Gender Differences in ICT Access and Use Among Brazilian Youngsters

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Abstract. The importance of gender equality in the knowledge society is being considered by the social and information science literature. Gender differences in ICT access and use suggesting lower levels of information literacy among women, also indicate that the perspectives of women in the Knowledge society are threatened. The objective of this work is to bring data and discussion on the Brazilian young generation, focusing on gender question. We point out questions about how girls are accessing and using the internet and their internet abilities. The data considered in the analyses presented were obtained from annual surveys from the Brazilian Bureau of Census (IBGE) and Regional Center for Studies on the Development of the Information Society (Cetic.br). Results suggest that, although girls are accessing the internet equally, they do not have the same profile of internet use and appropriation, and girls are being directed to some specific activities. Besides, the boys seem to show a better self-image of internet abilities than girls.

Keywords: ICT access and use · Gender differences · Internet abilities

1 Introduction

We can assert that access, diversity of use, as well as use ability with information and communication technology (ICT) are major aspects of information literacy, as emphasized by the literature on the theme. We can also assert that theoretical approaches and evidences that point to the existence of gender differences in ICT access and use, besides suggesting lower levels of information literacy among women, also indicate that the perspectives of women in the Knowledge society are threatened. This theme – gender differences in ICT access and use – should, therefore, become a serious concern of studies, and this concern is greater when the young generation, those that are being prepared to take action in the coming knowledge society, are the target of analyses. In this article, we focus on gender differences in aspects of internet access and use among Brazilian youngsters. We initially consider gender studies that deal with ICT and gender, a relationship that is being approached from different perspectives. We also take into account initiatives by major international institutions emphasizing the gender-ICT problem and proposing actions aimed at overcoming these gender divides. This literature and initiatives lead us to pose some basic research questions: Is there

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already gender parity in internet access by youngsters in Brazil? Are there significant differences in types of internet use and use abilities between young boys and girls in the country? Are there strong effects of socioeconomic and ethnic environments in how the internet is being used by boys and girls? Are there indications that girls are prepared to use the internet to promote gender equality?

To contribute in answering these questions, we analyse data from the Brazilian Household Annual Survey of 2015 (known as PNAD survey), a representative sample of the Brazilian population between 10 and 17 years old: 26.502.061 youngsters. The other data source considered here is the annual survey about children's Internet use, called ICT Kids Online Brazil also representative of Brazilian youngsters in 2016.

2 Data and Methodology

In order to evaluate the perspectives for information literacy among youngsters in Brazil, we bring about new information about ICT access and types of internet use by gender and race. Our analyses focus on internet access, aspects of internet use and internet abilities and skills.

We use as our main data source the Brazilian Household Annual Survey of 2015 (known as PNAD survey) [15]. This survey – based on a probability sample of the country's households - collects information about several socioeconomic characteristics of the Brazilian population since 1967. Access and use of the internet and other ICT devices – microcomputer, cellular phone for personal use and tablet - were included in the 2015 survey, the last survey with microdata available for analysis.

In 2015 the Brazilian population between 10 and 17 years old amounted to 26.502.061-13.527.007 boys and 12.975.054 girls. Another important methodological information is that the measure of 'access to the internet' we consider here refers to people that had at least one access to the net in the last three months prior the PNAD survey application.

The second data source considered in the analyses made here is the annual survey about children's Internet use, called ICT Kids Online Brazil, performed by the Regional Center for Studies on the Development of the Information Society (Cetic.br), a department of the Brazilian Network Information Center (NIC.br) [16]. The unit of analysis consists of children aged 9- to 17-years-old. This survey includes specific measures of online activities and internet skills by boys and girls.

3 Approaches to TICs and the Gender Question

The academic literature, as well as activism, focusing on women's and girls' relation to technology suggest some interesting approaches that can be taken into account in analyses of internet access and use by these social segments.

A first argument can be found in literature reviews of gender studies pointing out that initial work on the theme tended to reject technology in general, including ICT, because it was considered intrinsically masculine - being made and dominated by men. More recent work, however, tends to emphasize the idea that ICT, and the internet in

particular, can be used for the benefit of women, having the potential to transform society in the direction of gender equality [1, 2].

