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Analysis of the use of ICT by Children in Brazil – ICT Households 2009 Survey

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Introduction

In this article, we present the analysis of the results of an ICT survey conducted by Center of Studies on Information and Communication Technologies in Brazil (CETIC.br) which aims at assessing ownership and use of Information and Communication Technologies (ICTs) by children across the national territory aged between 5 and 9 years old. The results here presented are a sample of the state of ICT statistics collection and dissemination in Brazil for a very specific segment: young children. CETIC.br has consolidated its position as a reference center for the production of indicators and statistics on the uses of ICTs in Brazil. CETIC.br has been concentrating its efforts on broadening the scope and improving the quality of the indicators and statistics produced annually in its surveys. These efforts are intended to ensure the reliability of the results, the production of higher quality information and, most importantly, a higher degree of international comparability. CETIC.br has been accumulating significant experience in conducting national ICT surveys in different segments such as education, households, enterprise, electronic government, etc.

The current generation is immersed in a world where ICTs are increasingly becoming more present in their daily lives. As children become more familiar with these technologies and start using them, understanding the implications of this new reality becomes paramount. How do children aged 5 to 9 years old use the worldwide computer network? What are the implications of these habits? The present study aims at stimulating these and other thoughts.

Due to the complexity involved in researching such a young group, we have opted to have the questionnaire answered by two different types of interviewees. Thus, the first part of the survey was conducted with the parents or guardians of the children and information was gathered regarding access to ICTs in their households. These interviewees also presented their views on how their children use ICTs. The second part of the questionnaire targeted children themselves and touched on the specifics that characterize the use of computers, the Internet and mobile phones. It

is worth noting that the questions were adapted to the universe of children aged 5 to 9 years old, and the answers reveal their understanding of what was asked. Certain concepts, such as time and space, were adapted in order to improve perception by a child; when asking about the frequency of use, for instance, alternatives such as “daily”, “at least once a week”, “at least once a month”, “less than once a month”, which were used with adults, were replaced by “always”, “sometimes” and “just a little”, which are closer to the perception of a child.

The main highlights from the results obtained by the “ICT Households Survey – Children” are synthesized below:

- **Use of Computers vs. Use of the Internet:** Children use computers much more than they access the Internet. Income partially explains this phenomenon; however, the main hypothesis regarding the issue suggests that the Internet is not very accessible to children, that is, it does not offer much content designed specifically for them.
- **Location of access:** The indicator “location of access to the Internet” reveals the importance of households as the main doorway to the worldwide computer network for children. Moreover, with regard to the most frequent locations of access to the Internet, the study shows the importance of LAN houses, even for such a young audience.
- **The Internet in schools:** Despite the importance of the media in the education of children, schools play a secondary role as locations of access to the Internet: while 27% of children claimed to have accessed the Internet from these places, only 14% of them mentioned schools as the location of most frequent access. Even LAN houses obtained a more significant result regarding the “location of access to the Internet – most frequent” indicator (17%).
- **Internet Activities:** Recreational activities were the most commonly mentioned by children regarding Internet use. While games are widely engaged in, activities involving communication and education were not very popular among the subjects surveyed.
- **Mobility:** Mobile phones appeared as the most common technology among children aged 5 to 9 years old: 65% have already used one of these devices and 14% own one. Despite the high incidence of mobile phone use among the subjects surveyed, these devices are used mainly for gaming and listening to music, and not as a communication device.

A. Access to information and communication technologies in households

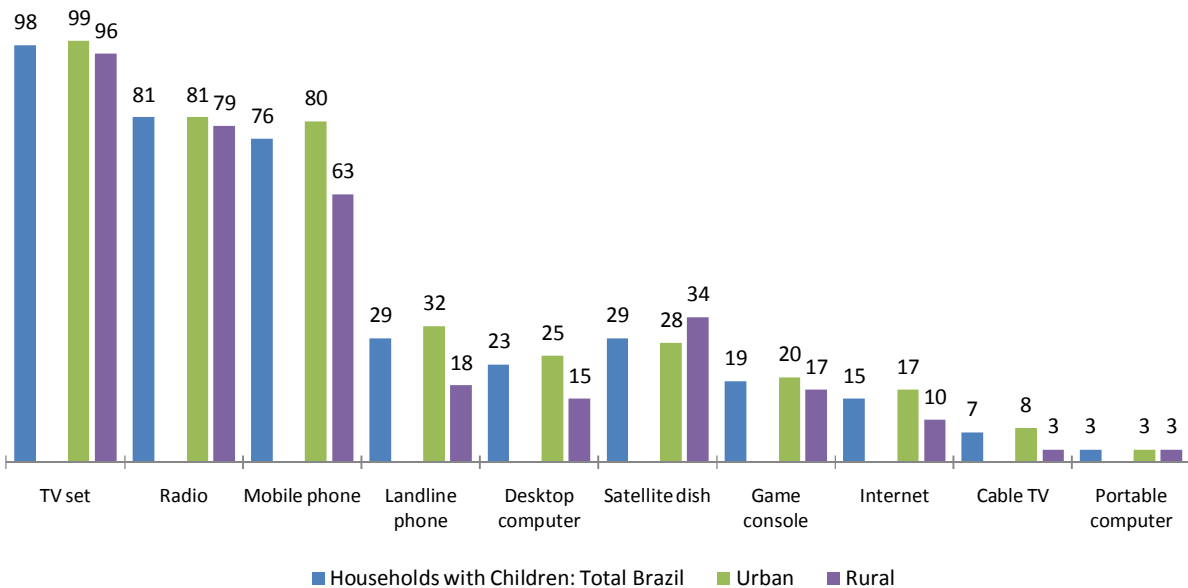
The results of the first ICT Households 2009 Survey – Children reveal that the determinant factors for the presence of information and communication technologies in households with children aged 5 to 9 years old are family income, social class and region of the country, following the pattern observed in the survey involving the general population. In terms of distribution, ICT penetration is

more prominent among households with higher family incomes and households located in economically privileged regions.

