Education Policy Analysis Archives/Archivos Analíticos de Políticas Educativas
ISSN: 1068-2341
epaa@alperin.ca
Arizona State University
Estados Unidos

Duarte, Rosália; Cazelli, Sibele; Migliora, Rita; Coimbra, Carlos
Computer Skills and Digital Media Uses among Young Students in Rio de Janeiro
Education Policy Analysis Archives/Archivos Analíticos de Políticas Educativas, vol. 21, enero, 2013, pp. 1-29
Arizona State University
Arizona, Estados Unidos

education policy analysis archives

A peer-reviewed, independent,
open access, multilingual journal

Arizona State University

Volume 21 Number 53 June 24th, 2013 ISSN 1068-2341

Computer Skills and Digital Media Uses among Young Students in Rio de Janeiro

Duarte, Rosália
Pontificia Universidade Catolica do Rio de Janeiro
Cazelli, Sibele
Museu de Astronomia e Ciências Afins
Migliora, Rita
Pontificia Universidade Catolica do Rio de Janeiro
Coimbra, Carlos
Museu de Astronomia e Ciências Afins
Brazil

Citation: Duarte, R., Cazelli,S., Migliora,R. and Coimbra, C. (2013) Computer Skills and Digital Media Uses among Young Students in Rio de Janeiro. *Education Policy Analysis Archives, 21* (53) Retrieved [date], from http://epaa.asu.edu/ojs/article/view/1241

Abstract: The main purpose of this paper is provide information relevant for the formulation of new policies for the integration of technology in education from the discussion of research results that analyse computer skills and digital media uses among students (between 12 to 18 years old) from schools in the city of Rio de Janeiro, Brazil. The schools surveyed were selected by a stratified random sample. The questionnaire allowed for statistical measurement of theoretical constructs employing non parametrical item response theory. The schools showed a homogeneous pattern with regard to the frequency of use and the ability of students to perform tasks on the computer. Most students use the computer and the Internet at home. The use of computers in schools is minimal and does not influence the students' ability. Even so, the use of a computer at school positively affects the frequency of use and suggests that schools can play a role in promoting digital inclusion. The availability of media resources at home, how long students have been using a computer and cultural practices during the students' free time had notable positive correlations with the student's abilities. The results suggest that the relation between age and abilities in the use of computer and internet was

Journal website: http://epaa.asu.edu/ojs/
Facebook: /EPAAA
Twitter: @epaa_aape

Manuscript received: 09/22/2012
Revisions received: 01/11/2013
Accepted: 02/04/2013

not significant, except in reference to school delays which were related to age and to students' grades, i.e., the more delayed a student is, the less able he/she will be.
Keywords: youth; educational policy; media use; computer abilities

Habilidades de uso de la computadora y de medios digitales entre jóvenes estudiantes de la ciudad de Río de Janeiro

Resumen: El objetivo de este artículo es ofrecer elementos para la elaboración de políticas de inserción de tecnologías de la información en la educación pública, a partir de la discusión de los resultados de una investigación que analiza los usos y las habilidades de uso de la computadora y de la internet entre los estudiantes (de 12 a 18 años) de escuelas públicas de la ciudad de Río de Janeiro. Las escuelas investigadas fueron seleccionadas a través de un muestreo aleatorio estratificado. El cuestionario permitió la medición estadística de constructos teóricos con la utilización de la teoría de respuesta al ítem no paramétrica. Las escuelas mostraron un patrón homogéneo con respecto a la frecuencia de uso y a las habilidades de los estudiantes en actividades llevadas a cabo en la computadora. La mayoría de los estudiantes utiliza la computadora y la Internet en casa. El uso de la computadora en la escuela es mínimo y, por lo tanto, no influye en las habilidades de los estudiantes. Sin embargo, el uso de computadora en la escuela tiene un efecto positivo en la frecuencia de uso y sugiere que las escuelas pueden desempeñar un papel positivo en la promoción de inclusión digital. La disponibilidad de medios digitales en la casa de los estudiantes, el tiempo el uso de la computadora y las prácticas culturales cultivadas llevadas a cabo durante el tiempo libre tienen una correlación positiva y significativa con estas habilidades de los estudiantes. Los resultados sugieren que la relación entre la edad y la habilidad en el uso de la computadora y de la Internet no fue significativa, excepto cuando hay desfasaje entre la edad y el grado cursado por el alumno, es decir, cuánto más el alumno está atrasado en relación al grado o año escolar, menos habilidoso ele será en relación a eses usos.
Palabras clave: juventud; política educacional; uso de medios; habilidades en el uso de la computadora

Habilidades de uso de computador e mídias digitais entre jovens estudantes da cidade do Rio de Janeiro

Resumo: O objetivo deste artigo é dar subsídios para a elaboração de políticas de inserção de tecnologias da informação na educação pública a partir de discussão de resultados de pesquisa que analisa usos e habilidades de uso de computador e internet entre estudantes (de 12 a 18 anos) de escolas públicas da cidade do Rio de Janeiro. As escolas investigadas foram selecionadas por meio de amostra aleatória estratificada. O questionário permitiu a medição estatística de constructos teóricos empregando a teoria não paramétrica de resposta ao item. As escolas apresentaram um padrão homogêneo em relação à frequência de uso e às habilidades dos estudantes no que diz respeito às atividades realizadas no computador. A maioria dos estudantes usa computador e internet em casa. O uso de computador na escola é mínimo e, por isso, não influencia as habilidades dos estudantes. Mesmo assim, o uso do computador na escola tem efeito positivo na frequência de uso e sugere que a escola pode desempenhar papel positivo na promoção de inclusão digital. A disponibilidade de recursos de mídia na casa do estudante, o tempo de uso do computador e práticas culturais cultivadas realizadas no tempo livre têm correlação positiva e significativa com as habilidades dos estudantes. Os resultados sugerem que a relação entre idade e habilidade no uso do computador e da internet não foi significativa, exceto no que se refere à defasagem idade/série, isto é, quanto mais atrasado em relação ao ano de escolaridade o estudante estiver, menos habilidoso será.
Palavras-chave: juventude; política educacional; uso de mídia; habilidades no uso do computador

Introduction[1]

In Brazil, according to the National Research of Households Sample for 2009 (Pesquisa Nacional por Amostra de Domicílios — PNAD, 2009), of the Brazilian Institute of Geography and Statistics (Instituto Brasileiro de Geografia e Estatística — IBGE), approximately 16 million Brazilian homes have computers with internet access. Children (10 years and older) and young adults form the most significant segment of internet users in the country. In 2009, when the data for this research were collected, the group between 15 and 17 years of age represented 62.9% of the 67.9 million people accessing the internet.

Access is still very uneven, however: 57.1% of the users have internet access at home while 35.2% use it in public places (internet cafe). There are also regional differences: in 2009, the higher percentages of users were in the Southeast (48.1%) and Centerwest (47.2%) regions, while the lower percentages were in the North (27.5%) and Northeast (25.1%) of the country. Additionally, more than half of the homes with computers (10.2 million) are in the Southeast region, with higher average incomes.

The access to IT (Information Technology) in large numbers started in 2005 with the increase of purchasing power by lower socioeconomic classes and with the implementation by the government of policies for the reduction of inequality in access to the internet. These strategies involved mainly the implementation of public computer centers and the introduction of computers in schools through the creation of computer laboratories or by providing teachers and students with individual personal computers. However, these policies were not based on research developed in the educational field, which made the proper articulation between IT integration in schools and educational projects difficult. The study reported in this paper is part of the attempt by Brazilian researchers to integrate into a research field, already consolidated internationally, on abilities acquired in the use of digital media. The main purpose is to provide information relevant for the formulation of new policies for the integration of technology in education.

Studies on abilities in the use of digital media were improved at the end of the 1990's in the most economically developed western countries, fostered by technological developments and by the broadening of media access. These studies have focused on a few aspects, such as: describing and analyzing the abilities that users of digital media develop in their daily relation with them; investigating how these abilities are developed; which of them are learned intuitively and which need to be taught, with the purpose of better comprehending the opportunities and risks involved in their use and to evaluate the different access levels of the population; analyzing opportunities and risks resulting from their use; and, fundamentally, offering evidence that supports public education, health, digital inclusion and citizen participation policies.

In the educational field, these studies also have the purpose of evaluating learning processes in order to guide the educational use of computers and the internet. A relevant part of the investigations carried out in Europe (Livingstone & Haddon, 2009; Mediappro, 2006; Kredens & Fontar, 2010) and in the U.S. (ITO, 2010) detected a strong presence of digital media in the daily lives of children and young adults outside schools and a slow (and sometimes inadequate) assimilation of these technologies by educational institutions. This has led agencies and international organizations to foster the financing of research in the area and to provide support for the implementation of policies.

