities (9.3%) appear ahead of courses that are traditionally closer to the programming area, such as engineering (6.8%) and information sciences (1.7%). The pioneering and transforming character of {reprograma} becomes evident in the 32.2% of the respondents who had never taken a computer course. In addition, 75.4% of them say that prior to {reprograma} they had never worked in the area yet 97.5% intend to continue or start technology careers after taking part in the bootcamps.

Regarding the gender gap and inequalities between men and women in the labor market, almost all respondents reported that they had prior knowledge of these topics. According to Carla de Bona, cofounder and head of education, {reprograma}'s courses do not have a specific content on gender, but participants are offered an introductory class on "women in technology" (personal communication, 04/20/2019). Teachers are oriented to encourage 'sorority' and to demonstrate that individuals tend to replicate what they experience in society:

*No matter how much we want to create an atmosphere of sorority among the students, deep down, we repeat things we've already experienced. We always have to take care so that the groups of students have [a feeling of] sorority among themselves and with the teachers, since many of them are former students. Not encouraging a competitive environment. Patriarchy is very efficient. It makes us repeat behaviors, while we could build a new experience. This is a constant*

---

<sup>2</sup> Woman cis (who has the sex of birth connected with the female gender). In the online survey, 98.3% of the participants declared themselves as "cis women" and 1.7% as "Non-binary" (who is not exclusively male or female; who refuses to necessarily and/or solely enter into gender binary or let this restrict them).

*effort to remind them that that space is not individual, but collective* (Carla de Bona, personal communication, 20/04/2019).

In testimonials featured in the press and on {reprograma}'s website, the participants say that this differentiated education in the area of programming allowed them not only to obtain professional training, but also to understand the importance of female protagonism. They point out that the psychological support, the 'sorority' and the mentoring from professional women were fundamental for them to feel encouraged to continue in the area, as well as for them to contribute to the creation of female-friendly work environments and products. The statement below illustrates a former student's perspective on the topic:

*It gets tiresome this thing of having to prove yourself all the time. Proving that you deserve to be there. I think if there were more women, it wouldn't be so bad. It's better to be able to arrive at one place, together. And {reprograma} does that. It shows that you don't have to compete with other women. That you can go alone, but that it will be very hard and tiring. That the best thing is to arrive together. And that we don't have to compete with each other. That's what sorority is. For me, it's the greatest teaching* (Respondent N°. 50, question N°. 25).

In general, gender appears in the answers as a diagnostic category of inequalities that are reflected in daily life, although it is also described as an open-ended process, in which women improve their capacities and discover new opportunities for professional performance. Many of them challenge the common sense that differentiates men and women based on supposedly natural characteristics. Others point to the "performative" dimension of gender, in a sense similar to that proposed by Judith Butler (1996; 2007), highlighting the consequences of cultural and discursive practices in the lives of men and women.

*I believe that it should be encouraged from childhood, at least in schools, showing all the possibilities of the technology market and that it is not as difficult as it may seem. [...] Promote within schools, universities and organizations events that show to men and women themselves how machismo is impregnated and needs to be deconstructed, urgently and on a large scale* (Respondent N°. 10, question N°. 25).

*It is important not to reproduce the distinction between girls and boys, even in childhood; to encourage girls to interact with the same things as boys, which consequently will broaden the vision of these girls in their future professional choice. And with regard to women, today, expand the opportunities for technological training* (Respondent N°. 42, question N°. 25).

*The inclusion of women through the dissemination of the experiences of other women. We cannot be what we cannot see. It is necessary to bring in the vision that women can be part of any space, and this is independent of gender, through the experience of other women, by building a community where they feel comfortable to mirror themselves in one another* (Respondent N°. 87, question N°. 25).