TV sets and stereos are also practically universal. According to the survey, of the households with at least one child, 98% own a TV set and 81% have a radio. Mobile phones also show a high rate of penetration, as they are present in 76% of these households, a percentage that vastly surpasses the 29% registered for landline phones. Desktop computers, on the other hand, are present in only 23% of the households, which is lower than the percentages registered in relation to older, less expensive media, such as TVs and radios. Desktop computers are present in all households from class A, that is, 100% of the households with children aged 5 to 9 years old have them. In class DE, this figure is significantly reduced to 4%. Game consoles are present in 19% of Brazilian households with children aged 5 to 9 years old, a significant figure when compared to the 16% found in the households of the general population.

Comparisons between households in urban and in rural areas reveal significant differences regarding the penetration of these technologies: while 80% of households in urban areas have mobile phones, only 63% of them do so in rural areas. The same is true for landline phone ownership (32% in urban areas versus 18% in rural areas) and desktop computers (25% in rural areas versus 15% in rural areas).

Chart 1: PROPORTION OF HOUSEHOLDS THAT HAVE ICT DEVICES (%)
Percentage over the total number of households with children



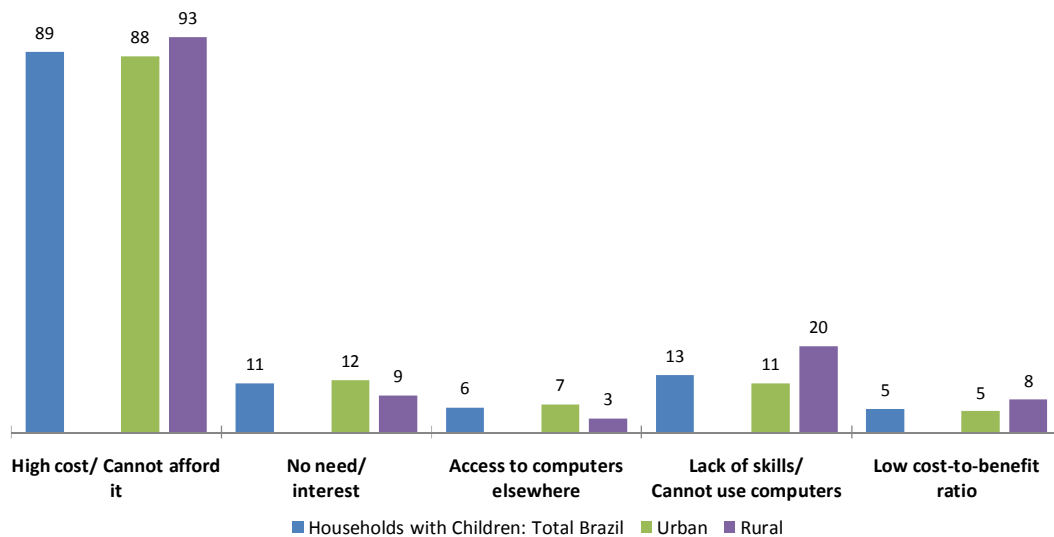
a. Computer ownership, access to the Internet and type of connection to the Internet

The survey showed that 25% of the households where children live have at least one computer, regardless of whether it is a desktop or a portable computer.

The absence of computers in the remaining households is mainly due to their high cost, as 89% of the interviewees who do not have this technology claim not to be able to afford it. This factor is predominant and ranks much higher than the other reasons mentioned by interviewees.

The second most common reason is “lack of skills” to use these devices, mentioned by 13% of the interviewees. The nine-percentage-point difference between interviewees from urban and rural areas who claimed to lack computer skills is noteworthy. In urban areas, this reason was mentioned by 11% of the people who do not have computers in their household; in rural areas this figure reaches 20%, suggesting a greater deficiency of ICT skills in the rural areas of the country. Finally, 11% of interviewees mentioned lack of necessity or interest as the main reason for not having computers in their households.