[1] This research was supported by FAPERJ (Foundation for Research Support of the State of Rio de Janeiro) and CNPq (National Research Council of Brazil)

This paper presents the results of a research project entitled "Youth and Media: school and social factors" among students of the network of municipal Public Schools in the city of Rio de Janeiro. The research was conducted in partnership with the Research Group in Media and Education (GRUPEM), the Education Evaluation Laboratory (LAEd) and the Research Group for Science Education in Informal Spaces (GECENF) of the Coordination of Science Studies at the Museum of Astronomy and Correlated Sciences (MAST). The proposed study involved the development and application of questionnaires (see Appendix) to 3,705 ninth grade students , 127 teachers, and 39 directors in a sample of 39 schools, with the aim of identifying the ways in which media is utilized by students and their teachers, and the skills developed in the different kinds of use.

The research focused mainly on students' abilities in media use. The questionnaires answered by teachers and directors were analyzed separately. It was not possible to compare the students' data to those of the teachers and directors as the data bases were not compatible. In the case of teachers, the number of respondents was not considered significant for a representative sample. The questionnaires answered by the school directors contained questions about management and school climate, which were therefore different from those contained in the questionnaires answered by students and teachers. For those reasons this paper only presents the results for the students.

Results of this research are presented and compared with the results of other similar surveys such as "The appropriation of new media by youth" (Mediappro 2006), which was a reference to the development of research strategies, and *Comprendre le comportement des enfants et adolescents sur Internet pour les protégés des dangers* (Kredens & Fontar, 2010). These research studies, in addition to attempting to understand the risks involved in the use of internet by young adults, also tried to observe their uses of internet and the abilities developed, as well as the time dedicated to the various activities involving internet, both in their free time and at school.

In 2006, the Mediappro research, the Appropriation of New Media by Youth, was published. It observed the uses, appropriations and representations made by young adults, especially with respect to new media, in nine European countries (Belgium, Denmark, Estonia, France, Greece, Italy, Poland, Portugal and the United Kingdom) and in the city of Quebec (Canada). The research involved 8,743 students between the ages of 12 and 18 years. The study had as its basis the idea that the more youngsters learn how to avoid the risks of the internet (researchers considered risks such as the possibility of suffering any type of physical, psychological or financial damage in the use of internet) the greater the possibility of them navigating safely. Therefore, the young adults must be able to transform an unknown danger into a risk perception. This capability depends on abilities such as keeping their independence and critical sense, which are recurring subjects in Media-Education. The Mediappro research developed an extensive questionnaire, and, among the concepts it was designed to observe, were computer uses and abilities. The questionnaire posed questions that avoided revealing some aspects of the students´ family life, but with the purpose of knowing what they do routinely. The main objectives were to study existing practices in education for the new media; study the practices and representations of youngsters with respect to new technologies (cellular phones, internet, video games multimedia supports) through an international questionnaire; identify educational and technological recommendations that could be adapted to the concrete conditions of the target audience (schools, associations, families) and their social context; contribute to the evolution of educational practices on the internet and new technologies; and to promote a safer use of new technologies.

Kredens and Fontar's (2010) research, called *Comprendre le comportement des enfants et adolescents sur Internet pour les protégés des dangers*, analyses four areas: forms of participation, public nets, learning based on pairs, and literacy for new media. This research, with data collected in 2008, consisted of

both qualitative and quantitative data. Forty-eight thorough interviews were carried out and served to direct the quantitative analysis (which involved one thousand French students) with the purpose of understanding their representations about the internet, contexts and types of use in general, the different uses, the knowledge and confrontation with the risks of using the internet. Giving emphasis to practice, the research was not centered only in risks. According to this research, there is a strong correlation between the representations children have about the internet and their practices on the internet. Therefore, youngsters define the internet according to their own practical use, i.e., as an entertainment tool, as a communication tool, and as a large library.

As for old media, the results show that French children prefer television and that this preference decreases with age. On the other hand, in the basic education cycle, middle school younger students prefer the internet and among students of high school the consumption of television and internet is similar.

Method

The Youth and Media research group collected data from 3,705 ninth grade students from 39 public schools in the municipality of Rio de Janeiro. The schools were randomly selected from the 1,024 subdivisions within the network of municipal schools in five strata, considering size, location, and availability of electronic equipment. The final sample originally had 40 schools. The questionnaires were answered by students, teachers and directors of the selected schools. Dates and times were scheduled for answering the questionnaires. All students in the 9th grade were present on the date set for answering the questionnaires, as were their teachers. The field work started on November 3 and finished on November 17, 2009. The visits to schools involved about 25 professionals hired and trained, in addition to members of the research groups who coordinated the research project. The management of one of the schools had problems with finding time available in their calendar and, after having repeatedly rescheduled the visits, asked for it to be definitely cancelled. At that point, it was no longer possible to recruit a new school. The sample was therefore composed of 39 schools, being seven Pole schools (schools who have equipment and laboratories for working with media) and eight schools in each of the other strata.

The questionnaires for the students consisted of thematic blocks (see Appendix). These were analyzed in order to build one-dimensional scales or factors in order to define the measurement of theoretical constructs of interest. For this, we used the theory of nonparametric item response that checks the fit of a Mokken scale by means of the coefficient of scalability H (Sijtsma and Molenaar, 2002). The item response theory for polytomous items is generally preferable, compared to principal component analysis, since the latter tends to produce spurious factors in the presence of items with large differences in popularity or difficulty (Van Schuur, 2003).

Questions on computer use by students formed a group of six items: (1) whether or not the student uses the computer, (2) how long he/she has been using the computer ("less than one year," "more than a year," "more than two years," "for more than five years"), (3) how frequently does he/she use the computer ("never" to "several times a day/every day") in school, (4) how frequently does he/she use the computer at home, (5) how frequently does he/she use the computer in a friend's house, and (6) how frequently does he/she use the computer in a public place. The thematic group that sought to measure the frequency of use was composed of 21 items that offered seven response options in an increasing Likert scale, ranging from "never" to "several times a day/every day." The block created to measure skills consisted of 20 items in order to identify the students' perception of their ability to perform tasks on the computer. The response options were on a rising scale of five levels: "I do not know what that means," "I know what that means, but do

not know how to operate it," "I can do it, but only with the help of others," "I can do this alone, but I have some difficulty" and "I can do this alone with no problem." The items on "uses and skills" had as references the Mediappro international survey (2006) and the PISA survey questionnaire (ICT Familiarity Component for the Student Questionnaire, PISA 2006).

The block on the habits and practices of the students in their spare time was formed by listing 30 items, analyzed by confirmatory and exploratory modes. These items, offering seven response options ("never" to "several times a week"), addressed activities such as cultural habits, leisure activities outside the home, television programs watched, sports activities, and religious practices.

Responses to selected items for the study of the availability of media assets in the student's home involved a dichotomous choice. The items addressed resources of digital media, print media, and digital equipment. The exploratory procedure showed the existence of two scales: availability of media resource (8 items; H=0.44 and reliability of 0.74) and availability of books (2 items; H=0.37 and reliability of 0.31).

The socioeconomic and demographic profile of the students was observed by asking the usual questions such as those on sex, age, ethnicity/race, education of mother and father, and households, and followed the formula used in the national demographic surveys. These questions, except the last, gave rise to indicator variables in the regression models. The list of households resulted in the creation of a range of economic levels for the students (8 items, H=0.28 and reliability of 0.68).

Questions about student perceptions of violence at school followed the pattern of the evaluation of basic education in Brazil (Saeb and Prova Brasil – both administered by the Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira of the Ministry of Education). The set of items chosen for the study of perception formed a scale called "school violence related to the student" (6 items, H=0.43 and reliability of 0.65).

Results

This section presents and discusses two linear regression models. First we describe the dependent variables frequency of computer uses and abilities in the use of computers and the internet. We show how the scale variables were constructed and present their statistical properties. The variables are discussed in relation to other media studies. Then the regression models are described and their consequences discussed.

In the analysis of the data, violence perception by the students and strata did not show significant results in any of the regressions. In the same way, the relation between age and abilities in the use of computer and internet was not significant, except in reference to school delays which were related to age and to students' grades.