Another perspective, suggested by Rommes [3], emphasizes that there are different dimensions that should be considered to observe the gender question. One is the structural dimension that leads us to look at the products of the information society and analyse if these are being equally beneficial to men and women: is parity of access to instruments and resources guaranteed? The answer to this type of question leads us focus on large data to track access and use of ICT by gender. Other dimensions of analyses deal with the identity and symbolic aspects of ICT, which lead us to different approaches.

One of these approaches, considering the gender identity problem, begins with the assumption that technology is in fact moulded by and for men; and the question it poses is: Do girls and women have to abdicate their identity and try to adapt themselves to technical products associated with masculinity? The other related approach stresses the symbolic dimension of ICT and argues that technological products are mostly referring to the masculine world, contributing to discomfort and alienation on the part of girls and women. Some examples are software dealing with pornography and violence, including humiliating references to girls and women. To overcome these problems, and promote gender equity in the information society, the solution proposed by these theories involves identifying gender differences in how ICT is being used, as well as incentives for ICT competence among women, and investment in products designed by girls and women, promoting their ICT inclusion.

Another argument that is being increasingly brought to light, is the idea that the gender question is not homogenous to all types of environments. Women in different economic, social and cultural environments face different problems, including their relation with ICT. These socioeconomic and cultural conditionings have to be considered in studies involving the gender question, and these factors are especially relevant in studies done in underdeveloped or developing countries. Moreover, feminist movements on the Internet tend to be aware of and emphasize the diversity of women's lifestyles, visions, and expectations. Studies with this tendency in Brazil have emphasized, for example, that the racial theme has to be included in feminist movements [4, 5]. These studies also called attention to the role of the Internet in the popularization of feminism.

When the field of analysis is the country's young generation, as is the case here, these more recent approaches lead us to consider, besides observing differences in internet access, the types of internet boys and girls are using, the internet resources that these gender groups are mastering, indications of abilities among girls suggesting that they are being prepared to profit from this technology, using it for their own benefit, and also the weight of social and ethnic environments in shaping aspects of internet access and use.

4 Initiatives by International Institutions on ICT and Gender

In this session we consider some initiatives made by relevant international institutions towards the promotion of gender equality through the use of ICT. These efforts go in the same direction as the above mentioned theoretical approaches that tend to view

some advantages of using ICT for that purpose, besides emphasising its human rights aspect. The World Summit on the Information Society – WSIS [6] has included the gender question as part of the discussion in the event and this topic is included in its Action Plan. According to this document, gender equality and women's empowerment constitute one of the challenges of the information society. In its second phase, in 2005, in the compromise letter in Tunis, it was recognized that the gender digital divide, was considered to be connected to the human rights theme.

With the same concern, the Web Foundation [7] indicates three related ways through which women might use ICT to their benefit: informational power – having better access to relevant information and capacity to produce their own informational content; communicative power – to promote new informational channels and participation; and associative power – to create new political articulations and to improve existent structures.

Another initiative, the Media and Information Literacy- MIL proposed by UNESCO, is also based on human rights principles and detaches women's empowerment, considering their cultural and linguistic diversity. UNESCO recognizes the pervasiveness of ICT, especially that the use of the internet and mobile technology promotes new opportunities and forms of civic engagement. The gender question is also implicit in the emphasis made by the MIL approach in fundamental human rights, freedom of expression and opinion that can be enhanced with ICT use and appropriation. Security aspects, privacy and ethics in the digital era are also considered by the MIL approach [8]. The main MIL objectives are clearly applicable to women. These objectives are, according to UNESCO [9], to guarantee rights of expression, to defend information access, the ability to evaluate information content, to secure public participation in governance, and to contribute to assure that all voices are heard. One of these voices is, of course, that of women.

5 Gender Differences in Internet Use: Evidences from Previous Studies

In this section we bring about evidence from some gender studies about specificities of women's use of the internet.