It is revealing the fact that 41.5% of the respondents did not know professional women in the technology market before joining {reprograma}. For 65.3%, the main reason for the low participation of women in the sector is machismo and gender prejudice, imbricated, in turn, with the respondents' belonging to different social classes and socioeconomic profiles - which can be seen, especially, in the statements of respondents who declare themselves black. Initiatives such as {reprograma} are seen as a "way to fight back" and to empower women:

*Honestly, we women must continue to fight to occupy these spaces. In a capitalist, macho and patriarchal society, like the one we live in, attitudes like that of {reprograma}, of encouraging women in the area, of helping and teaching, are a form of struggle and I will always be grateful for this project* (Respondent N°. 7, question N°. 25).

*[...] By reducing gender inequality, I see this as a positive consequence of the social inequality reduction as a whole* (Respondent N°. 8, question N°. 25).

*Initiatives like {reprograma}, PrograMaria, Laboratoria etc. play a very important role, both in getting women into jobs and keeping them there* (creating a network of help of immeasurable value) (Respondent N°. 11, question N°. 25).

*[...] Our retrograde, macho culture has "excluded" women's choice of technology, and now it's time to return!* (Respondent N°. 83, question N°. 25).

One of the participants (Respondent N°. 2, question N°. 25) pointed out the need to "promote actions in public and private schools concerning women in technology" and that the training courses should pay special attention to the inclusion of women who are mothers. Another participant said the same thing: *We have to train and support our girls. Show that they can be where they want to be and, when in a job position in a company, do our part to fight this inequality* (Respondent N°. 3, question N°. 25).



According to Buskens and Primo (2010, p. 33), "gender awareness speaks to the commitment to become aware of gendered thinking patterns, their accompanying customs and behaviours and the effects these have on women, men and their lived realities and their environments". A considerable part of the women who answered the survey demonstrate precisely this understanding, by indicating the need to re-educate men and women and to promote a change of mindset (Respondent N°. 114, question N°. 25).

*There are two fronts: the first is the (re)education of men and women about equality issues; and (re)teaching women about our place in the field of technology, which has been taken away from us over the years by the macho stance of society. The second is to encourage and create support networks that encourage women in the area of technology and that help them to occupy spaces in the labor market (Respondent N°. 12, question N°. 25).*

*In the short term, incentive programs in the area of technology and courses aimed at women starting from school, so that they become interested and understand that this is a possible path, from an early age. Showing the importance of inclusion to companies, with real inclusive policies that are not just a façade, and with job openings aimed at this. Training programs and anti-macho policies that involve the professional teams as a whole (because there is no point in hiring women only to have them face a horrible work environment afterwards) (Respondent N°. 34, question N°. 25).*

When asked about their evaluation of a project made by and for women, practically all (99.2%) declare it is "very important". When they evaluate their capacity to work professionally after the conclusion of the courses, 55.1% affirm they feel "prepared" and a percentage of 27.1% state they feel "very prepared".

Considering the bootcamps taken by the respondents, 64.4% of them participated in "front-end" courses, 18.6% in "back-end" courses, 10.2% in distance learning courses and 10.2% in "full-stack" courses. This data is very revealing and confirms the trend identified by the American researcher Miriam Posner, of the Department of Information Studies at the University of California. Posner warns that "conventional wisdom says that the key to reducing gendered inequality in tech is giving women the skills they need to enter particular roles. But in practice, when more women enter a role, its value seems to go down more" (POSNER, 2017). This is because the subdivision of areas of professional practice in the field of programming tends to reflect hierarchies and gender inequalities:

But here's the problem: the technology industry enforces a distinct gender hierarchy between front-end and back-end development. Women are typecast as front-end developers, while men work on the back end – where they generally earn significantly more money than their front-end counterparts (POSNER, 2017).

One of the participants of the online survey demonstrated her discomfort with this situation. In her words, it is necessary to *invest in other fronts, such as the training and awareness of women from school, [...] and, for God's sake, help women to enter other IT careers, because just staying on the front-end is not possible* (sic) (Respondent No. 103, question No. 25). However, just as in the case of black women, mentioned above, there is a lack of data on the average remuneration of technology professionals in Brazil in order to draw up a comparative analysis in relation to the Euro-American context, assessed by Posner (2017).