Types of computer and internet use

Students participating in the survey were mostly of 14 and 15 years of age (71%). Male students form 51% of the sample. Figure 1 shows the cross distribution of sex by age group. As can be seen, females are the majority among the younger students while males are the majority among the students left behind the modal group of 15 years of age. More than 70% of the students said that they have been using computers for more than three years and that they use them mostly at home, where 47% had broad band internet connection and 15% had dial-up connection. The pattern of computer use at school must be noted, 68% of the students declaring that they never use a computer at school. Figure 2 shows the cross distribution of computer use at school (never, rarely, more than once a month) and the time the student said they've been using computers.

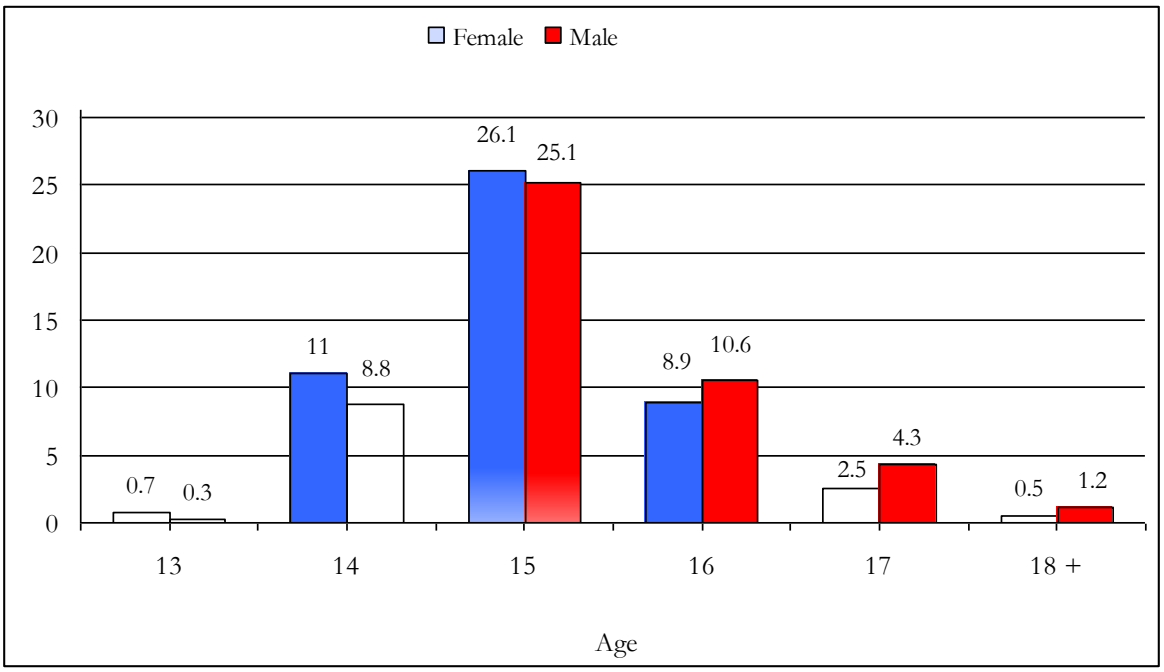

Figure 1. Histogram of the cross distribution, in percentages, of sex by age groups of the students in the sample

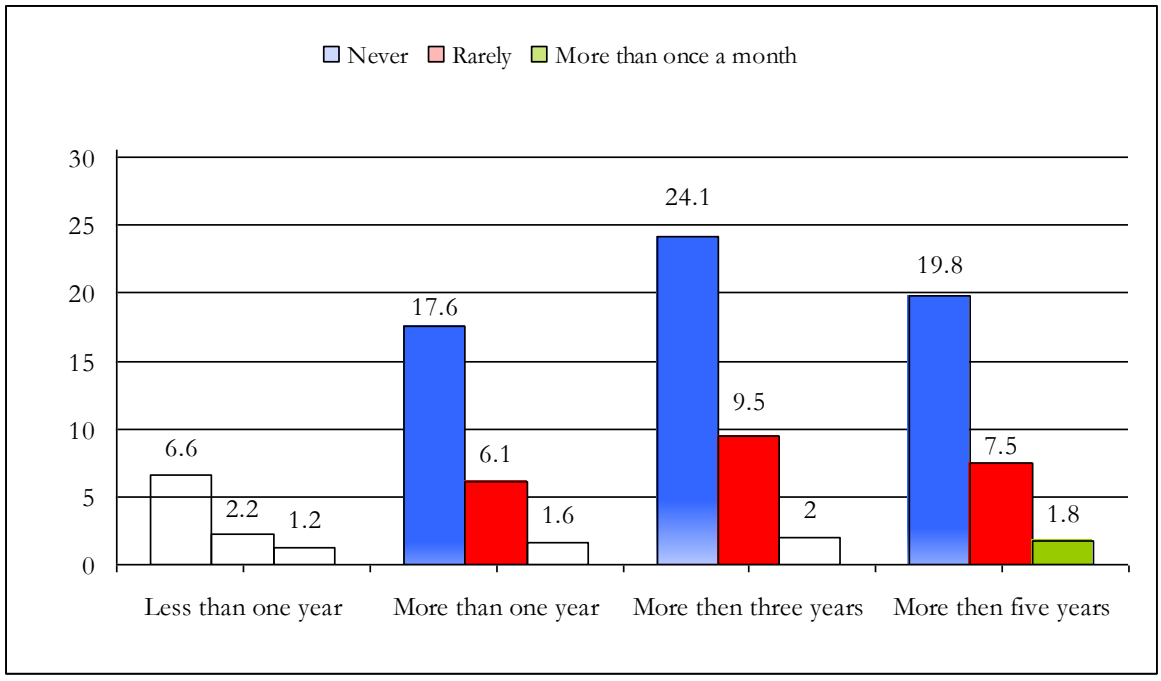

Figure 2. Histogram of the cross distribution, in percentages, of computer use at school, according to the time the students said they have been using a computer

There were no significant differences between genders in the use of computers, except with regard to online games: 43.2% of boys said they played online games intensively, while only 16.5% of the girls reported the same. Girls were more likely than boys to use the Internet for activities related to photography. This difference is not, however, explained in the literature, so it requires new research.

Although coming from the poorer classes with parents who, for the most part, have not completed high school, these young people make frequent use of digital technologies in their homes. More than half of them have broadband at home and only 30.6% reported using a computer in public spaces. Computers and the Internet are still very expensive in Brazil and the significance of their presence in the homes of low income families should be noted. It is believed that this is due to two interrelated factors; one is merchandising in character and the other is of a social nature. While, on the one hand, politically and economically, digital technologies are associated with academic achievement and professional success, on the other hand, children and young people seem to now have a sense of belonging associated with online communication and participation. Almost all advertising for computers and internet providers is anchored in the phrase "web access" and equates it to "career success". Moreover, youth culture feeds the argument that "those who are not online, do not exist". It is thus up to the family to provide access to the internet to ensure that the younger people have both a promising future and a social life.

Kredens and Fontar (2010) show that, regardless of age, 93% of the activities connected to the Internet were performed at home. The preferred online platforms for most of them were Facebook, YouTube, and MSN; however, 340 other sites also appeared on the list of favorites. According to the authors, even though they share common practices, young people do not all play the same games or visit the same music sites. That led them to believe that the internet can help reconcile the demands of different groups with varying personal preferences and interests.

Mediappro (2006) sought to identify uses, appropriations, and representations of young people related to the new media in nine European countries and concluded that the use of the internet is universalized. In analyzing the data, they highlighted another important issue: the fact that young people indicate that they learn more about the uses and computer skills at home, either with friends, siblings or parents (Mediappro, 2006).

Both studies highlight the gap between the use of the computer and the Internet at school and at home. The young people who were surveyed access the Internet primarily from home and the authors argue that this difference in use is evident in terms of frequency, access, regulation, learning, skills development, and the type of activity. Youth and Media Research identifies only 3.4% of students using computers at school "several times a week", "once a day" or "several times a day (every day)".

The European research mentioned above and the results of this Brazilian study indicate a low frequency in the use of computers and the Internet for activities that involve acquisition of new knowledge and creative and autonomous learning. For participants in this survey, searching for information relating to the nature of school knowledge and education, using educational programs, writing texts to produce new content and activities, and preparing presentations seemed to be infrequent activities.

In this study, 27% of the students who answered the questionnaire said that they use educational programs to learn school subjects, 30.4% said they often use the computer to do their homework, and 26.8% reported using the technique of "cutting and pasting" text from the Internet to do their homework.