Chart 2: REASONS FOR THE ABSENCE OF COMPUTERS IN THE HOUSEHOLD (%)
Percentage over the total number of households with children that have no computers



It is worth noting that 87% of household computers are equipped with Microsoft/Windows operating systems, which brings into evidence the high predominance of this type of system. Linux

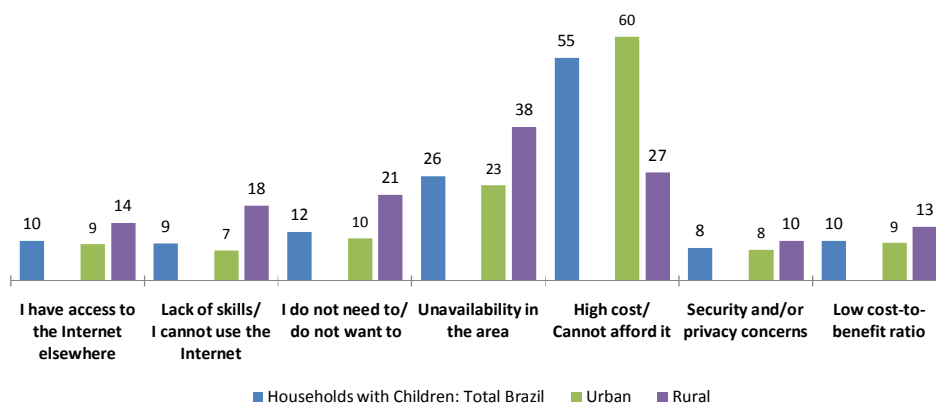
and Mac OS operating systems were mentioned by less than 1% of interviewees, while 12% claimed not to know which operating system they had.

Since 2003, the Brazilian government has been investing on policies that promote the use of free, open-code operating systems. However, the results from the survey show that these efforts have not yet resulted in any benefits. Moreover, as the survey targets households with children, a potential implication of the strong prevalence of Microsoft operating systems is that new generations of computer and Internet users may become used to this software, which suggests a tendency to perpetuate its prevalence and excludes the opportunity to develop an open software culture.

Regarding Internet access, only 15% of the households selected in the sample had access to the network. When the regions of the country are factored in, the analysis of the survey data reveals a strong disparity in the proportion of households connected in each region. At 5%, the Northeast region features the lowest percentage, while the South and Center-West regions rank first, with 25% of households connected to the worldwide computer network in each region. The North region registered 9%, whilst in the Southeast region, this value reaches 21%.

When analyzing the households that have computers but no access to the Internet, it becomes clear that the main barrier preventing access to the network is the high cost of the service, mentioned by 55% of all the interviewees. The results for the rural areas show that this is not the main reason preventing households from having the service, but the “unavailability in the area” instead, which accounted for 38% of all the answers, which is 11 percentage points higher than “High cost/ Cannot afford it”.

Chart 3: REASONS FOR THE ABSENCE OF INTERNET ACCESS IN THE HOUSEHOLD (%)
Percentage over the total number of households with children that have computers, but no access to the Internet



Broadband is the most common type of connection among Brazilians, and it was mentioned by 66% of the households from the general population connected to the Internet, as shown by the ICT Households 2009 survey. This percentage remains the same for households with children: broadband was present in 66% of the households interviewed. Traditional modems are present in 20% of the households from the general population, and among households with children the percentage is lower: 16%, which shows that broadband distribution among households with children is generally similar to that of the households from the general population.

The influence of income on the acquisition of Internet access was significant. If households with children are divided into two different categories according to family income, one up to three minimum wages and the other more than three minimum wages, 22% of the lower-income range population connects to the Internet through dial-up connections and 69% through broadband. Among households earning higher incomes, the corresponding percentages are 9% and 84% respectively.

B. Use of information and communication technologies by children aged 5 to 9 years old

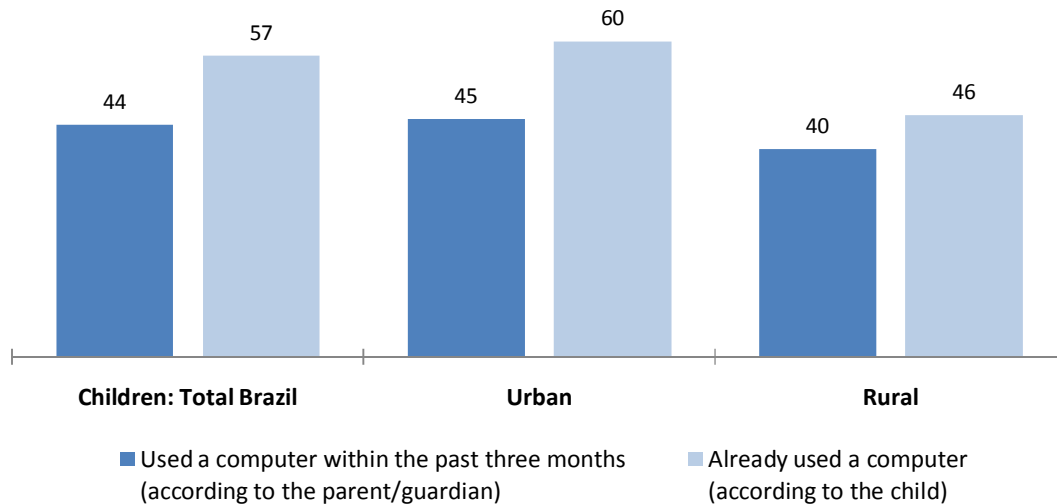
a. Use of Computers, location and frequency of use

The results from the survey reveal that 57% of children aged between 5 and 9 years old have already used a computer, which is higher than the 53% registered by the ICT Households 2009 survey, suggesting that younger generations are significantly more familiar with this technology.

However, when considering the answers given by parents or guardians when asked if their children or wards had used computers in the previous three months, the percentage of use drops to 44%, which is closer to the 43% observed among the general population.