In the discursive answers, it is noteworthy that the words "training," "incentive," "opportunities," and "gender" appear in a much higher proportion than the mentions of "machismo" and "prejudice". The frequency of these words must be considered in relation to the themes addressed in the answers and that reveal the participants' understanding that the inclusion of women in the technology sector refers mainly to training and the creation of opportunities. This is what can be inferred from most of the accounts:

*We need more initiatives such as {reprograma}, which technically train women and insert them in the technology areas, in order to reduce this [gender] gap (Respondent N°. 15, question N°. 25).*

*Continue with the initiatives that enable us to enter this area. With statistical data, insist and reinforce with the companies and the population about the prejudices against women in the area of technology. And point out the benefits of integrating us into this market (Respondent N°. 36, question N°. 25).*

*Demystify the idea that women have learning difficulties and show the transformative power of technology. But mainly, increase job opportunities and gender-equitable environments, from the selection of vacancies (Respondent N°. 59, question N°. 25).*

As stated earlier, Amartya Sen's (1999) capabilities approach allows us to analyze individuals' freedom in terms of the capabilities and opportunities they have to achieve their life goals. Although the theme of technology is not central in the author's work, its conceptualization has been used

in researches that seek to assess the impact of Information and Communication Technologies for Development (TSHIVHASE *et al.*, 2016; SMITH *et al.*, 2011; ZHENG, 2009).

In the specific case of countries like Brazil, it is important not to lose sight of the fact that technology will not solve all issues related to gender inequalities (PATEL; PARMENTIER, 2005; TOYAMA, 2015; ZHENG, 2009), since it is necessary to consider the importance of other variables and problems, such as those evidenced by the concept of intersectionality.

## Final Considerations

This article aimed to present some considerations about the relationship between gender and technology, based on the preliminary case study of a social impact startup directed to the professional training of women in the area of programming. Theoretical and empirical bases were presented that allow to affirm that the inequalities that mark the gender relations in the technology sector can be better understood with the approximation between the studies of Information and Communication Technologies and those originated in the Human Sciences, such as the critical studies of science, technology and gender. In this sense, one of the most successful interdisciplinary approaches has been that of "sociomateriality," with emphasis on the works of Orlikowski (2007), for reflecting on the entanglement between the social and the material.

The preliminary data show that the respondents are clear about the importance of a conjunction of efforts to reduce gender inequalities. They perceive and affirm that the transformations they desire are not limited to professional training and obtaining jobs in the technology sector. To this end, they identify the participation of civil society, government institutions, and private initiative as key factors for a radical and profound transformation of the relations between men and women in Brazil and in the world. Moreover, one can notice a concern about the importance of a closer look at the diversity of women, such as black, indigenous, and trans women, among others.

As for the impact of initiatives like {reprograma} on the career paths of alumnae, it is considered that employability "refers to the knowledge and skills that individuals bring to an employer" (Yvonne Al-Chi; Arul Chib, 2018, p. 4) and that, in the words of Claudia Heijde and Beatrice Van Der Heijden (2006), can be defined as an "occupational expertise" (p. 454). This ability would be valued by employers as an aptitude to perform a certain job (Robert HOGAN *et al.*, 2013).

In view of the testimonials and data regarding the perception of the respondents about their professional performance capacity, it can be inferred that {reprograma}'s graduates perceive an undeniable improvement in their employability. As the job market is expanding and there is a lack of qualified labor, the possibilities of professional insertion and performance after completing the courses are real and very promising. Nonetheless, as the authors who are dedicated to gender and ICT4D studies warn, at least in the current conjuncture, it is predictable that the performance of women will be concentrated in the lower paid positions (such as front-end positions). This adds to the challenges imposed on women in the labor market in countries like Brazil, marked by strong gender inequality, machismo, racism, discrimination, and other forms of violence.