Table 1 presents a description of the lower end of the scale measuring the frequency of computer use. The five least popular items are shown along the percentage of responses in the lower

end of the Likert scale of response options. The popularity of items are measured by the items means, that is, the sum of all responses (with the 7 point Likert scale coded numerically from 0 to 6) divided by the number of respondents. This shows students behavior in relation to activities less frequently undertaken. The complete scale of computer uses, with the statistics of scalability, is presented in the appendix.

Table 1
Activities less frequently undertaken by students (i.e. with lowest item means) and the percentage of responses on the lower end of the Likert scale

Items concerning activities on the computer	Item mean	Never (%)	Rarely (%)
Downloading or reading digital books	1.31	44.1	30.5
Posting digital videos	1.78	31.3	33.1
Drawing, painting, or using graphics programs	1.92	26.7	37.3
Writing personal texts	1.92	30.1	31.3
Using educational programs (for school subjects)	2.27	15.7	32.8

Note: Puc-Rio/Mast-Research Youth and media: school and social factors, 2009

The fact that the use of educational programs ranks among the lowest seems to be consistent with the answer on the use of computers at school: 68% of the students said that they never use the computer at school. Another activity that is less frequent is the reading or downloading of digital books, which may be associated with unfamiliarity with the practice of online reading.

There is no empirical evidence of correlation between the low use of computers and the Internet at school and the low frequency of their use for educational activities. However, it does not seem absurd to assume that there is at least an absence of mediation by the schools in favor of this aspect of learning.

This study indicates young people tend to use the Internet for social activities and entertainment, as shown in Table 2, which presents a description of the higher end of the scale measuring the frequency of computer uses. This shows students behavior in relation to the most popular or most practiced items.

This preference suggests a fine delineation of a boundary between the online and offline world. If being in touch with friends and colleagues for as long as possible, talking, listening to music, and watching movies have a high priority in the lives of young people, it is not surprising that the stress is higher on the use of the internet for online activities that involve communication and entertainment. Keeping in mind the activities of youth, the results of the Youth and Media research are similar to those obtained by Kredens and Fontar (2010). "Communication via Skype, MSN, or others" is an activity carried out by 67% of young Brazilians and has the highest frequency (once a day; several times a day /every day) as compared to 75% of French young people, who have online discussions as one of their favorite activities.

Table 2
Activities more frequently performed by students (i.e. with higher item means) and the percentage of responses on the higher end of the Likert scale

Items concerning activities on the computer	Item mean	Once a day (%)	Several times a day/Every day (%)
Frequenting social networking sites	3.33	9.3	59.0
Communicating via Skype, MSN, or any other service	3.37	9.8	56.9
Downloading music	4.08	11.0	42.7
Watching movies and clips online	4.67	10.7	30.1
Posting photographs	4.81	9.4	27.2

Note: Puc-Rio/Mast-Research Youth and media: school and social factors, 2009

It is worth emphasizing that the data of the Mediappro survey were collected between 2005 and 2006, when social networking sites had started to expand. This can be one of the reasons why the use of computers to access social networks does not appear among the five preferred and more common activities of young people in that study; the use of "search engines" was most common among the young people (98%) who participated in that research.

Skills involved in the use of a computer and the internet

We define skills in this context as specific abilities needed for the efficient use of available resources on the computer and the internet. Table 3 presents the five tasks perceived as most difficult for which Brazilian students reported lower levels of skill. The difficulty of a task is measured by the item's mean, that is, the sum of all responses (with the 5 point Likert scale coded numerically from 0 to 4) divided by the number of respondents. The table also presents the percentage of responses on the two options indicating lowest abilities. The complete scale of computer skills with the statistics of scalability are presented in the appendix.

Table 4 presents the tasks perceived by students as the easiest, measured by averaging the responses to the item mean. The table also includes the percentage of the responses to the two options indicating the highest abilities.

The ability to multitask appears as the ability with the highest level of response among the young people surveyed, it being an important cognitive skill that, according to Jenkins, is part of the "New Literacies required by 'convergence culture'" (Livingstone, 2009, p. 83). It should also be noted that, for these young people, the Internet is a strong relationship tool, as observed in the Bevort synthesis report on the study conducted by *Fréquence Ecoles* (Kredens & Fontar, 2010, p.16).

In the Final Report by Mediappro (2006), the researchers say that despite the vaunted creative use of the internet, only a minority of the young people surveyed said that they had the skills to create and maintain their own blogs and websites. The same was also observed in the research reported here.

Table 3
Tasks in which students had lower skill levels (lowest items means) and the percentage of responses on the low end of the Likert scale

Items concerning activities performed on the computer that require less skill	Item mean	I do not know what that means (%)	I know what that means, but I do not know how to do it (%)
Creating web pages	2.06	9.5	31.3

Table 3 (Cont'd.)
Tasks in which students had lower skill levels (lowest items means) and the percentage of responses on the low end of the Likert scale

Items concerning activities performed on the computer that require less skill	Item mean	I do not know what that means (%)	I know what that means, but I do not know how to do it (%)
Creating a blog	2.30	8.2	27.4
Creating a multimedia presentation	2.75	5.2	16.7
Using programs for creating presentations	2.75	8.7	13.9
Editing videos	2.77	3.3	17.1

Note: Puc-Rio/Mast-Research *Youth and media: school and social factors*, 2009

Table 4
Tasks in which students had the highest skill levels (highest items means) and the percentage of responses on the high end of the Likert scale

Items concerning activities performed on the computer that require more skill	Item mean	I can do this alone, but I have some difficulty (%)	I can do this without any problem (%)
Carrying out multiple tasks at the same time	3.40	4.9	88.1
Sending text messages (chatting) via the internet	3.50	6.2	84.0
Writing and sending e-mails	3.61	13.3	69.4
Moving files from one location to another	3.67	8.9	76.0
Video chatting online	3.76	13.3	69.4

Note: Puc-Rio/Mast-Research *Youth and media: school and social factors*, 2009

Discussion: explaining uses and skills

This section presents and discusses two linear regression models. The first model describes how the scale of computer use is related to the context variables and to the variables of the students' behavior. The second model describes how the scale of computer abilities is related to these same explanatory variables. This modeling allows an initial exploratory analysis of the similarities and differences in the explanations of computer utilization and computer skills of the students surveyed.

The correlation between "Use" and "Skill" is statistically significant (p=0.000) with a value of 0.57. As expected, the survey did not identify students who use computers a lot but have a low level of skill. However, the opposite is observed; for the highest levels of skill, the survey did identify students who said that they make little use of the computer. This reflects the fact that the distribution widens with increasing skill level.

In both models, seven context variables were transformed into dummy variables – stratification, sex, age, color/race, mother's education, father's education, and the length of time the student uses the computer. Below all dummies are described with their coded names in parenthesis.

The five strata generated four dummies: small schools near favelas (FP_d); large schools far from favelas (NFG_d); small schools far from favelas (NFP_d) and a special group of large well equipped schools (PM_d). Large schools near favelas, with the largest number of students surveyed, were used as a reference group.

The variable "sex" generated an indicator variable for female students (fem_d), with the male students as the reference group. The variable "age" generated five indicator variables created to reflect how the students were positioned in relation to the modal age of 15 years. Thus students could be one, two, three or more years behind (at1_d, at2_d, at3_d), one or two years ahead (av1_d and av2_d). The reference group was the mode, students with 15 years of age. In the variable "color/race," the color brown (the mode of the variable) was used as reference in the regression. So it generated three dummies for the students "color/race", white (bran_d), yellow (am_d), and black (pret_d).

The variables "mother's education" and "father's education" generated four dummy variables each: never studied (m0an_d and p0an_d), studied up to five years (m5an_d and p5an_d), studied up to nine years (m9an_d and p9an_d), and had college education (msup_d and psup_d). The reference was a group of mothers and fathers with high school education, in both cases the modal groups.

The variable "how long the student uses the computer for" generated three dummy variables: used for less than one year (me1a_d), used for more than one year but not more than three years (ma1a_d), and used for more than three years (ma3a_d). The reference group was the mode, students that had used a computer for more than five years.

So, the reference group in both regression models was the male students, 15 years old, with brown skin, having a mother and a father with high school education and who have been using the computer for more than five years. These were the modal cases among the respondents.

The regression models also included 16 ordinal or continuous scale variables describing various social, economic, cultural, and psychological conditions of the respondents. Four of these variables describe the frequency of computer use in four types of location: at school (usa_escola), at home (usa_casa), at a friend's home (usa_amigo), and in a cyber café or public place (usa_locpub). These ordinal variables were obtained with a single question for each of them, with a seven point Likert scale of response options.