In a review article, Ono and Zavodny [10] consider tendencies to the study of gender and the internet. According to them, gender differences in access to the net, considered a 'first level' gender internet gap, tend to disappear and studies on the subject tend to consider a 'second level' gender gap that focuses on different gender online behaviour. These authors also point out that one of the arguments brought about by the literature to explain differences in gender online behaviour is that girls and women tend to have an auto-image that is negative with respect to their technical capacity in developing activities in the digital environment. According to these authors, showing this tendency, women's search of different resources and potentials of the internet is limited, as well as the impact that the net can have in their private and professional lives.

This argument is also developed by Hargittai and Shaffer [11]. These authors did not find gender differences when considering measures of abilities in searching different types of information online. However, women tended to consider themselves as

less able with the internet. A problem with these findings, suggested by the authors, is that this negative auto-image would probably also have a negative effect on online behaviour, limiting internet uses and returns.

In the same vein, the global report about online rights by the Web Foundation [7], identified a lack of confidence by women in their ICT knowledge. Analysing differences in online competence, comparing men and women with the same educational level, data indicated that women tend to acknowledge less competence.

Other studies point out different gender profile of internet use. Analysing activities online by gender, Wasserman and Richmond-Abbot [12] found out that women use the internet more for communication purposes. Besides, they observed different tendencies in communication behaviour by men and women. The use of the internet to exchange messages, to maintain long distance contacts and to emphasize contacts with familiar persons were more intensely found among women. Men, on the other hand, tended to emphasize chats with unknown persons. Besides, also pointing out the more intensive use of the internet for communication purposes by women, another gender characteristic found by a comparative study in Latin America by Navarro and Sanchez [13], is the inclination of women to use the internet more for educational purposes. This tendency was also observed in another study of internet use by Brazilian students [14].

A negative online auto-image among women is compatible with the theoretical approaches, previously mentioned, suggesting that women feel less identified with a technology historically attached to a masculine world. However, the idea that women could profit from the technology to overcome their disadvantages, allied to the identification of specific behavioural profiles – as their communication abilities – seems to suggest the relevance of research focusing on use gender profiles, taking into account environmental characteristics.

6 Data Analysis

The data obtained by the PNAD 2015 allows us to generate information about aspects of internet access by Brazilian youngsters: approximately 26,502,061 individuals, from age 10 to 17. The total amount with internet access, considering a general measure – access in the last three months - is 19,680,412, corresponding to 74% of these youngsters. The percentage obtained indicates that this young group has more access to the internet than the total population, of which only 57.4% has internet access.

Before focusing on gender differences, we present the relationship of internet access by two other important socio-demographic variables - race and income level groups - which are shown in the two first tables that follow.

Table 1. Internet access by race – Brazilian population 10 to 17 years old.

Race	% with access	N with access	N without access	Total
White	83%	8,759,123	1,761,274	10,520,397
Afro-descendent	68%	10,813,197	4,986,611	15,799,808
Other	13%	108,092	73,764	181,856
Total	74%	19,680,412	6,821,649	26,502,061

Source: IBGE. Pesquisa Nacional por Amostra de Domicílios 2015.

Table 2. Internet access by monthly household income *per capita* - Brazilian population 10- to 17-years-old.

Income	% with access	n with access	n without access	Total
Up to 1/4 minimum wage	45%	1,954,879	2,406,074	4,360,953
More than 1/4 up to 1/2 minimum wage	65%	4,494,801	2,448,412	6,943,213
More than 1/2 up to 1 minimum wage	82%	6,792,073	1,461,221	8,253,294
More than 1 up to 2 minimum wage	93%	4,129,912	298,903	4,428,815
More than 2 up to 3 minimum wage	96%	926,051	42,793	968,844
More than 3 up to 5 minimum wage	98%	547,293	12,229	559,522
More than 5 minimum wage	99%	350,640	4,749	355,389
Without income or no answer	69%	484,763	120,741	605,504
Total	74%	19,680,412	6795,122	26,502,061

Source: IBGE. Pesquisa Nacional por Amostra de Domicílios 2015.