As limitations of this study, it should be highlighted the need to further analyze the literature and to conduct in-depth interviews with female and male professionals in the technology and programming sector. As in the work of Dorothea Kleine (2013), in a next stage of this research, an ethnographic study will be conducted, with the objective of observing the interaction between the participants and the environment in which the activities and courses of {reprograma} take place. With the broadening and deepening of the research, it is envisioned the possibility of a comparative analysis of {reprograma} against similar initiatives, especially in Latin American countries and in the Euro-American context, arising from different demands and in response to the very diversity of women engaged in these initiatives.

## References

- AKOTIRENE, Carla. *O que é interseccionalidade?* São Paulo: Letramento, 2018.
- AMEEN, Nisreen; WILLIS, Robert. "Towards closing the gender gap in Iraq: understanding gender differences in smartphone adoption and use". *Information Technology for Development*, v. 25, n. 4, p. 660-685, March 2018.
- ANTONIO, Amy; TUFFLEY, David. "The Gender Digital Divide in Developing Countries". *Future Internet*, v. 6, n. 4, p. 673-687, October 2014.
- AVGEROU, Chrisanthi. "Information systems in developing countries: a critical research review". *Journal of Information Technology*, v. 23, n. 3, p. 133-146, June 2008.
- BEAUVOIR, Simone. *O Segundo Sexo*. Volume 2. São Paulo: Difusão Europeia do Livro, 1967.

BRAZIL. *Censo da Educação Superior*. Ministério da Educação. Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira, 2019. Disponível em <https://www.gov.br/inep/pt-br/areas-de-atuacao/pesquisas-estatisticas-e-indicadores/censo-da-educacao-superior>.

BUSKENS, Ineke; PRIMO, Natasha. "Integrating gender awareness in ICT4D research: concept paper for ACACIA International Development Research Center Ottawa, Canada". *IDRC-CRDI*, Grabouw, p. 1-71, 2010. Available at <https://idl-bnc-idrc.dspacedirect.org/bitstream/handle/10625/47248/133612.pdf?sequence=1&isAllowed=y>. Accessed on 04/21/2019.

BUTLER, Judith. "Gender as Performance: an interview with Judith Butler". *Radical Philosophy*, n. 67, p. 32-39, Summer 1996.

BUTLER, Judith. *Problemas de gênero: feminismo e subversão da identidade*. Rio de Janeiro: Civilização Brasileira, 2018.

CARNEIRO, Sueli. "Mulheres em movimento". *Estudos Avançados*, v. 17, n. 49, p. 117-132, 2003.

CASTELLS, Manuel. "Epilogue: Informationalism and the Network Society". In: HIMANEN, Pekka. *The hacker ethic, and the spirit of the information age*. New York: Random House Trade Paperbacks, 2001. p. 155-178.

CASTRO, Bárbara. "Performing gender at work". *Cadernos Pagu* [online], Campinas, n. 35, p. 379-388, 2010. Available at <https://www.scielo.br/scielo.php?script=sci-arttext&pid=S0104-83332010000200014>. ISSN 0104-8333. <https://doi.org/10.1590/S0104-83332010000200014>. Accessed on 04/21/2019.

COLLINS, Patricia Hill. "Se perdeu na tradução? Feminismo negro, interseccionalidade e política emancipatória". *Parágrafo*, v. 5, n. 1, p. 6-17, jan./jun. 2017.

COUTINHO, Dimitria. "Reprograma coloca mulheres no mercado de trabalho de tecnologia". *Ada* [online], 2018. Available at <https://ada.vc/2018/12/13/reprogramamercado-de-trabalho/>. Accessed on 04/21/2019.

CRENSHAW, Kimberlé. "Documento para o encontro de especialistas em aspectos da discriminação racial relativos ao gênero". *Revista Estudos Feministas*, v. 10, n. 1, p. 171-188, 1º semestre 2002.

DALE, Karen. "Building a Social Materiality: Spatial and Embodied Politics in Organizational Control". *Organization*, v. 12, n. 5, p. 649-678, September 2005.

ENGLUND, Victoria. *Foundation for Media Alternatives: A qualitative study of women empowerment through ICT*. 2019. Thesis (Bachelor) – Department of Humanities, Education and Social Sciences, Örebro University, Örebro, Örebro, Sweden.