Six variables describe the frequency of several practices that the respondent declared to do in his free time outside school: cultivated culture (ptl_cult), leisure activities (ptl_lazer), sports

(ptl_sport), use of cellular phone (ptl_celul), watching television (ptl_telev), and religious activities (ptl_relig). Three variables on the availability of certain media resources were also included: electronic media (disp_midia), newspapers (disp_journ), and books (disp_livr). One variable on the ownership of household goods was included as a proxy for economic status. Finally, two variables on violence in schools were include, one related to violence among students (viol_alun) and another related to violence between students and teachers (viol_prof). These variables were all obtained through a mokken scale analysis of blocs of items. All scales demonstrated good scalability properties as measured by the usual statistics of non parametric item response theory. The details of each scale are not presented but can be obtained from the authors upon request.

In the regression models all 16 ordinal or continuous variables entered as a z-score obtained from the total score. The results showing only the statistically significant effects on the models of linear regression of the frequency of computer use and the skill reported by the students in the use of computers are summarized in Tables 5 and 6 below. The complete models are show in the appendix.

It was observed that the strata have no significant influence on either the pattern of computer usage or on the levels of skills required in the use of computers. This stratification which was so important in sociological models explaining proficiency in mathematics and language showed little effect here. The distribution of computer uses and skills is quite homogeneous along the strata. With regard to these two aspects of the relationship of the students with the computer, the schools seem to be quite similar.

Table 5
Linear regression model for the frequency of computer use

Dependent Variable		Dependent Variable	
Computer Use		Computer Use	
Explanatory Variables	Coefficient (standard)	Explanatory Variables	Coefficient (standard)
Female	-0.054***	Use at friend's house	0.126****
Behind 1 year	0.006 (ns)	Use in public places	0.129****
Behind 2 years	0.001 (ns)	Cultivated culture	0.098****
Behind 3 years	-0.035**	Leisure activities outside the home	0.167****
Use less than 1 year	-0.073****	Sport related activities	0.035*
Use more than 1 year	-0.088****	Cell phone use	0.086****
Use more than 3 years	-0.082****	Media availability	0.113****
Use in school	0.059****	Availability of books	0.055****
Use at home	0.394****	Violence between students	0.024 (ns)

Note: (****) p-value ≤ 0.001; (***) p-value ≤ 0.010; (**) p-value ≤ 0.050; (*) p-value ≤ 0.100; (ns) non-significant result, with p-values > 0.100.

The gender inequality prevalent in Brazilian society is reflected in these results. With respect to this variable, it was found that girls use the computer less frequently, but are at par with boys where computer skills are concerned. However, when the latter scale is restricted to the items that measured technological skills, thus defining a subscale of technological skills, girls have a significantly lower skill level than boys.

In Brazil, the number of male users of the internet (35.8%) is higher than the number of female users (33.9%)(PNAD, 2009). The Brazilian Internet Steering Committee (CGI.br) in its research, ICT Education (2010), observed that, among the Brazilian students in the 9th grade, boys

are the most intensive internet users (boys - 45%, girls - 41%). On the other hand, international research on internet use and abilities shows little difference in use and abilities between boys and girls (Sala & Chalezquer, 2008; Fontar & Kredens, 2010; McQuillan and d'Haenens (2009). Ito (2010) in her research *Living and Learning with New Media* observed that girls are more stigmatized when they are identified with geek practices, which are practices that demand a greater engagement as well as greater skills. These are practices defined as interest-oriented, which are carried out by those who also use the online world to explore interests and find information that go beyond what they have access to at school or in their local communities. The online groups allow these youngsters to keep in touch with people who have similar interests or belong to *niches* such as online games, creative writing, or video editing.

The race/color factor does not show any significant effect on computer use. However, declaring themselves as being white has a positive effect on their skills. Although this effect had the lowest effect among all variables as measured by the standardized coefficients, it was not included in the descriptive tables (Tables 5 and 6).

With respect to the different age groups represented by the dummy coding of the children left behind in schooling, the only one that has an influence on computer use is the one with individuals who have a delay of three or more years in relation to the regular age of 15 years. With respect to skills, all three levels of discrepancy are significant and the delay of three or more years in relation to regular age (behind 3 years) has a strong negative effect. When examining the effect of age with respect to the subscales of skills, it was observed that social skill is affected by the three levels of delay, educational skill is affected by the two higher levels of delay, and technological skill is affected only by a delay of three or more years.

A negative correlation was observed between age/grade gap and skills. There is a significant relationship between school delays and abilities in the use of computer, i.e., the more delayed a student is, the less able he/she will be. This can be a result of the effect of low self-esteem from recurring failure. According to Crahay (2006), in his study of the effects of failure in the school life of students, failure produces a negative effect in learning ability and generates low self-esteem in those who are required to repeat a grade. In addition to this, the study suggests that the successful acquisition of school knowledge can play a significant role in the development of these skills.

Table 6
Linear regression model for computer skills

Dependent Variable		Dependent Variable	
Skills with regard to computer use		Skills with regard to computer use	
Explanatory Variables	Coefficient (standard)	Explanatory Variables	Coefficient (standard)
Female	-0.032 (ns)	Use at friend's house	0.012 (ns)
Behind 1 year	-0.030*	Use in public places	-0.044**
Behind 2 years	-0.046***	Cultivated culture	0.068****
Behind 3 years	-0.065****	Leisure activities outside the home	0.063***
Use less than 1 year	-0.197****	Cell phone use	0.131****
Use more than 1 year	-0.158****	Watching TV	0.050***
Use more than 3 years	-0.081****	Media availability	0.161****
Use in schools	0.033**	Availability of books	0.052***
Use at home	0.243****	Violence between students	0.041**

Note: (****) p-value ≤ 0.001; (***) p-value ≤ 0.010; (**) p-value ≤ 0.050; (*) p-value ≤ 0.100; (ns) non significant result, with p-values > 0.100.

The education (schooling) of the father and the mother were not important for explaining either of the two measures - use and skill - under study. Their influence was not significant in the analysis of technological, educational, and social skill scales. The absence of parental education having an influence on skill suggests that parents may no longer be mediators in the relationship that young people establish with technologies.

The variable on the frequency of computer use in different places presents interesting results. Computers are rarely used in schools, as mentioned before. However, the use of computers in schools has a positive influence (p=0.000) on the frequency of use and a strong positive influence (p=0.033) on abilities, suggesting that the school may have a significant role in the use of computers for different tasks. In fact, with respect to the use of computers, all variables relating to the place of use (school, house, a friend's house, or a public place) are significant and positive. On the other hand, using a computer at a friend's home is irrelevant to the abilities but using it in public places has a negative effect.

What the student does in his or her free time has an influence on computer use and skills. Three of the variables (activities connected to cultivated culture, leisure activities outside home, and using a cell phone in free time) have a positive influence on use and skills. Sports related activities show a positive effect on use but not on skills. Religious activities do not have any influence. Watching TV shows a significant effect only as far as skills are concerned.

The availability of media resources also shows a uniform effect on both dependent variables. The availability of electronic media has a strong positive effect on both use and skills, the same applying to the availability of books. On the other hand, the availability of newspapers and magazines was not deemed significant.

The positive correlation between the development of skills and the presence of media and books at home, as well as cultural activities (visits to museums, cultural centers, movies, theatre shows, etc.) suggests the need to reduce social differences, which would, in turn, make these resources accessible to all.

The basic economic variable, built to reflect the possession of household goods, does not show any effect on use and skills and is not included in the above tables.

The variables of violence, measuring the students' perception of episodes of violence involving students and teachers, were found to be insignificant. However, the few students who reported more episodes of violence in school tend to have significantly higher computer skills (p=0.018). This correlation needs to be further explored in future studies. However, with the data generated in this study, which relate primarily to verbal abuse, a consistent interpretation cannot be made.

Conclusions

The results obtained from the lower classes of young students studying in public schools in the city of Rio de Janeiro, (the social class that now attends public schools in Brazil), and from European countries with higher socioeconomic levels suggest that perhaps we are faced with a phenomenon that is, paradoxically, universal and particular. Ways of using digital media and the skills developed from these uses are very similar amongst young people from different countries, different socioeconomic levels, and different levels of schooling even if the conditions of access to these media are unequal.

One way to understand this phenomenon is to take it as a result of a smaller impact of factors related to social class in relation to young people with Information Technology (IT) skills that correlate with the acquisition of school knowledge. Sociological research on educational inequalities has shown, for more than half a century, the strong effect of social origin, in particular parents' education, on the academic performance of students. However, studies on the use of IT skills performed in Europe (Livingstone, 2009) found a strong similarity in the use and skills of digital technologies among children and young people whose parents had different education levels, with the exception of the skills that relate to the secure use of the internet.

