

# **INTERNET ACCESS IN BRAZIL: SOCIAL CONTEXT AND SCIENCE AND TECHNOLOGY PROFESSIONALS**

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**Gilda Olinto**

Instituto Brasileiro de Informacao em Ciencia e Tecnologia – IBICT  
Graduate Program in Information Science  
Rua Lauro Mueller 455, Rio de Janeiro, RJ, Brazil, 22290-160  
Tel/Fax (55 21) 2275-0321  
e-mail: gilda@ibict.br

## **Abstract**

Access to the Internet is an evidence of connectivity and has been considered an indicator of participation in today's knowledge society and in the globalization process, the latter also defined as "complex connectivity" and empirical condition of the modern world. However, evidences of the growth of this resource around the world is confronted with several questions regarding the discrepancies between developed and developing countries, regarding regional and social differences within countries and regarding the perspectives of its use by knowledge professionals. This subject – Internet access and use – has been included in the 2005 Annual Survey of the Brazilian Census Bureau. This paper is part of a more inclusive research project that focuses on the characteristics and perspectives of Brazilian society with regard to Internet access and use. Besides describing access to this resource, it tries to examine its several social, economic and work conditionings. In the data analyses presented here, emphasis is given, at first, to the description of socio-demographic inequalities with regards to Internet access. A second emphasis is given to describing and comparing Internet access among Science and Technology professionals, particularly professionals in the field of Information and Communication, and between the public and private sectors.

## **INTRODUCTION**

This article is concerned with the relationship between Internet use and its social context. It is clear that this technological resource is a condition for inclusion in today's knowledge society and this paper deals with discussions and controversies regarding social inequalities related to Internet use. The data presented here depict certain dimensions of ethnic, economic, and educational inequalities related to Internet access in Brazil. Another point that is emphasized in the data analyses refers to the characterization of the access to this resource by occupational segments considered essential for Brazil's inclusion in the knowledge society: human resources in Science and Technology, particularly Information and Communication professionals.

Data used in this study were obtained from the 2005 Annual Survey of the Brazilian Census Bureau (Pesquisa Nacional por Amostra de Domicílios do Instituto Brasileiro de Geografia e Estatística, IBGE/PNAD), which specifically deals with the topic of Internet use in Brazil in 2005. Other studies about Internet use in Brazil have already been published. What renders this particular PNAD-2005 project unique, however, is the fact that it permits the examination of relationships between characteristics of Internet use with several other information regarding the socioeconomic characteristics of the users and non-users from a large national survey: a representative sample of the Brazilian population involving interviews in more than 140 thousand households nationwide.

The relevance of analyzing these data becomes evident in light of the recent production in the field of Information Science, in which Internet and information technology usage, as well as their social insertion, have received special attention. One notes, in this literature as well as in social studies in general regarding the knowledge society, a growing interest in identifying and analyzing Internet usage patterns under various perspectives, and also in studying other information and communication technology (ICT) related concepts, such as information competency and digital fluency. It is also noted that the emphasis given to topics such as digital division, including related controversies, reflect the concern with equal access to information technology.

## **INTERNET AND SOCIAL CONTEXT**

### **Internet, development and the knowledge society**

The use of the Internet can be seen as a condition for participating in the knowledge society. This usage is an evidence of connectivity and, moreover, indicates participation in the globalization process, which can be defined as “complex connectivity” and seen as an empirical condition of the modern world (Van Der Bly, 2005).

Both national and international organizations have sought to identify the access to and the use of the Internet through various types of measurements. Comparisons between countries and regions also underline wide disparities in the world (OECD, 2002). Data raised specifically about Latin America indicate that Internet usage is growing rapidly in the region, albeit in a slower rhythm than other ICTs such as mobile phone (ECLAT, 2003). Furthermore, recent data on Brazil prove that Internet use is still low nationwide (CGI, 2005) and Brazil is considered one of the countries that presents the largest internal differences. Comparative analyses and other efforts described above display how highly valued the theme is at present, seeing that it is considered a basic dimension for social development.

Many studies also suggest that the presence of professional segments closely related to information and knowledge and their familiarity with new technologies are essential for succeeding in establishing and generalizing the use of the Internet in society and for instituting relevant public policies (Brint, 2001, OECD, 2002). This matter is of course sharpened when the focus is on developing countries, since for the latter, a recurring aspect that has been identified as an impediment to ICTs is the lack of expertise (Meng, Li, 2001).