Chart 4: PROPORTION OF CHILDREN WHO HAVE ALREADY USED A COMPUTER (%)

Percentage over the total population aged between 5 and 9 years old



A possible explanation for this variation may be the different reference periods used in each question. Parents or guardians were asked specifically about use within the “previous 3 months”, whereas children were not. Having considered this, the answers given by the children may refer to several reference periods, including periods longer than the “past 3 months”. The question asked of the adults made reference to a fixed period, and this is probably why its corresponding index is lower.

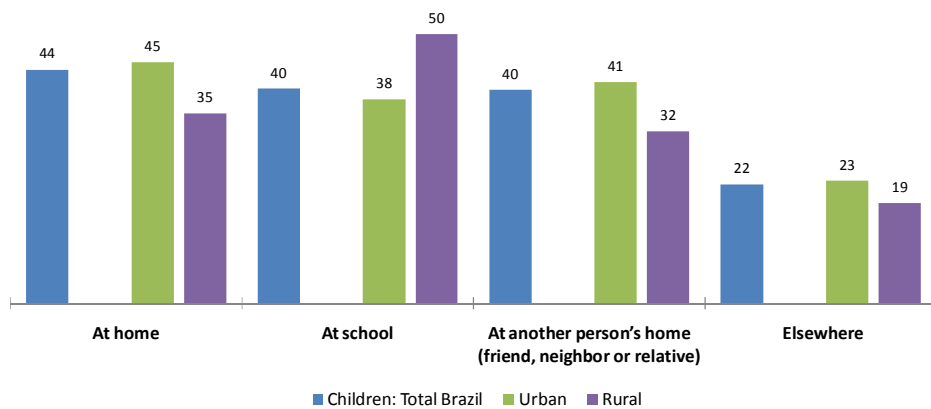
With regard to the locations of access to computers in the survey involving children, the home of the child (44%), the school (40%) and another person’s home (40%) registered very similar proportions. However, the results for the general population show that households are the main location of access, far surpassing another person’s home and school (54%, 27% and 17%, respectively).

When the results regarding children are analyzed separately for urban and rural areas, different patterns of use emerge. In rural areas, schools rank first (50%), followed by the home of the interviewee (35%) and then by another person’s home (32%). These data reveal the importance of schools as a location of access to computers, as they are more conducive to this purpose in rural areas. Moreover, the fact that schools feature as the most important locations of access to the Internet in rural areas, ahead of households, corroborates the idea that the low penetration of computers in these households may help explain why the results regarding computer access and use are lower in these areas than in urban areas. While in urban areas 45% of the children had used

computers within the 3 months prior to the survey, in rural areas, where household access is less common, only 40% of children had done so within the same reference period.

The survey also explores the perspective of the child regarding the relevance of these locations for the use of computers. From this perspective, the household features as the location where children use computers “more times”, significantly surpassing the results obtained by schools. When only the location of access to computers is taken into account, and not the frequency of use in these locations, schools and households are at the same level. However, when surveying the location where access is most frequent, 36% of children claimed the household to be the location where computers were used more often, while 24% mentioned schools and/or another person’s home, revealing a 12-percentage-point difference between the first and the other places mentioned.

Chart 5: LOCATION OF INDIVIDUAL ACCESS TO COMPUTERS (%)
Percentage over the total number of computer users aged between 5 and 9 years old



Among the computer users interviewed, 17% claimed to “always” use the device. In urban areas, 18% of children claim to always use computers, whereas only 9% of the children in rural areas do so. Moreover, 45% of interviewees claim to use computers “sometimes” and 39% “just a little”.

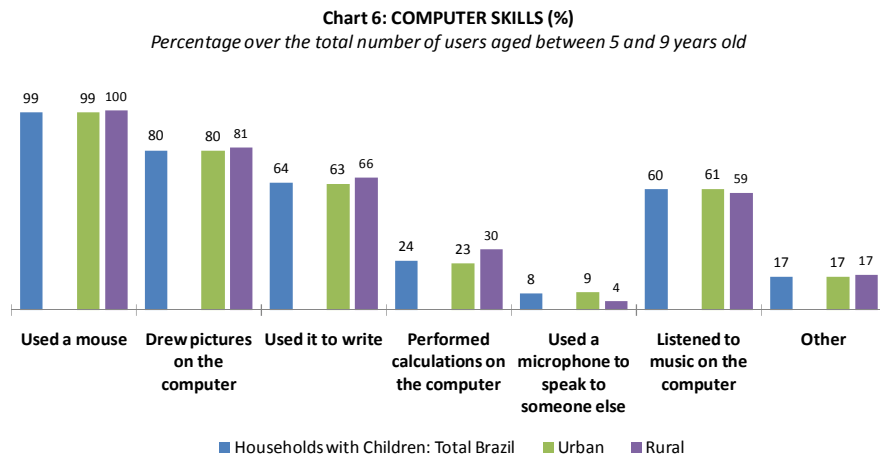
When comparing the location of access to computers with the frequency of use, as perceived by the child, households are the location where use is most frequent. This suggests that the presence of computers at home contributes toward a more skilled use of computers. Among the children who claimed to use computers at these locations, 29% “always” use it, which is 12 percentage points above the average when compared to other access locations. The survey also shows that the percentage regarding the location where computers are used most frequently is twice as high for

households (29%) as for schools (14%). A more frequent use of computers results in better computer skills, bringing as a consequence the ability to perform a wider range of activities.

b. Computer Skills

Regarding computer skills, the main skill mentioned by all of the children that had used a computer was using a mouse, which is needed to carry out various activities. Additionally, 80% of them claimed to use computers to draw, 64% to write and 60% to listen to music.