In the study that led to this paper, indicator variables of social origin, such as possession of durable goods and parental education, were not significant in the analysis of the factors that interfere with the ability of young people to t use the computer and internet. A possible explanation may be a result of "worldhood" (Ortiz, 1994), of digital culture, which means that there are global processes transcending groups, social classes, and nations. These processes are centered on culture, that is, appropriation that is relatively unique, at the domestic level, but is common to a world of meanings, symbols, and icons associated with the use of digital media. Digital culture can be understood as a particular form of culture; a play of the forces of globalization configured as organizational practices and skills that are invested with a high symbolic value and are, therefore, distinctive (Bourdieu, 1979).

Another possibility of understanding the phenomenon is in the fact that learning to use digital media occurs essentially in collaborative relationship between peers. The results from the Youth and Media study (like the other studies mentioned above) suggest that the most significant gain of using the computer and the Internet among the young people surveyed is seen in the context of sociability, which is understood as transmission of knowledge and values among peers. Peer learning is driven primarily by the absence of a hierarchy between the teacher and learner and by interaction between people with different skill levels. The students thus interact as equals to learn new things and are recognized at the same time for things they already know. This form of socialization and interaction has a value in itself and the satisfaction of being together takes precedence over the ends (Simmel, 1983). Young computer and Internet users learn with each other to use the machine's resources and networks efficiently and economically as well as to learn the rules of interaction and communication in digital environments. For Kredens & Fontar (op.cit.), among young people "[a] sphere of friends is without doubt the first way to find the news network" (p.6). This can also be one of the factors responsible for the strong similarities found in empirical studies on digital media skills among young people from different countries and cultures.

These results suggest that maybe the focus for school mediation should not be the pedagogic-didactic use of IT in the classroom, but the creation by teachers of activities that are focused on collaborative tasks and learning in pairs. This will require new research focusing on the adoption of instruments and criteria for the evaluation of both individual and collective gains.

We work with the hypothesis that the majority of abilities related to the use of computers and the internet are connected to the development of the abstract/reflexive thinking that depends on teaching. From this standpoint, we believe there is a mistake in the design of the policies to provide access with the purpose of fostering the use of IT in school environments. Even if teachers and students must know and master information technologies, the main objective of introducing those in schools is not to promote access; the main task of the school in the 21st century is to create favorable conditions for the development of necessary learning abilities aiming at students' autonomous intellectual use with the purpose of acquiring knowledge and participating in the public sphere. This means that maybe the most adequate way to achieve this is the implementation of educational policies that consider self-developed abilities. At the same time, those policies have to

allow for the development of teaching activities in the mediation of the students' relationship with media considering the acquisition of school knowledge and the safe use of internet. The schools' duty today is fundamentally to create strategies that favor the development of these abilities, such as the evaluation of the level of reliability of information, interpretation and production of content using different languages, self-narrative and narrative of the other, among others.

The significant effect (0.092***) of cultural consumption on t computer abilities and internet use suggests the urgency for policies focused on the broadening of access to cultural assets in the country, as well as the fostering in the school curriculum of forms of knowledge other than scientific knowledge.

Projects that pursue the implementation of cultural equipment in areas where there are none, such as peripheral areas from major cities and small cities in the country side, may contribute directly to the development of abilities in the use of digital media among youth. Thereby, cultural policy is as important as technological investment in schools.

References

Bourdieu, P. (1992). *La distinction: critique sociale du jugement*. Paris: Editions de Minuit.

Crahay, M. (2006). É possível tirar conclusões sobre os efeitos da repetência? (Is it possible to come to conclusions on the effects of student repetition?). *Cadernos de Pesquisa*, vol.36, n. 117, 223-246, jan-abril

Ito, M. (2010). *Hanging out, messing around and geking out.* Cambridge: The MIT Press.

Kredens, E., & Fontar, B.(2010). *Comprendre le comportement des enfants et adolescents sur Internet pour les protégés dês dangers.* Retrieved from http://www.isjm.fr/docs/apel/rapport%20Prevention%20nouv%20techno.pdf?PHPSESSID=304ba8420f5eb5bf6ce3fcf6dd3ae5ab

Livingstone, S., & Haddon, L. (Eds.). (2009). *Kids on line: opportunities and risks for children.* Bristol: The Policy Press.

Livingstone, S. (2009). *Children and the internet*. Cambridge: Polity Press

Mcquillan, H., & D'haenens, L. (Eds.). (2009). Youth people online: gender and ages influence. In Livingstone, S., & Haddon, L. (Eds.), *Kids on line – opportunities and risks for children*. Bristol: The Policy Press, 95-106.

Mediappro Final Report. (2006). *The appropriation of new media by youth*. Retrieved from http://www.mediappro.org

Ortiz, R. (1994). *Mundialização e cultura.* 3a edição, SP: Brasiliense.

PNAD. (2009). National Research of Households Sample (Pesquisa Nacional por Amostra de Domicílios). Retrieved from http://www.ibge.gov.br/home/estatistica/populacao/trabalhoerendimento/pnad2009/

Sala, X. B., & Chalezquer, C. S. (2008). *La generación interactiva en IberoAmérica*. Barcelona: Editora Ariel

Sijtsma, K., & Molenaar, I. W. (2002). *Introduction to nonparametric item response theory*. New York: Sage Publications, Inc.

Simmel, G. (1983). *Georg Simmel: sociologia (col. didática)*. São Paulo: Ática.

CGI.br (Brazillian Internet Steering Committee). (2010). *ICT Education*. Retrieved from http://www.cetic.br/educacao/2010/index.htm

Van Shuur, W. (2003). Mokken scale analysis: between the Guttman scale and the parametric item response theory, *Political Analysis*, 11, 139-163.

APPENDIX

STUDENT QUESTIONNAIRE
SCHOOL: _____
CLASS: _____PERIOD: _____
NAME:_____
E-MAIL: _____CONTACT PHONE: _____

1. TELL WHY YOU GO TO SCHOOL AND STUDY
ANSWER IF YOU DISAGREE OR AGREE WITH THE FOLLOWING STATEMENTS:
(Select only one option for each line)

Fully disagree	Disagree	Partly disagree	I don't know	Partly agree	Agree	Fully Agree
1	**2**	**3**	**4**	**5**	**6**	**7**
1) Because eventually it will allow me to find a job in an area that I like.				1 ☐	2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐	7 ☐
2) For pleasure and to feel that I know more about subjects I like.				1 ☐	2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐	7 ☐
3) To have a better salary later.				1 ☐	2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐	7 ☐
4) I had good reasons to go to school but now I wondering if it is worth continuing to go.				1 ☐	2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐	7 ☐
5) Studying bores me.				1 ☐	2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐	7 ☐
6) Because my best friends are at school.				1 ☐	2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐	7 ☐
7) Because studying allows me to continue learning things that interest me.				1 ☐	2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐	7 ☐
8) Honestly I have an impression that going to school is a waste of time.				1 ☐	2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐	7 ☐
9) Because without studying I will not find a job that pays well.				1 ☐	2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐	7 ☐
10) To show to myself that I'm an intelligent person.				1 ☐	2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐	7 ☐
11) Because it will help me make a better choice as to future jobs.				1 ☐	2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐	7 ☐
12) Because I want show to myself that I can be successful in my studies.				1 ☐	2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐	7 ☐
13) Because I believe that studying more will increase my qualification for the labor market.				1 ☐	2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐	7 ☐
14) I can't understand why I go to school and I don't care.				1 ☐	2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐	7 ☐
15) I'm forced to go to school and I feel like a stranger there.				1 ☐	2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐	7 ☐
16) For the pleasure I have when I discover things that I had never seen before.				1 ☐	2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐	7 ☐
17) To prove to myself that I can finish basic education.				1 ☐	2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐	7 ☐
18) To get a better job in the future.				1 ☐	2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐	7 ☐
19) I have doubts. I can't understand what I'm doing at school.				1 ☐	2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐	7 ☐

20) Because I feel comfortable at school.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
21) Because being successful at school makes me feel important.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
22) Because I want to have a comfortable life in the future.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
23) Because I feel pleasure and satisfaction in learning new things.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
24) Because I think studying will make me better prepared for the career I choose.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
25) I go to school but I feel that it´s not made for me.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

2. DO YOU USE A COMPUTER?
(A) Yes (B) No ➔ GO TO QUESTION **7** ON PAGE **4**.

3. HOW LONG HAVE YOU USED A COMPUTER FOR?
(A) Less than one year.
(B) More than one year.
(C) More than three years.
(D) More than five years.