Data in Table 1 indicate that there is a substantial difference in internet access by race among Brazilian young boys and girls: Afro-Brazilians have clearly smaller access to the net. In Table 2, we also observe some differences of internet access according to income level. However, it is noteworthy that more than 90% of young people from families with only a little more than one minimum wage already have access to the net.

We turn now to our analysis of gender differences in ICT access and use in Brazil, beginning with comparisons between gender groups considering the same general measure of access, as shown in Table 3 below:

Table 3. Internet access by gender - Brazilian population 10 to 17 years old.

Gender	% with access	n with access	n without access	Total
Male	72%	9.786.908	3.740.099	13.527.007
Female	76%	9.893.504	3.081.550	12.975.054
Total	74%	19.680.412	6.821.649	26.502.061

Source: IBGE. Pesquisa Nacional por Amostra de Domicílios, 2015.

These results indicate that we have reached parity of internet access between genders among the country youngsters - in fact, with a slight preponderance of access by females (76%) in relation to males (72%). We seem, therefore, to have overcome this 'first level' gender gap as suggested by the literature. But is this positive information - gender parity in internet access - accompanied by parity in types of equipment utilized for this access?

Despite its potential for promoting inclusion in the Information Society, the use of the internet solely by cellphone may be limited since it does not allow a diversified access to a broad range of information. Internet use through computer and tablets can be considered as important instruments for education, enhancing opportunities. We therefore pose these questions: Is the use of the internet with a computer already widespread among youngsters of both sexes? Is the use of the tablet also involving this segment? Is use of the tablet already a reality for young Brazilians?

We try to answer these questions considering the total amount of respondents (representing 19.680.412 young Brazilians) who said that they had access to the Internet. The results are as follows:

Table 4. Type of equipment utilized for internet access by gender - Brazilian population 10- to 17-years-old

Equipment	Male	%	Female	%
Cellphone	8.014.276	81	8.555.045	86
Computer	7.255.001	72	6.991.241	69
Tablet	1.520.043	16	1.535.454	16

Source: IBGE. Pesquisa Nacional por Amostra de Domicílios, 2015.

The data in Table 4 indicate, initially, that the cellphone has a more generalized use than a computer, and that the tablet is still a rare instrument for this young group of Brazilians. These numbers also show that the use of the cellphone is mentioned more by girls, and that the use of the computer is more intense among boys.

These analyses of gender difference in internet access is here complemented with data, focusing on the differences in types of internet use. As mentioned in the discussion previously presented, gender differences in how the internet is being used would reveal the presence of a second dimension of gender inequality that might be more persistent and affect the perspectives of Brazilian girls in the knowledge society. On the other hand, some aspects of internet use by girls, as use for communication activities - creating and sharing content - could also suggest that they are being prepared to act in favour of their needs and rights, as also pointed out in our discussion.

Indicators of types of internet use considered here include: frequency of use, types of activities developed, and aspects of internet abilities. Measures of abilities involve direct inquiries about knowledge of several specific abilities, as well as the respondent's perception of their abilities. The data source utilized for this analysis is the annual survey Kids Online, mentioned in the methodology section. It is based on the most recent CGi report of 2016 [16], which includes some information and comments about gender differences in internet use. Since the focus on gender is not the central theme of the analyses presented in that report, we try here to retrieve and congregate data taking the gender dimension as the main focus of analysis. The idea of a second level of gender segregation which might impact girls' ICT appropriation, as discussed above, is what we seek to detect in the data analyses that follows.

We first present Fig. 1 showing gender differences in types of activities that they report doing online:

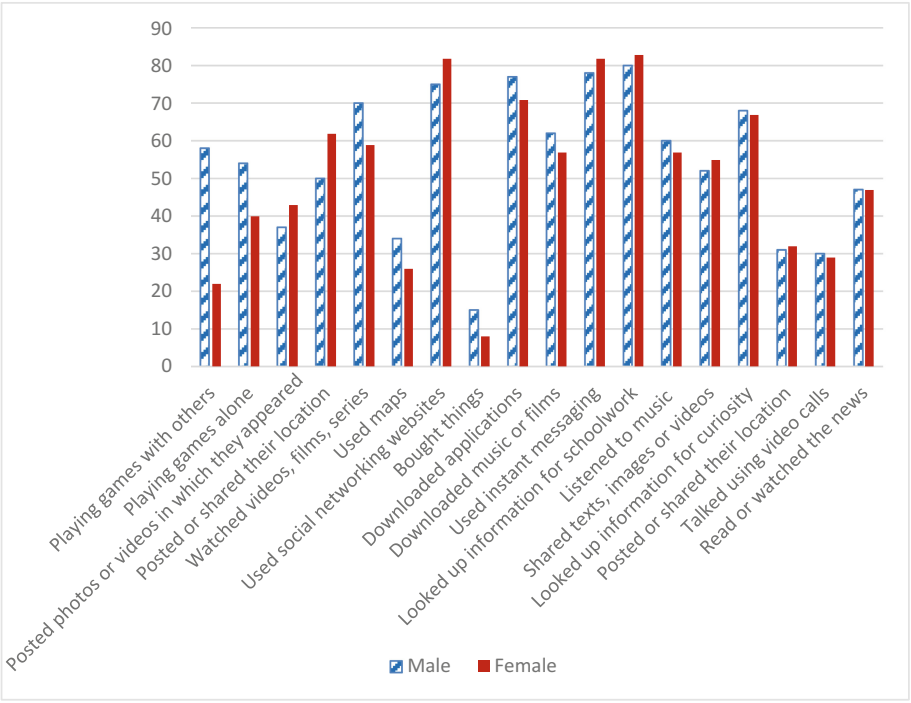

Fig. 1. Activities online by gender - Brazilian population 9- to 17-years-old. (Source: Cetic.br, Survey on Internet Use by Children in Brazil – ICT Kids Online Brazil 2016)

Data in Fig. 1 suggest that boys have more fun using the internet, surpassing girls in activities like playing games, watching videos and listening to music, besides using the net more for pragmatic activities, such as buying things, downloading, and consulting maps. This gendered profile of internet use has already been observed in previous works [11, 12, 14, 17]. The prevalence of playing games online among boys, for instance, seems to reflect the greater availability of software specially designed for them, and can be seen as one of the consequences of an ICT culture that is mostly produced and designed for this gender group. Another type of internet use more typical among boys is the pragmatic or technical approach, as it is the case of activities like shopping, downloading software and consulting maps, suggesting that they might value, or are being prepared for, a different kind of appropriation of the internet. Girls, on the other hand, prevail in activities related to communication, as sending messages and sharing information, posting and sending photos. This is an interesting tendency, since the internet might be used to give voice to girls. As mentioned above, social network sites can promote gender activism and become a resource to expose the multiplicity of experiences and representations of women, especially those who are

typically underrepresented. such as black women [5]. On the other hand, internet use for communication might indicate that girls are just internalizing their female role as keepers of their family and social contacts and building their social networks. This last interpretation should be credited to Bott [18], a pioneer in social network studies who emphasizes this female role of family communicator.

In the same study, we could also consider the relation of gender to variables trying to measure abilities online, with questions aiming at detecting the respondent's knowledge of each aspect considered in Fig. 2, above. Results indicate that boys and girls show similar levels of abilities, and again, girls seem to surpass boys in managing activities related to communication. Also, interestingly, girls are more able to deal with activities related to data protection in the internet. As expected, boys reported a higher percentage in practical actions, such as downloading, verifying internet use costs, and controlling location data.