In research that focuses on individual and community development, as well as on information and communication means for group mobilization, the use of the Internet has been studied in order to evaluate its use by government agencies as well as its role in the flow of information between government and society – that is, as a resource for strengthening e-governance and e-democracy. Hence, there has been a large growth of initiatives that see Internet use as a means to fight inequalities and guarantee access to informational resources to groups that are at a disadvantage. One example of such an initiative, among many others, is the use of the Internet in the empowerment of black women (Mehra, Bishop, Bazzell, & Smith, 2002). Studies about community development carried out by Wellman (2002) suggest that the effects of Internet use tend to be positive, contributing to social relations, both locally and at long distance, thereby increasing the individual’s social capital.

Castells (2003) finds that the Internet reduces the chances of symbolic manipulation by individuals, as well as broadens their sources of information – two important ingredients in establishing democracy. Internet access has also been seen as one dimension of human rights (McIver, Birdsall, & Rasmussen, 2006).

### **Internet and persistence of social inequalities**

The vast disparities among countries, regions and social groups in terms of access and use of the Internet have led many authors to challenge the use of the term “digital divide” as a reference to the inequality of access to information technology. For them, the idea of a digital divide would be inadequate since it would turn the attention away from the vast social inequalities and towards digital inequalities. Wajcmann (2002: 349) finds that “rhetoric about the ‘digital divide’, that between the information rich and the information poor, serves to camouflage pre-existing patterns of social and class inequality” and Menou (2001) states that “the digital divide metrics may indeed refer more to the appetite for new markets rather than equity concerns”.

Although one could say that the digital divide is nothing more than one single dimension of social inequality, questioning it reflects the authors’ concern with the intrinsic relationship between technology and society and shows the need for taking social aspects into account, considering the theme and data analysis about the digital divide. In fact, empirical works on Internet access and use carried out by authors like DiMaggio, Wellman and others show strong inequalities in access and use of the Internet along several demographic and socio-economic dimensions, both within and between countries. These studies also emphasize the complex relationship that exists between technology and society, questioning how many of the inequalities in the several dimensions of Internet access and use are likely to persist and to what extent this technology can contribute to enhance individual life chances (DiMaggio et al., 2004; Chen and Wellman, 2003).

Since Internet use is still a characteristic of developed nations, where almost 90% of the users are located, the specific problems related to Internet penetration in developing countries are also considered by these analysts as well as many others. Political, institutional and cultural characteristics, like the language barrier, were found to be essential for the understanding of Internet access in these countries (Chen and Wellman, 2003; Diniz and Olinto, 2005). Likewise, the emphasis that some authors give to the Internet as a non-neutral political and social space seems to be an important contribution for the study of the digital divide in developing countries (Barzilai-Nahon, 2006). Another issue regarding digital divide in developing countries involves their structural position in the global economy, which might restrict or define new conditions of Internet access and use. In fact, a recent empirical study about e-mail use in forming invisible colleges revisits the idea of prevailing hierarchical relations between central and peripheral countries (Thompson, 2006).

## **THE FOCUS OF THE ANALYSES, DATA AND MEASURES**

The theories and the evidence presented here regarding social inequalities – which underline the access to the Internet – and the discussions involving the complex relationship between Internet and society attest to the importance of analyzing the social conditions behind Internet access. For this reason, some of the socio-demographic characteristics of individuals interviewed in the IBGE/PNAD

survey are considered in the data analyses. Region and state of residence, gender, race and educational level are the variables initially selected for the examination of their relationship with Internet access. After that, to complement the social profile of Internet access in Brazil, the characteristics of this access by the student population, at various levels of the educational system, is examined with the purpose of identifying the perspectives of Internet use in the younger generation of Brazilians.

Another aspect considered in data analyses is the access to the Internet by occupational categories that indicate Brazilian adaptation to knowledge society. These are formed by the whole group of science and technology professionals, with emphasis given to the sub-group of information and communication professionals<sup>1</sup>. The access to the Net by employees of the public sector is also taken into account here, as this access indicates, as already mentioned, the perspectives of e-Government and to e-Democracy in Brazil.