4. HOW OFTEN DO YOU USE A COMPUTER?
(Select only one option for each line)

Never	Rarely	Once a month	Once a week	Several times per week	Once a day	Several times a day (every day)
1	**2**	**3**	**4**	**5**	**6**	**7**

1) At school.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
2) At home.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
3) At the house of relatives or friends.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
4) At public places (Internet cafe or Cyber Cafe).	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

5. HOW OFTEN DO YOU USE A COMPUTER FOR THE FOLLOWINGS ACTIVITIES?
(Select only one option for each line)

Never	Rarely	Once a month	Once a week	Several times per week	Once a day	Several times a day (every day)
1	**2**	**3**	**4**	**5**	**6**	**7**

1) To search the Internet for information about people and things.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
2) To play games saved on the computer or on CD's.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
3) To participate in blogs or discussion groups on the Internet.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
4) To write personal texts.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
5) To download photos from digital cameras.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐
6) To play online games.	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐

7) To search the internet in order to learn new things.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
8) To download programs (including games).	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
9) To draw, paint or use graphic programs.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
10) To use educational programs (for school subjects).	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
11) To upload digital videos.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
12) To read or download digital books.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
13) To access social media web sites (*Orkut*, *My Space*, etc.).	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
14) To download music.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
15) To watch movies and video clips online.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
16) To communicate by *Skype*, MSN and others.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
17) To upload music.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
18) To upload photos.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
19) To read and send email messages.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
20) To write school assignments.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
21) To copy and paste internet texts for school assignments.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐

6. HOW DO YOU SEE YOUR ABILITIES IN THE FOLLOWING ACTIVITIES?

(Select only one option for each line)

I don't Know what that means	I know what it means but I don't know how to do it	I can do it, but only with help	I can do it by myself but I have some difficulty	I can do it by myself without any problem
1	**2**	**3**	**4**	**5**

1) Record a CD or DVD.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
2) Online chat with written messages.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
3) Use a program to eliminate a computer virus.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
4) Edit digital photos or other graphic images.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
5) Copy a CD or DVD.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
6) Move files from one place to another on the computer.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
7) Online chat with voice and/or images.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
8) Download files or programs.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
9) Attach files to email messages.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
10) Use a word processer to write (*Word* or *BrOffice*).	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
11) Edit music.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
12) Create a multimedia presentation (with sound, images and video).	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
13) Write and send an email.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
14) Edit videos.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
15) Use presentation programs (*Power Point* or *BrOffice*).	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
16) Build a web page.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
17) Create a blog.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
18) Do several tasks at the same time (listening music, talk and navigate)	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
19) Install print, webcam etc.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
20) Write and use internet language (abbreviations, moticons, etc.).	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

7. INDICATE WITH WHICH FREQUENCY YOU DO THE FOLLOWING ACTIVITIES IN YOUR FREE TIME:

(Select only one option for each line)

Never	Once a year	Once a semester	Once every two months	Once a month	Once a week	Several times per week
1	**2**	**3**	**4**	**5**	**6**	**7**

1) Read newspapers/magazines.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
2) Watch documentaries on TV.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
3) Listen to music.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
4) Go to movies.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
5) Watch news on TV.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
6) Use a cell phone for telephoning.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
7) Read a Bible or other holy books.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
8) Read a newspaper´s sports section.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
9) Watch shows and musicals on TV / DVD / INTERNET.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
10) Go to the beach.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
11) Use a cell phone to send and receive images or music.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
12) Go to sports events.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
13) Watch movies or series on TV / DVD / INTERNET.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
14) Access the internet.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
15) Read literature or poetry.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
16) Use a cell phone to send and receive messages / SMS.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
17) Do sports activities (play soccer, volley, basketball etc.).	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
18) Go to bars and restaurants.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
19) Watch soap operas on TV.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
20) Use cell phones to take pictures and record videos.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
21) Go to museums or cultural centers.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
22) Watch sports programs on TV.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
23) Go to the theatre.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
24) Use a cell phone to play games.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
25) Go to mass/ cult / religious meeting.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐

26) Go to a shopping center.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
27) Do physical activities (running, riding bicycles, etc.).	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
28) Go to shows.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
29) Go to parties / friends´ houses.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐
30) Go to bookstores.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐	6 ☐	7 ☐

8. WHICH OF THE ITEMS BELLOW DO YOU HAVE AT HOME?

(Select only one option for each line)

ITEMS	AT HOME	
	YES	NO
1) Newspapers and/or general information magazines.	☐	☐
2) General information magazines and/or a newspaper subscription.	☐	☐
3) Scientific magazines.	☐	☐
4) Literature books.	☐	☐
5) Radio.	☐	☐
6) Television.	☐	☐
7) Stereo system / mp3	☐	☐
8) VCR.	☐	☐
9) DVD equipment.	☐	☐
10) Videogame.	☐	☐
11) Music CD.	☐	☐
12) Educational and/or leisure VCR's and DVD's	☐	☐
13) cable TV (*Net*, *Sky*, *Directv*; TVA).	☐	☐
14) Computer.	☐	☐
15) Internet dial access.	☐	☐
16) Broadband Internet.	☐	☐
17) Computer games (educational and/or leisure, online games).	☐	☐

9. HOW MANY OF THE ITEMS BELOW DO YOU HAVE?

(Select only one option for each line)

ITEmS	HOW MANY?		
1) Rooms (apart from the bedroom).	(0) ☐	(1) ☐	(2) ☐
2) Bathroom.	(0) ☐	(1) ☐	(2) ☐
3) Land line.	(0) ☐	(1) ☐	(2) ☐
4) Cell phone.	(0) ☐	(1) ☐	(2) ☐
5) Digital camera.	(0) ☐	(1) ☐	(2) ☐
6) Video camera.	(0) ☐	(1) ☐	(2) ☐
7) Fridge-freezer.	(0) ☐	(1) ☐	(2) ☐
8) Washing machine.	(0) ☐	(1) ☐	(2) ☐

9) Motorcycle	(0) ☐	(1) ☐	(2) ☐
10) Automobile	(0) ☐	(1) ☐	(2) ☐

10. UNTIL WHAT LEVEL OF SCHOOL HAS YOUR MOTHER OR OTHER WOMAN RESPONSIBLE FOR YOU STUDIED OR STILL STUDIES?

(Select only one option for each line)

(A) Never studied.
(B) Until the 5th grade of elementary school
(C) Until the 9th grade of basic school.
(D) Until high school.
(E) Until university.
(F) I don't know.

11. UNTIL WHAT LEVEL OF SCHOOL HAS YOUR MOTHER OR OTHER WOMAN RESPONSIBLE FOR YOU STUDIED OR STILL STUDIES?

(Select only one option for each line)

(A) Never studied.
(B) Until the 5th grade of elementary school
(C) Until the 9th grade of basic school.
(D) Until high school.
(E) Until university.
(F) I don't know.

12. ABOUT THE FACTS LISTED BELOW, SAY IF THEY OCCURED OR NOT THIS YEAR AT YOUR SCHOOL:

(Select only one option for each line)

ITEMS	YES	NO
1) Have you been a victim of attempted murder?	☐	☐
2) Have you been threatened by a fellow student?	☐	☐
3) Have you been verbally abused by a fellow student?	☐	☐
4) Have you been physically assaulted by a fellow student?	☐	☐
5) Have you been a victim of a theft?	☐	☐
6) Have you been a victim of a robbery (with the use of violence)?	☐	☐
7) A teacher teaching under the effect of an alcoholic beverage?	☐	☐
8) A teacher teaching under the effect of illicit substances?	☐	☐
9) A teacher teaching with a weapon (knives, penknives, etc.)?	☐	☐
10) A teacher teaching with a firearm?	☐	☐

13. WHEN WERE YOU BORN? _____

14. HAVE YOU HAD YOUR BIRTHDAY THIS YEAR:

(A) Yes (B) No

15. DO YOU CONSIDER YOURSELF?

(A) White (C) Brown
(B) Black (D) Yellow

16. WHAT IS YOUR GENDER?

(A) Male (B) Female

Table A1

Results of the regression models, dummy explanatory variables with standardized beta coefficient and significance levels