The gap between the indexes regarding the skills mentioned by children in the rural and the urban areas of the country is only evident when more specific activities are considered, such using microphones and performing calculations with the computer. In urban areas, 30% of children claimed to have used computers to add and to divide, whereas 23% had done so in rural areas. Regarding the use of microphones, results in urban areas reached 9%, whereas in rural areas this index dropped to 4%. Another activity that revealed significant disparity was the use of computers to write: 66% of the children interviewed do so in urban areas, against 63% in rural areas. Activities such as “drawing” (81% in urban areas and 80% in rural areas) and “listening to music” (61% in urban areas and 59% in rural areas) had very similar results.



Regarding the skills developed through the use of computers, it is noteworthy that girls outnumber the boys when it comes to drawing and writing. While 76% of boys had used computers to draw,

among the girls this proportion is of 84%. Moreover, 58% of boys claimed to have used the computer to write, while among girls this skill was mentioned by 70% of the interviewees.

The frequency of use of computers has a direct impact on skill development. In all the activities mentioned by children, as the frequency of computer use increases, so do skills. Thus, the percentage of children who had performed each of the activities was higher among those who claimed to “always” use computers, and lower among those who claimed to use it “just a little”.

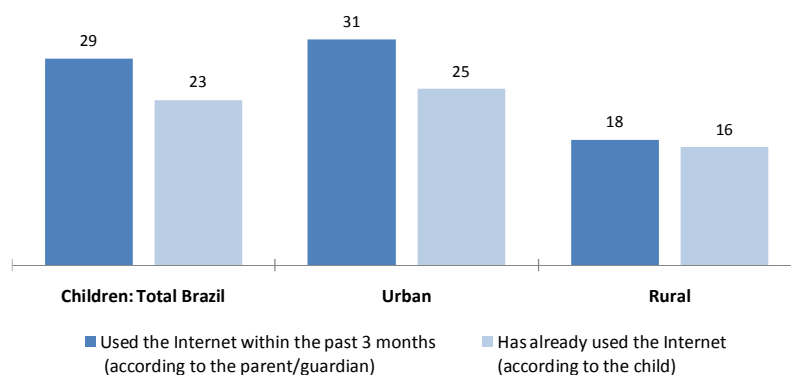
Regarding the location where children acquire these skills, the survey shows that schools are the most prominent, as they were mentioned by 20% of the interviewees who use computers. The high percentage of self-teaching is also noteworthy, as it was mentioned by 16% of children. Also, parents were mentioned by 16% of interviewees, a percentage that in rural areas drops to 7%, suggesting that people are less familiar with ICTs in these areas. Thus, although schools are not the main location of access to computers, they play an important role in promoting skills related to their use.

c. Use of the Internet, location and frequency of use

The survey revealed that 28% of the children aged between 5 and 9 years old claimed to have already used the Internet. In rural areas, the percentage of use drops to 18%, which means that 82% of the interviewees in these areas have never used the Internet. From the perspective of the parents or guardians, however, the percentage of children who had used the network within the three months prior to the interviews was 23%, which is the indicator that determines Internet users in this population, as it refers to use within a recent period of time.

Chart 7: PROPORTION OF CHILDREN WHO HAVE ALREADY ACCESSED THE INTERNET

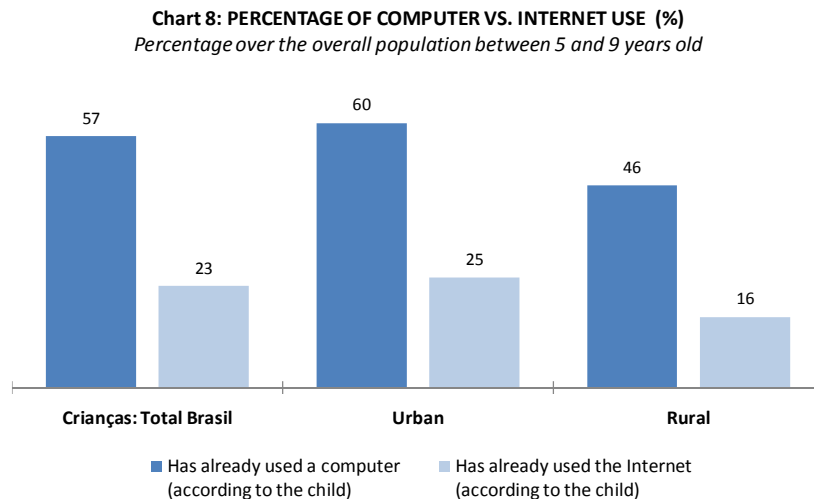
Percentage over the overall population of children aged between 5 and 9 years old



A large variation in Internet use is also revealed when the various regions of Brazil, household income and user age group are taken into account. In the North and Northeast regions, for example, children who had used the Internet within the previous 3 months represented 12% and 13%, respectively, which is far below the 43% registered in the Center-West region. Regarding income, 72% of the children who live in households that earn 10 or more minimum wages had used the Internet within the reference period, whereas among households earning up to 1 minimum wage this proportion was of only 8%.