Internet access, the main concept of this study, was measured in the IBGE annual survey of 2005 by way of a nominal dichotomous variable<sup>2</sup>. Other aspects involving Internet use were also measured in the questionnaire but, up until March 2007, only the issue of access has been made available for analysis.

Although it could be stated that the concept of Internet use begins with the notion of access, it is worth mentioning that mere access is considered a passive aspect, a potential consequence of the confluence of commercial and political interests, and is therefore insufficient to capture the idea of Internet use. Hence, one would have to go “beyond access” and include other dimensions of access and use, like the autonomy, ability and the purposes of use (DiMaggio et al., 2004), or content of search and problem definition in the act of search (Savolainen, 1999). Some authors have also suggested the notion of “effective use” that involves the idea of the ability to use the Internet and ICTs in general for some kind of individual or group purpose (Gurstein, 2003; Menou, 2001). Other concepts like information literacy and digital fluency – concepts that have been taken into account in various studies in the field of Information Science- could be considered. The focus on the access is, therefore, a first approach to the topic, and the project of which this study is a part, will include a number of other approaches with respect to Internet use in Brazil.

Regarding the measurement of Internet access, it should be finally said that even this more direct and simple measure usually does not generate comparable results, because the operational definition of the concept varies, as well as the population considered in the studies, which could include children, teenagers or only adults (Wellman, 2002).

## **DATA ANALYSIS**

The analysis of the data begins with Table 1 below, which presents the result of the most important piece of the information in this work: access to the Internet.

TABLE 1. INTERNET ACCESS. BRAZIL. 2005\*

<b>Access</b>	<b>%</b>	<b>People</b>
Yes	21.04	32.1 million
No	78.96	120.6 million
<b>TOTAL</b>	<b>100</b>	<b>152.7 million</b>

Source: IBGE (PNAD). Microdata.

Population aged ten years of age or more

As shown in Table 1, only 21% of Brazilians aged 10 years or more have access to the Internet. Although this number implies around 32 million people, almost 80% of the Brazilian population (of 10 years of age or higher) has yet to be exposed to this technology – that is, almost 153 million people<sup>3</sup>.

The next analyses focus on detecting the differences in Internet access based on basic socio-demographic features. In terms of gender inequalities, the percentage difference favors the male sex by 2.9%. This difference is apparently small, and seems to reflect reducing gender gaps that have been observed in several contexts. On the other hand it is important to take into account that gender differences with regards to the use of ICT are more concentrated in specific aspects of use, such as frequency, autonomy and self-evaluation of personal skills, as well as in the small number of women working in the field of Information Technology (Bonder, 2003; Diniz & Olinto, 2005; Olinto, 2005). Regarding regional differences, the data reveal that, as expected, the percent difference of people with Internet access in more developed regions can be up to 15% (as in the difference between the Northeast and Southeast) and even greater between the more developed states, such as Paraná (where 35% of the population has access), and the less developed states, such as Alagoas (with 8.2% access).

The next two tables, Table 2 and Table 3 respectively, show the differences in Internet access by ethnic group and educational level measured by years of schooling:

TABLE 2. INTERNET ACCESS BY ETHNIC GROUP.  
BRAZIL-2005\*

<b>Ethnic group</b>	<b>% with access</b>	<b>People in stratum</b>
White	28.27	77 million
Afro-Brazilian	14.84	74.5 million
Other	33.5	1.1 million
<b>TOTAL</b>	<b>21.4</b>	<b>152.7 million</b>

Source: IBGE (PNAD 2005). Microdata.

\* Population aged ten years of age or more

TABLE 3. INTERNET ACCESS BY YEARS OF SCHOOLING.  
BRAZIL-2005

<b>Years of schooling</b>	<b>% with access</b>	<b>People in stratum</b>
0*	0.5	16.5 million
1 to 3	3.8	21.5 million
4 to 7	9.9	47.6 million
8 to 10	22	25 million
11 to 14	42.2	33 million
15 more	75.9	8.6 million

Source: IBGE (PNAD 2005). Microdata.