ESCOBAR, Arturo. "Latin America at a crossroads?". *Cultural Studies*, v. 24, n. 1, p. 1-65, January 2010.

FRIEDAN, Betty. *Mística feminina*. Petrópolis: Vozes, 1971.

GAMBA, Susana; DIZ, Tania (Orgs.). *Dicionário de Estudos de Gênero y Feminismo*. Buenos Aires: Biblos, 2007.

GANTMAN, Ernesto R.; YOUSFI, Hèla; ALCADIPANI, Rafael. "Challenging Anglo-Saxon dominance in management and organizational knowledge". *Revista de Administração de Empresas*, v. 55, n. 2, p. 126-129, março/abril 2015.

GONZALEZ, Léila. "Por um feminismo Afro-Latino-Americano". *Caderno de Formação Política do Círculo Palmarino*, n. 1, p. 12-20, 2011. Available at [https://edisciplinas.usp.br/pluginfile.php/271077/mod\\_resource/content/1/Por%20um%20feminismo%20Afro-latino-americano.pdf](https://edisciplinas.usp.br/pluginfile.php/271077/mod_resource/content/1/Por%20um%20feminismo%20Afro-latino-americano.pdf). Accessed on 05/11/2020.

GOYAL, Ashima. "Developing women: why technology can help". *Information Technology for Development*, v. 17, n. 2, p. 112-132, April 2011.

HARAWAY, Donna. "Saberes localizados: a questão da ciência para o feminismo e o privilégio da perspectiva parcial". *Cadernos Pagu*, Campinas, n. 5, p. 7-41, 1995 [1988]. Available at <https://periodicos.sbu.unicamp.br/cadpagu/article/1828>. Accessed on 05/07/2020.

HEIJDE, Claudia; VAN DER HEIJDEN, Beatrice. "A competence-based and multidimensional operationalization and measurement of employability". *Human Resource Management*, v. 45, n. 3, p. 449-476, August 2006.

HICKS, Marie. *Programmed Inequality: How Britain Discarded Women Technologists and Lost its Edge in Computing*. Cambridge: MIT Press, 2017.

HOGAN, Robert *et al.* "Employability and career success: Bridging the gap between theory and reality". *Industrial and Organizational Psychology*, v. 6, n. 1, p. 3-16, March 2013.

IBGE. INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA. *Estatísticas de Gênero: Uma Análise dos Resultados do Censo Demográfico*. Rio de Janeiro, 2014. Available at <https://biblioteca.ibge.gov.br/visualizacao/livros/liv88941.pdf>. Accessed on 05/22/2020.

KELAN, Elisabeth. *Performing gender at work*. London: Palgrave Macmillan, 2009.

KLEINE, Dorothea. *Technologies of choice? ICTs, development and the capabilities approach*. Cambridge: MIT Press, 2013.

LOH, Yvonne Ai-Chi; CHIB, Arul. "Tackling social inequality in development: beyond access to appropriation of ICTs for employability". *Information Technology for Development*, p. 532-551, 2018. DOI: 10.1080/02681102.2018.1520190.

LUBAR, Steven. "Men/Woman/Production/Consumption". In: HOROWITZ, Roger; MOHUN, Arwen (Orgs.). *His and Hers: gender, consumption, and technology*. Charlottesville: University Press of Virginia, 1998.

MAJCHRZAK, Ann *et al.* "Designing for digital transformation: Lessons for information systems research from the study of ICT and societal challenges". *MIS Quarterly: Management Information Systems*, v. 40, n. 2, p. 267-278, June 2016.

MAUSS, Marcel. "Les techniques du corps". *Journal de Psychologie*, n. 32, p. 271-293, 15 mars-15 avril 1936.

McKENNA, Peter. *Gender and programming: a difference in style?* 2002. PhD Thesis. University of Liverpool, Liverpool, Lancashire, England.