Age is also a relevant factor regarding the use of the Internet: the older the child, the higher the percentage of children that used the Internet within the three months prior to the survey. Among 5-year-olds, the proportion of Internet users is of 14%, whereas among 9-years-olds it reaches 33%. Social class also featured as a relevant factor affecting this indicator, as among interviewees in class A the proportion of Internet users is of 89%, whereas in classes DE only 8% had used the Internet within the past three months.

It is worth noting that there are significant discrepancies between the use of computers and the Internet, both from the perspective of the children and that of the parents/guardians. From the perspective of the children, 57% claimed to have used computers and only 29% claimed to have used the Internet. Their parents and guardians also perceive computers use as being much more frequent than Internet use. According to them, 44% of children aged 5 to 9 years old had used a computer within the previous 3 months, whereas only 23% had accessed the Internet within the same period.



Among the general population this difference is very small: four percentage points. While 43% of the people aged 10 years old or older claimed to have used computers within the three months

prior to the survey, 39% had used the Internet within the same reference period, and this difference is not very constant when income ranges are taken into consideration, which implies that this variable may provide a partial explanation to the phenomenon. The gap between computer users and Internet users decreases as family income increases: among those who earn up to one minimum wage, 22% are computer users and 8% Internet users, revealing a gap of 192%. Nonetheless, the percentage of children who are computer users (75%) is only 4% higher than the percentage of children who are Internet users (72%) among those who earn 10 or more minimum wages.

Therefore, the difference between the general population and the behavior of children is expressive and cannot be explained by the income variable alone. Thus, another possible explanation for the low rate of Internet use among children is related to accessibility and the content available on the Web.

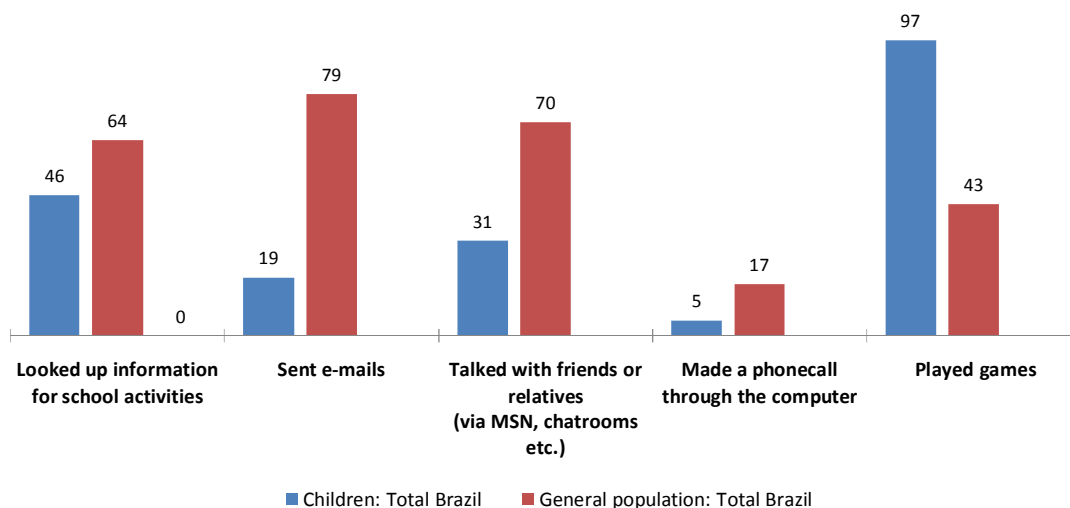
Within this context, it is worth questioning whether Internet websites are appropriate for an infant audience, that is, whether they are accessible to children. The term Web accessibility was initially coined with the purpose of providing Internet access for the disabled. Specific guidelines for website design were then set forth to meet these demands. From a broader viewpoint, this is a highly relevant concept, because it involves the construction of the kind of Web that enables everyone to perceive and understand the Internet, as well as browse and interact through it, thereby also contributing to its construction. Hence, we must ask if those who contribute to the development of the Web on a daily basis are aware of the need to make it accessible to children. Another question: are there any guidelines for the development of a Web accessible to children?

The results of the survey with children aged up to 10 years old show evidence that the Internet can be more exclusive toward this segment of the population. A sign of this is the discrepancy between the percentage of children who are only computer users and that of those who are Internet users as well. Moreover, the perception that the Internet is not very accessible to them is confirmed when comparing the different uses mentioned by the general population and by those who are 5 to 9 years old. The analysis of the activities performed by 5- to 9-year-olds shows that their use is focused on activities involving games. Thus, it can be seen that 97% of children use the Internet to play games. The most prominent among the other activities surveyed, "played on TV cartoon websites", has only half of the penetration of gaming, that is, it was mentioned by 55% of the children who use the Internet.

According to Chart 9, Internet use among the general population is more diverse and widespread than among the children interviewed. On the other hand, among the uses mentioned by children aged 5 to 9 years old, the percentage of activities involving recreation and gaming is noteworthy.

Other activities involving communication and education are not widely performed among this segment of the population.