\*without formal instruction

Table 2 reveals the huge disparity between ethnic groups in relation to the access to information technology: the percent access of Whites is more than twice that of Afro-Brazilians. It is important to mention here the numerical equivalence of these two large groups – each one making up about half of the Brazilian population<sup>4</sup>. The systematic effect of education in Internet access, displayed in Table 3, also shows how strong this social dimension impacts on access. The table also clearly shows how the mass access to the Internet only occurs in a segment of the population with many years of schooling, generally corresponding to college-level education: 15 years. However, the very low number of people in this last segment – as well as the Internet access of this segment still being far from 100% - are indicative of Brazil's poor adaptation to the knowledge society.

The next analytical focus with regards to Internet access involves the student population. The situation of this population is shown in the following tables:

TABLE 4. INTERNET ACCESS BY SCHOOL LEVEL.  
BRAZILIAN STUDENT POPULATION – 2005.

<b>School Level</b>	<b>% with access</b>	<b>N in segment*</b>
Elementary & Middle	22.3	21.8 million
High School	44	8.6 million
College	87.4	4.9 million
MA, MSc or PhD	93.6	0.3 million

Source: IBGE (PNAD-2005). Microdata.

\*Population with 10 years or more in regular schools.

TABLE 5. INTERNET ACCESS BY SCHOOL LEVEL AND TYPE OF SCHOOL ATTENDED. BRAZILIAN STUDENT POPULATION – 2005

School Level	% with access*	
	Attend Public School	Attend Private School
Elementary and Middle	16.8	74.1
High School	37.3	84.2
College	84.2	88.4

Source: IBGE (PNAD-2005). Microdata.

\*Population with 10 years of age or more in regular schools

When one takes into consideration the fact that the data above include especially the child and teenage population as well as young adults enrolled in the different school levels, then the number of people who access the Internet is very low. Table 4 shows that for students in Elementary and Middle Schools, the percentage Internet access is similar to that of the general population. Among High school students, less than half have Internet access. Only those students enrolled in undergraduate or graduate schools show a high percentage – but still far from 100%, which should be the norm at these educational levels. The data are even more shocking in Table 5, which compares the situation of public school students with those enrolled in private schools: the latter show high access percentages on all school levels, while those in public schools only reach similar proportions to students of the private sector when they reach college<sup>5</sup>.

The next set of tables focuses on professional segments that are representative of the knowledge society, presenting their absolute frequencies and the proportion of the total that has access to the Internet. Table 6 highlights the situation of professionals in the four main areas within Science and Technology, as well as professionals classified as higher education professors. Table 7 takes the broadest category of S&T professionals and extracts from it those that can be classified as working in the information and communication fields.

TABLE 6. INTERNET ACCESS BY HUMAN RESOURCES IN SCIENCE AND TECHNOLOGY. BRAZIL-2005

Occupation	% with access	People in Occupation
Exact Sciences and Engineering	92.6	0.579 million
Biological and Health Sciences	80.2	0.787 million
Law	92	0.469 million
Social and Human Sciences	84.2	0.899 million
College-level Teachers	65.7	1.775 million

Source: IBGE (PNAD 2005). Microdata.

TABLE 7 INTERNET ACCESS BY SEGMENTS OF  
INFORMATION AND COMMUNICATION PROFESSIONALS.  
BRAZIL-2005

Occupation	% with access	People in Occupation
<b>Information/Communication</b>		
Marketing and Publicity	86.1	99.0 thousand
Journalism	99.2	48.4 thousand
Information professionals	59.5	23.8 thousand
Archivists /Museologists	69.9	12.7 thousand
<b>Information Technology</b>		
Information Analysts	98.8	153.5 thousand
Programmers	96.4	26.8 thousand

Source: IBGE (PNAD-2005). Microdata.

In Table 6, we can observe that Science and Technology professionals show high proportions of access to the Internet, greater than that of people with 15 years of more of schooling and similar to the percentages shown for students enrolled in higher education institutions – with the exception of the “college-level Teachers” category, whose Internet access proportion is still relatively low. This latter result reflects the well-known, precarious situation of this professional category in Brazil, whose wages are relatively low in comparison to the other categories classified under Human Resources in Science and Technology. The unfavorable number for the Teachers segment could also be the partial result of their larger numbers in this category in comparison to the other segments classified under human resources in S&T. Another point worth highlighting in Table 6 is the low total number of people working in Science and Technology in general in the country, which could compromise the future perspectives of Brazil in the knowledge society.