MEAD, Margareth. *Sex and temperament in three primitive societies*. New York: Dell, 1935.

MICHIE, Susan; NELSON, Debra. "Barriers women face in information technology careers". *Women in Management Review*, v. 21, n. 1, p. 10-27, January 2006.

OLABI. "Um levantamento sobre a necessidade e a pertinência de incluir mais mulheres negras na inovação e na tecnologia". *Pretalab* [online], 2018. Available at <https://www.pretalab.com>. Accessed on 04/21/2019.

ODAME, Helen. "Introduction". In: VALK, Marine (Org.). *Gender and ICTs for development: A global sourcebook*. KIT (Royal Tropical Institute), Critical Reviews and Annotated Bibliographies Series. Amsterdam/Oxford: KIT/Oxfam, 2005. p. 13-23.

ONU. "Transforming our world: the 2030 Agenda for Sustainable Development". Department of Economic and Social Affairs. Sustainable Development. *United Nations*, 2015. Available at <https://sdgs.un.org/2030agenda>.

ORLIKOWSKI, Wanda. "Sociomaterial Practices: Exploring Technology at Work". *Organization Studies*, v. 28, n. 9, p. 1435-1448, September 2007.

PATEL, Reena; PARMENTIER, Mary. "The Persistence of Traditional Gender Roles in the Information Technology Sector: A Study of Female Engineers in India". *Information Technologies and International Development*, v. 2, n. 3, p. 29-46, Spring 2005.

PINEDA, Evelyn; GONZALEZ, Carlos. "Networking Skills in Latin America". *IDC/Cisco* [online], 2016. Available at [https://www.cisco.com/IDC\\_Skills\\_Gap\\_LatAm.pdf](https://www.cisco.com/IDC_Skills_Gap_LatAm.pdf). Accessed on 03/08/2019.

PNAD/IBGE. *Pesquisa Nacional por Amostra de Domicílios*, 2015. Available at <https://cidades.ibge.gov.br/brasil/pesquisa/44/0>. Accessed on 03/08/2019.

POSNER, Miriam. "We can teach women to code, but that just creates another problem". *The Guardian* [online], 2017. Available at <https://www.theguardian.com/techwomen-code>. Accessed on 04/21/2019.

QUINAUD, Adriana. *Rede social empresarial: uma proposta de abordagem interdisciplinar, multiteórica e integrativa*. 2018. Dissertação (Mestrado) – Programa de Pós-Graduação em Engenharia e Gestão do Conhecimento, Universidade Federal de Santa Catarina, Florianópolis, Santa Catarina, Brasil.

RANGEL, Pamela. *A Quantitative Examination of Gender Bias and Language Paradigm in the Evaluation of Source Code*. 2018. PhD (Thesis) – School of Business and Technology Management, Northcentral University, San Diego, California, United States of America.

RAPKIEWICZ, Clevi. *Femina Computationalis ou A construção do Gênero na Informática*. 1998. Tese (Doutorado) – Programa de Pós-Graduação em Engenharia de Sistemas e Computação, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Rio de Janeiro, Brasil.

RME (Rede Mulher Empreendedora). "{reprograma} abre inscrições para curso gratuito de programação para mulheres". *RME* [online], 2016. Available at <https://rme.net.br/2016/08/31>. Accessed on 03/08/2019.

RUSSO, Paschoal; GUERREIRO, Reinaldo. "Percepção sobre a sociomaterialidade das práticas de contabilidade gerencial". *Revista de Administração de Empresas*, v. 57, n. 6, p. 567-584, nov./dez. 2017.

SALIH, Sara. *Judith Butler – Routledge Critical Thinkers*. London: Routledge, 2002.

SCHWARTZ, Juliana *et al.* "Mulheres na informática: quais foram as pioneiras?". *Cadernos Pagu* [online], Campinas, n. 27, p. 255-278, 2006. Available at [https://www.scielo.br/scielo.php?script=sci\\_arttext&pid=S0104-83332006000200010&lng=pt&nrm=iso&tlng=pt](https://www.scielo.br/scielo.php?script=sci_arttext&pid=S0104-83332006000200010&lng=pt&nrm=iso&tlng=pt). ISSN 1809-4449. <http://dx.doi.org/10.1590/S0104-83332006000200010>. Accessed on 03/08/2019.