Chart 9: ACTIVITIES PERFORMED ON THE INTERNET (%)
Percentage over the total number of Internet users aged 5 to 9 years old



Communication between children and friends and relatives was mentioned by 19% of internauts in this age group. Sending e-mails reached 31%, but it was concentrated among 8- and 9-year-olds (24% and 27%, respectively). Besides, 5% of the children who use computers talk to friends using a microphone. Thus, activities such as games and children’s play, although not widespread, show evidence of future changes in the way people communicate. Apart from the wider variety of channels used, there is also a different perception of value associated with these activities, due to the fact that this segment of society becomes accustomed to less expensive means of communication from a young age.

Access to the Internet among children aged 5 to 9 years old takes place mainly in the household, which was mentioned by 49% of the interviewees who had accessed the worldwide computer network. “Another person’s home” ranked second, and was mentioned by 35% of children. The high rate of household Internet use revealed by the survey reinforces the importance of computer ownership for bringing new technologies closer to users.

Besides households, other places of access to the Internet are relevant to children. “School” is mentioned by 27% of interviewees aged 5 to 9 years old, followed by “other places” (25% - in which

LAN houses registered 22%). Telecenters are not very expressive within this age group and are used by approximately 5% of the interviewees in this segment.

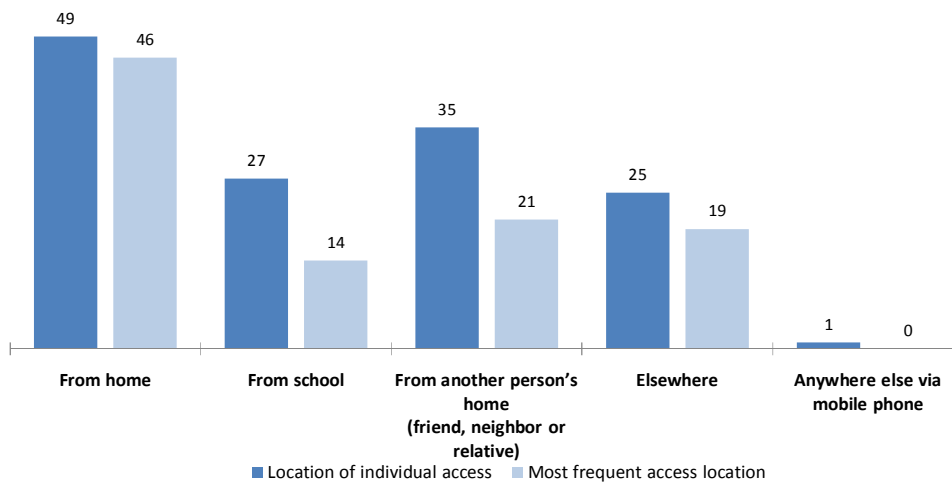
It is noteworthy that the location of access to the Internet varies according to the age of the interviewee. In school, for example, the percentage of Internet use is lower among 5-year-olds (15.5%) and higher among 9-year-olds (35%). Interestingly, the situation is reversed when it comes to households: whereas 64% of the children aged 5 years old claimed to have accessed the Internet from their households, 40% of 9-year-olds had done so.

It is worth noting that the location where computers are used does not always coincide with the location of Internet access. According to the survey, 40% of children claim to use computers at school, whereas only 27% access the Internet from this place. The low rate of access to the Internet from schools, compared to the higher rate of computer use, may be related to an infrastructural issue, such as unavailability of a local connection, restricted or controlled use of the Internet at school, teachers who are not qualified to use it with students, or the school staff being unfamiliar with the use of ICTs.

Another factor that corroborates this analysis is the results for the “most frequent place of access” indicator: schools were behind households and LAN houses, and were mentioned by 14% of children as the most frequent access location.

Chart 10: LOCATION OF INDIVIDUAL ACCESS TO THE INTERNET VS. MOST FREQUENT LOCATION (%)

Percentage over the overall number of users aged between 5 and 9 years old



It is worth noting that despite the low rate of Internet use in school, this place was mentioned as the most important for computer skill acquisition. Besides, mass communication outlets, which include the Internet, play a key role in the process of social interaction, as they are the main providers of information and images of our time (GIRARDELLO, 2008).

It seems beyond any doubt that the various communication outlets currently play a fundamental pedagogical role: they promote socialization and communicate the codes that make the world function, a role that is shared between the media and schools. After all, the importance of the Internet in this process raises the legitimate question of whether schools are, in fact, preparing students to use it appropriately (GIRARDELLO, 2008).

Households featured as the most frequently mentioned location of Internet access, mentioned by 46% of the children. Another person's home (21%) ranked second, followed by "elsewhere", with 19% (17% of children mentioned that LAN houses were this other location).