		Model 1		**Model 2**	
		Computer uses		**Computer abilities**	
	Explanatory Variables	Standardized Coefficients	p-value	Standardized Coefficients	p-value
	(Intercepte)	**0.0**	**0.000**	**0.0**	**0.000**
FP_d	Small schools near favelas	0.011	0.547	0.004	0.813
nFG_d	Large schools far from favelas	-0.013	0.542	0.034	0.120
nFP_d	Small schools far from favelas	-0.034	**0.075**	-0.002	0.902
PM_d	Special group of large well equipped schools	-0.009	0.652	-0.008	0.709
fem_d	Female	-0.054	**0.007**	-0.032	0.122
bran_d	White	-0.009	0.605	0.044	**0.016**
amar_d	Yellow	-0.022	0.173	-0.030	**0.081**
pret_d	Black	0.009	0.593	-0.012	0.513
av1_d	Ahead 1 year	-0.025	0.149	-0.011	0.553
av2_d	Ahead 2 years	-0.007	0.684	-0.002	0.928
at1_d	Behind 1 year	0.006	0.728	-0.030	**0.094**
at2_d	Behind 2 years	0.001	0.938	-0.046	**0.009**
at3_d	Behind 3 years	-0.035	**0.031**	-0.065	**0.000**
m0an_d	Mother who never studied	-0.011	0.496	-0.004	0.829
m5an_d	Mother who studied up to five years	0.014	0.481	-0.014	0.477
m9an_d	Mother who studied up to nine years	-0.012	0.523	-0.020	0.306
msup_d	Mother who had a college education	-0.044	**0.016**	-0.016	0.419
p0an_d	Father who never studied	0.011	0.524	-0.005	0.796
p5an_d	Father who studied up to five years	0.016	0.401	-0.036	0.106
p9an_d	Father who studied up to nine years	0.013	0.493	-0.038	0.132
psup_d	Father who had a college education	0.013	0.481	-0.007	0.718
me1a_d	Use less than 1 year	-0.073	**0.000**	-0.197	**0.000**
ma1a_d	Use more than 1 year	-0.088	**0.000**	-0.158	**0.000**
ma3a_d	Use more than 3 years	-0.082	**0.000**	-0.081	**0.000**

Table A2

Results of the regression models, ordinal and continuous explanatory variables with standardized beta coefficient and significance levels

		Model 1		**Model 2**	
		Computer uses		**Computer abilities**	
	Explanatory Variables	Standardized Coefficients	p-value	Standardized Coefficients	p-value
	(Intercepte)	**0.0**	**0.000**	**0.0**	**0.000**
usa_escola	Use in school	0.059	**0.000**	0.037	**0.033**
usa_casa	Use at home	0.394	**0.000**	0.243	**0.000**
usa_amigos	Use at friend's house	0.126	**0.000**	0.012	0.500
usa_locpub	Use in public places	0.129	**0.000**	-0.044	**0.023**
ptl_culti	Cultivated cultural	0.098	**0.000**	0.068	**0.001**
ptl_lazer	Leisure activities outside the home	0.167	**0.000**	0.063	**0.003**
ptl_sport	Sport related activities	0.035	0.093	0.022	0.298
ptl_celul	Cell phone use	0.086	**0.000**	0.131	**0.000**
ptl_relig	Religious activities	0.000	0.997	0.008	0.656
ptl_telev	Watching TV	-0.007	0.691	0.050	**0.006**
disp_midia	Media availability	0.113	**0.000**	0.161	**0.000**
disp_jorn	Availability of newspapers	0.000	0.998	-0.008	0.654
disp_livro	Availability of books	0.055	**0.001**	0.052	**0.003**
bens	Ownership of household goods	-0.015	0.433	0.030	0.124
viol_alun	Violence between students	0.024	0.147	0.041	**0.018**
viol_prof	Violence between students and teachers	0.022	0.174	-0.017	0.337

Table A3

The complete scale of computer use with the items in order of popularity, starting with the less popular or more difficult items, as measured by the item mean M. The last column contains the scalonability H a measure of discrimination of the item

How often do you use a computer for the following activities?		
ITEMS	**M**	**H**
5.12. Read or download digital books.	1.27	0.29
5.11. Upload digital videos.	1.79	0.34
5.09. Draw, paint or use graphic programs.	1.91	0.28
5.04. Write personal texts.	1.93	0.29
5.03. Participate in blogs or discussion groups on the Internet.	2.19	0.28
5.21. Copy and paste internet texts for school assignments.	2.25	0.26
5.10. Use educational programs (for school subjects).	2.26	0.25
5.20. Write school assignments.	2.52	0.27
5.08. Download programs (including games).	2.65	0.37
5.02. Play games saved on a computer or on CD's.	2.66	0.25
5.06. Play online games.	2.72	0.27
5.17. Upload music.	2.80	0.37
5.01. Search on the Internet for information about people and things.	2.91	0.29
5.07. Search on the internet to learn new things.	3.05	0.31
5.05. Download photos from digital cameras.	3.13	0.34
5.19. Read and send email messages.	3.29	0.32
5.18. Upload photos.	3.34	0.38
5.15. Watch movies and video clips online.	3.39	0.35
5.14. Download music.	4.11	0.43
5.16. Communicate by *Skype*, MSN and others.	4.75	0.46
5.13. Access social media web sites (*Orkut*, *My Space*, etc.).	4.83	0.44

Note: Metric properties of the scale: H is the scalonability of the MoKKen Theory = 0.32; Ro is the reliability Mokken Theory = 0.90; Alpha is the Cronbach reliability of the Classical Test Theory = 0.89.

Table A4:
The complete scale of computer ability with the items in order of popularity, starting with the less popular or more difficult items, as measured by the item mean M. The last column contains the scalonability H a measure of discrimination of the item

How do you see your abilities in the following activities?		
ITENS	**M**	**H**
6.16. Building a web page.	2.09	0.39
6.17. Creating a blog.	2.33	0.41
6.12. Creating a multimedia presentation (with sound, figure and video).	2.78	0.41
6.14. Editing videos.	2.79	0.34
6.15. Using presentation programs (*Power Point* or *BrOffice*).	2.81	0.41
6.03. Using a program to eliminate a computer virus.	2.83	0.44
6.9. Attaching files to email messages.	2.88	0.41
6.19. Installing perifericals (print, webcam, etc.)	2.94	0.44
6.10. Using a word processer to write (*Word* or *BrOffice*).	2.95	0.39
6.11. Editing music.	2.97	0.30
6.01. Recording a CD or DVD.	3.13	0.46
6.05. Copying a CD or DVD.	3.22	0.46
6.20. Writing and using internet languages (abbreviations, moticons, etc.).	3.32	0.38
6.04. Editing digital photos or other graphic images.	3.36	0.41
6.07. Chatting online with voice and/or images.	3.43	0.43
6.08. Downloading files or programs.	3.43	0.43
6.06. Moving files from one place to another on the computer.	3.54	0.46
6.13 Writing and sending an e-mail.	3.64	0.39
6.02. Chatting online with written messages.	3.69	0.39

Note: Metric properties of the scale: H is the scalonability of the MoKKen Theory = 0.41; Ro is the reliability Mokken Theory = 0.92; Alpha is the Cronbach reliability of the Classical Test Theory = 0.91.

About the Authors

Rosalia Duarte
Pontificia Catholic University of Rio de Janeiro
E-mail: rosalia@puc-rio.br
Rosalia Duarte is senior researcher at the Department of Education at Pontificia Catholic University of Rio de Janeiro and research director of GRUPEM - Research Group Education and Media. Her current research interest is related to digital media uses of youth and children.

Sibele Cazelli
Museum of Astronomy and Related Sciences
E-mail: sibele@mast.br
Sibele Cazelli is senior researcher at the Department of Science Education at Museum of Astronomy in Rio de Janeiro. Her current research interests include the use of statistical models in the assessment in formal education, non-formal education and audiences studies within the approach of an applied sociology of education. She also teaches graduate courses in Museum Studies at the University of the State of Rio de Janeiro.

Rita Peixoto Migliora
Pontificia Catholic University of Rio de Janeiro
ritaelig@terra.com.br
Rita Peixoto Migliora is associated researcher at GRUPEM - Research Group Education and Media at Pontificia Catholic University of Rio de Janeiro. Her current research interest is related to computer skills and digital media uses of young people, especially in relation to educational activities.

Carlos Alberto Q. Coimbra
Museum of Astronomy and Related Sciences
E-mail: caqcoimbra@mast.br
Carlos Alberto Q. Coimbra is senior researcher at the Department of Science Education at Museum of Astronomy in Rio de Janeiro. His current research interests include the use of statistical models, such as item response theory and multilevel analysis, in the study of sociological questions with data obtained in large scale surveys on Education. He also teaches undergraduate courses at the National School of Statistical Science in Rio.

education policy analysis archives
Volume 21 Number 53 June 24th, 2013 ISSN 1068-2341