SEN, Amartya. *Development as freedom*. London: Oxford University Press, 1999.

SILVA, Salete. "Contribuições para a incorporação da perspectiva de gênero no parlamento". *Interfaces Científicas – Direito*, Aracaju, v. 3, n. 2, p. 29-42, fevereiro 2015.

SMITH, Matthew *et al.* "Mobile phones and expanding human capabilities". *Information Technologies and International Development*, v. 7, n. 3, p. 77-88, January 2011.

STRATTON, Caroline; BAILEY, Diane. "A Turn to Latin America: Improving Theory Development in the ICT4D Literature". In: iCONFERENCE, 2015. New Port Beach, University of California, Irvine: The Donald Bren School of Information and Computer Sciences. *Proceedings*, 2015, p. 1-11. Available at <http://hdl.handle.net/2142/73438>. Accessed on 05/22/2019.

TOLBERT, Caroline *et al.* "Are All American Women Making Progress Online? African-Americans and Latinas". *Information Technologies and International Development*, v. 4, n. 2, p. 61-88, Winter 2007.

TOYAMA, Kentaro. *Geek heresy: Rescuing social change from the cult of technology*. New York: Public Affairs, 2015.

TSHIVHASE, Mmabatho *et al.* The use of Sen's capability approach in ICT4D: an exploratory review. In: INTERNATIONAL CONFERENCE ON INFORMATION RESOURCES MANAGEMENT (CONF-IRM), 10, 2016, Capetown, University of Capetown. *Proceedings*, 2016. Available at <https://aisel.aisnet.org/confirm2016/10>. Accessed on 05/22/2019.

WALSHAM, Geoff. "ICT4D research: reflections on history and future agenda". *Information Technology for Development*, v. 23, n. 1, p. 18-41, January 2017.

YANSEN, Guillermina; ZUKERFELD, Mariano. "Why Don't Women Program? Exploring Links between Gender, Technology and Software". *Science, Technology and Society*, v. 19, n. 3, p. 305-329, October 2014.

ZHENG, Yingqin. "Different spaces for e-development: What can we learn from the capability approach?". *Information Technology for Development*, v. 15, n. 2, p. 66-82, February 2009.

**Silvia Rodrigues Follador** ([silviarf08@gmail.com](mailto:silviarf08@gmail.com)) is a PhD candidate in Public Administration and Government (FGV EAESP), holds a Master in International Relations (Sciences-Po Paris), a Postgraduate degree in Reflective Social Practice (Crossfields Institute & Alanus Hochschule) and a Bachelor in International Relations (PUC SP and Sciences Po Paris).

#### HOW TO CITE THIS ARTICLE ACCORDING TO THE JOURNAL'S NORMS

RODRIGUES FOLLADOR, Silvia. "{reprograma}": gênero e tecnologia em um estudo de caso preliminar". *Revista Estudos Feministas*, Florianópolis, v. 29, n. 1, e67314, 2021.

---

#### AUTHORSHIP CONTRIBUTION

Not applicable. Translated by the author. All other translations of texts originally published in Portuguese or Spanish were translated into English by the author.

---

#### FINANCIAL SUPPORT

Not applicable.

---

#### CONSENT TO USE IMAGE

Not applicable.

---

#### APPROVAL OF RESEARCH ETHICS COMMITTEE

Not applicable.

---

#### CONFLICT OF INTERESTS

Not applicable.

---

#### USE LICENSE

This article is licensed under the Creative Commons License CC-BY 4.0 International. With this license you can share, adapt, create for any purpose, as long as you assign the authorship of the work.

---

#### HISTORIAL

Received on 30/08/2019  
Resubmitted on 28/05/2020  
Approved on 26/06/2020

---