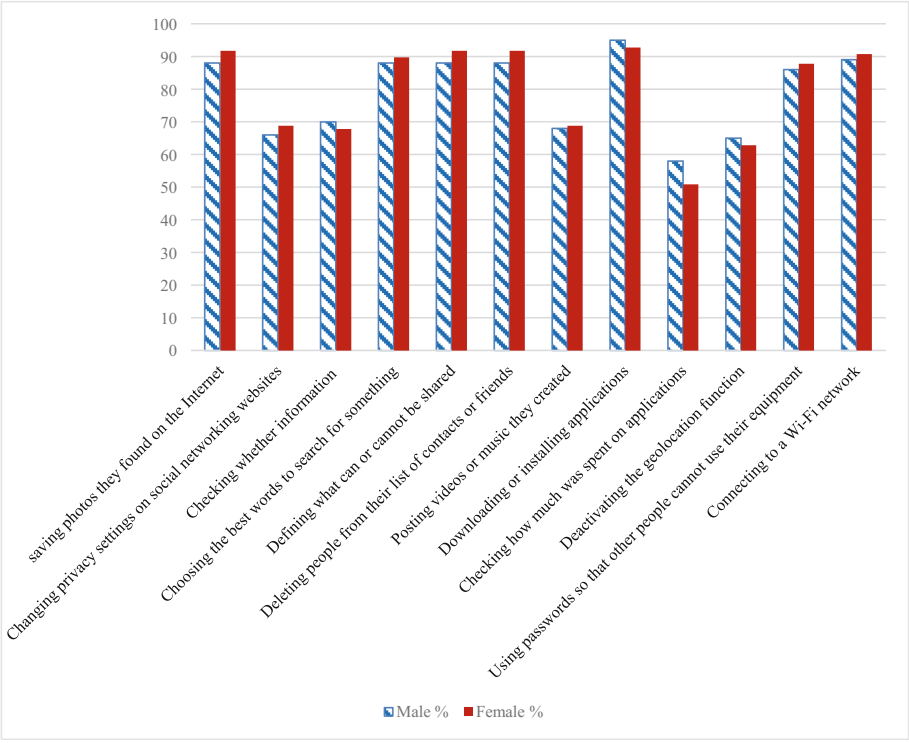

Fig. 2. Internet skills by gender - Brazilian population 9- to 17-years-old. (Source: Cetic.br, Survey on Internet Use by Children in Brazil – ICT Kids Online Brazil 2016)

Another group of questions focused on perceptions of abilities, which were measured through a few indicators. The relation of these perceptions with gender is shown in the following Table 5:

Table 5. Perceptions regarding their Internet skills by gender - Brazilian population 9- to 17-years-old

Sentence	Male agrees %	Female agrees %
Knows more about the Internet than their parents	76%	76%
Knows a lot of things about using the internet	74%	68%
There are a lot of things on the Internet that are good for children the same age as them	85%	78%

Source: Cetic.br, Survey on Internet Use by Children in Brazil – ICT Kids Online Brazil 2016.

Data in Table 5 suggest that, although boys and girls show a similar perception of abilities in using the internet when they are asked to compare themselves with their parents. However, girls do not evaluate themselves on the same level of abilities as boys, when they are asked to position themselves as someone that "knows a lot of things about using the internet". A less favourable self-image among girls does not seem to correspond to measures of their actual ability, in which boys and girls have similar results. A lower self-image regarding ICT in the female group was already found in other studies about internet use, as mentioned before [7, 11, 12]. This tendency of a poorer self-image among girls is also present in work done in the field of sociology of education, as those focusing on school performance: girls tend to feel themselves as less able in academic fields related to science and technology, despite having equivalent performance as boys [19].

7 Concluding Remarks

As a whole, data described here suggest that gender parity in internet access - the overcoming of the first level gender gap – seems to have been reached among young Brazilians, as in other contexts. However, gender differences in types of internet use and appropriation - the second level gender gap- seem to reflect the burden of gender culture, as suggested by the literature on the subject discussed in the text: Brazilian girls are being directed to some specific activities, and showing different profiles of internet use and appropriation. These evidences could, therefore, be interpreted that ICT is still associated with masculinity, making boys feel more at ease in doing certain activities, as is the case with playing games. Also, supporting this point of view, the boys seem to show a better self-image of internet abilities than girls, which may inhibit girls to exploit ICT resources or to become more sensitive to criticism in their digital activities. However, as appointed by more recent studies on gender and ICT, some of the characteristics observed, such as communication abilities - spending time in communicating, posting messages and taking photos -, in which girls surpass boys,

might indicate that these young girls are acquiring a specific knowhow that could have a positive impact on their perspectives in the knowledge society, as long as they recognize their potential for societal transformation.

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