The survey also takes into account the perception of children themselves when interviewed about their frequency of Internet access. According to the results from the survey, 21% of users aged 5 to 9 years old claimed to access the Internet "always", 49% "sometimes" and 30% "just a little". Among households, the proportion of children who claimed to always access the Internet was higher than the general average: 34%. Moreover, it was twice the percentage observed in schools, which came to 17%. Use of the network in schools is still behind "another person's home", which features 18%.

d. Use of e-mail

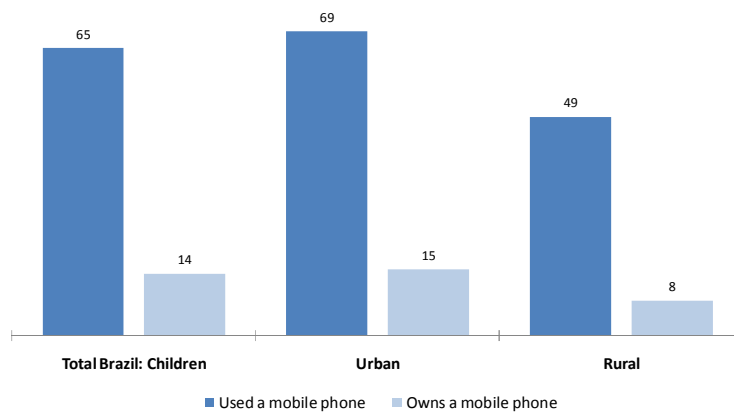
The results from the survey show that 31% of the users interviewed who use the Internet have e-mail accounts. Analysis of the data by age group reveals that, generally, the increase of this figure is directly proportional to age. While 10% of children aged 5 years old claimed to have e-mail accounts, this percentage increased to 37% among 9-year-olds. Additionally, among those who have e-mail accounts, 26% are boys and 36% are girls. It is also noteworthy that 19% of children claimed to send e-mails, which is less than the 31% registered among 5- to 9-year-olds who claim to have e-mail accounts. It is possible that parents or guardians be the ones who create e-mail accounts for their children, especially in the case of 5-year-olds, in order to provide them with access to applications such as social networks or even online games.

e. Wireless Access

Besides the use of computers and the Internet, the survey also investigated the use of mobile phones among children. This technology proved to be the most common among the subjects surveyed: 64% of children aged 5 to 9 years old have already used a mobile phone and 14% own a

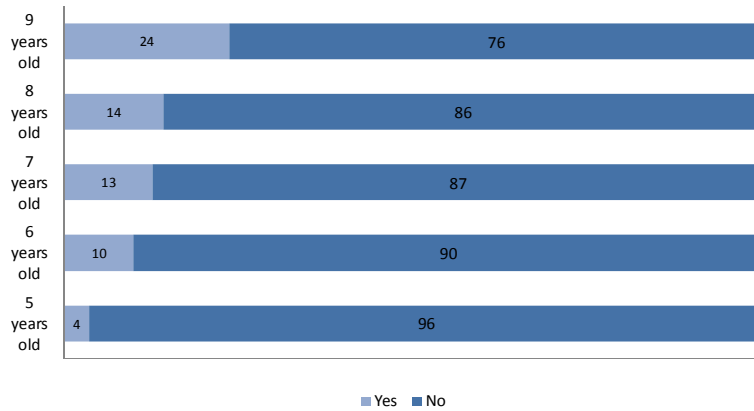
device. It also shows that, in addition to the high penetration of mobile phones among children, there is a large gap between ownership and use of these devices, which could be due to the high number of users per phone, which often belongs to one member of the family but is used collectively.

Chart 11: PERCENTAGE OF USE VS. OWNERSHIP OF MOBILE PHONES (%)
Percentage over the total population aged between 5 and 9 years old



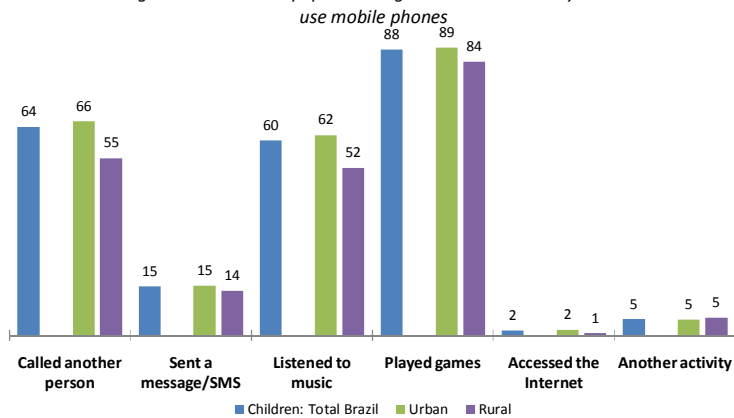
Despite the fact that the percentage of ownership of mobile phones is lower among children than among the general population, 14% and 59% respectively, the percentage registered for children under nine years of age is significant. It should be taken into account that interviewees are not yet able to make decisions regarding which device they purchase, and therefore are bound by the decision made by the parents. Nine-year-old children registered the most prominent results regarding mobile phone ownership, which was claimed by 24% of interviewees.

Chart 12: PROPORTION OF CHILDREN THAT OWN MOBILE PHONES (%)
Percentage over the overall population of 5 to 9 year olds



Among children, the main use of this technology is not communication, but entertainment. Therefore, 88% of the children who use mobile phones do so to play games, an activity that is far more recurrent than communication, compared to 64% who claimed to use mobile phones to talk with other people. Moreover, the survey revealed that mobile phones are often used to listen to music, as 60% of children claimed to use them for this purpose. It is worth noting that this is a much higher percentage than the one obtained when interviewing the general population, 25% of which claimed to use mobile phones to access songs or videos.

Chart 13: ACTIVITIES PERFORMED WITH MOBILE PHONES (%)
Percentage over the overall population aged between 5 and 9 years old who use mobile phones



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