Table 7, which shows the access to the Internet and the absolute frequencies of information and communication professionals, reveals that there are greater imbalances within this category than in the broader category of S&T professionals presented in the previous table. It is especially obvious if one looks at the difference in access to this technological resource of the so-called “Information Professionals”, category which is comprised to a large degree of Brazil’s librarians. Another relatively low percentage is that of Internet use among Archivists and Museologists. It is also worth mentioning that some professional categories, though not directly connected to information technology – such as journalism – have the same level of Internet access as systems analysts and even more than the category of programmers. These results suggest that access to information technology may have become essential in professional segments that are not traditionally associated to the technology.

The last analysis to be presented here refers to the Internet access of employees of the public sector in all three levels of government in comparison to employees of the private sector:



TABLE 8 INTERNET ACCESS BY EMPLOYEES IN  
PUBLIC AND PRIVATE SECTORS. BRAZIL-2005

Sector	% with access	People in Sector
Federal Gov.	75.3	1.38 million
State Gov.	53.9	3.27 million
Municipal Gov	29.1	4.71 million
Private	31.5	33.79 million

Source: IBGE (PNAD-2005). Microdata.

In Table 8, you can see that employees in the private sector, making up almost 34 million people, have a low Internet access – a percentage that is, nevertheless, equivalent and even superior to the one shown by the group of employees working in the Municipal government, which makes up the largest number of public service employees. These data indicate how poorly prepared the national public sector is for the functioning of e-government and for the development of e-democracy in Brazil. Only those employees working at the Federal level show what could be seen as high Internet access, though these employees make up the smallest component of public service employees.

## CONCLUDING REMARKS

The analyses that have been conducted here show that Internet access in Brazil is still very low, and that this access is strongly related to the social conditions of the Brazilian population. The differences in access among ethnic groups are large, and the differences between regions are also significant, as are the differences observed between educational levels. It can be said, therefore, that, in general, the arguments involving the close relationship between digital division and social inequality were reinforced.

When we look specifically at the situation of the student population, it becomes clear that access to the Internet for students in Elementary, Middle School and High School does not distinguish itself from that of the general population – except when one looks at those enrolled in private schools. Only college students at the undergraduate and graduate levels show relatively high access to this information technology, with no distinction between the public and private sectors. Nevertheless, considering the low proportions of students that manage to get into university, we can conclude that the Brazilian student population still has a very limited experience with the Internet and is not being prepared to use this resource during the learning process.

When the focus of the analysis turns to professional groups that could be seen as indicators of the knowledge society – or professional segments that are considered as essential for the introduction and penetration of new information technologies – the data indicate that access to the Internet is quite high among human resources in S&T, as well as among professionals in the information and communication fields. On the other hand, the differences seen among some of these professional categories and, particularly, the unfavorable situation of some of them – such as college-level professors, librarians and Municipal public service employees – indicate that there is still a long way

to go and that urgent changes should be promoted by way of public policy and other initiatives so that Brazil can find its way towards becoming an information society.

Further research on the subject suggested by the discussion and data presented here includes the search for other aspects of digital inequalities that might be revealed through analyses based on different dimensions of Internet use. The development of comparative measures of Internet and ICT use that take into account the specific problems of access to information technology in developing countries is another topic of interest.

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<sup>1</sup> The variable from which these occupational categories were obtained follows international classification standards (ISCO-88). (IBGE/PNAD).

<sup>2</sup> This question was asked to Brazilians of 10 years of age or more who were to answer if they had accessed the Internet in the last three months. The absolute frequencies that appear in the table are projections for the entire population, made by IBGE (the Brazilian Census Bureau) based on the sample.

<sup>3</sup> The proportion of Internet access is similar to the ones obtained in smaller surveys conducted recently (CGI, 2005).

<sup>4</sup> The term Afro-Brazilian refers to people who classified themselves as negros (Black) or pardos (Mixed race) in the 2005 IBGE/PNAD Survey.

<sup>5</sup> The comparison between students of public and private schools is conducted based on information regarding the schooling of the students enrolled. The information does not refer to Internet access in the schools themselves.

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