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The digital divide between high school students in Colombia

Frederick Andrés Mendoza-Lozano [a,*], Jose Wilmar Quintero-Peña [b], Jose Felix García-Rodríguez [c]

[a] Department of Basic Sciences, Institución Univesitaria Politécnico Grancolombiano, Bogotá, Colombia
[b] Department of Business and International Development, Institución Universitaria Politécnico Grancolombiano, Bogotá, Colombia
[c] Academic Division of Economic and Administrative Sciences, Universidad Juárez Autónoma de Tabasco, México City, Mexico

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ABSTRACT

By extracting information from Saber 11 Tests taken by high school students close to finishing that educational period in Colombia, the digital divide evolution over time and its determinants are analyzed using a probabilistic model and the calculation of georeferenced concentration indexes. The topic is relevant as previous studies have shown a positive relationship between access to ICTs (Information and Communication Technologies), educational achievement, and economic growth. It is concluded that the digital divide persists over time and is accentuated in rural areas. Besides, the determinants of access are variable since they are out of the students' control. Therefore, this study deals with the social inequity around the access that students have, depending on their geographical location, into digital scenarios that allow them to increase their intellectual capital on the context of the situated cognition.

1. Introduction

Colombia's new National Development Plan (PND), named "Agreement for Colombia, Agreement for Equity", shows a problem in the supporting and motivational documentation associated with limited access to ICTs below the average for OECD (Organization for Economic Co-operation and Development) countries. Based on the management of the new government, it is proposed to reduce the divide as a strategy for economic growth and strengthen educational programs. Alternatively, previous governments also dealt with the problem and developed, since 2002, an ambitious program of access to technology in high school education, with special emphasis on rural areas, called "Computers to educate" (CPE, for its acronym in Spanish). The evaluation of the impact of this program has revealed that access to ICTs tools reduces the drop-out rate probability by 5.9 percentage points; also, it favors the probability of access to higher education (Rodríguez et al., 2011). In contrast, in the evaluation of the same program, Barrera-Osorio and Linden (2009) found other results, in the sense that, although the availability of ICT resources in educational establishments has increased, the effects on relationships with schoolmates, perception and school achievement were null.

The evaluation report of the Research Technology for Education and Innovation Group (GITEI, for its acronym in Spanish), alternatively, found evidence of a positive impact on school achievement, with significant differences between rural and urban schools (Universidad Nacional de Colombia, 2018). This program also showed that its effects are remarkable in the long term; specifically, positively influences academic achievement measured on standardized tests (Rodriguez et al., 2015) and seemingly, technologies

* Corresponding author.
E-mail addresses: famendozal23@gmail.com, famendoza@poligran.edu.co (F.A. Mendoza-Lozano), jquinterop@poligran.edu.co (J.W. Quintero-Peña), jfgr55@hotmail.com (J.F. García-Rodríguez).

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facilitate academic spaces for group work, as they simplify and make more precise the evaluation and student to teacher interaction (CARO & Rodríguez, 2018). To a large extent, motivated by the results of the CPE plan, in 2010, the national government launched the Live digital Plan; a strategy that, in four years, managed to increase from 200 to 1078 the number of municipalities with access to at least one connection point for the municipality to the optical fiber, which represents a coverage of 96%. (Valencia-Tello, 2016).

On the other hand, the specialized literature on education, and specifically in didactics, found that the use of ICTs brings knowledge closer to the leisure interests of young people although it is not devoid of risks associated with poor literacy for the academic use of technology (Duarte et al., 2016). With a process of literacy for teachers and students, access to ICTs becomes a strategy to overcome difficulties in accessing higher education, as well as learning difficulties through didactic tools that are combined with classic classroom methods (Báez et al., 2012). Additionally, this study modality demands great autonomy, which implies the acquisition of skills associated with generic competences, such as: reading comprehension, quantitative reasoning and writing; It is also essential learning to interact in knowledge networks (Mesquita et al., 2016).

Finally, it should be taken into consideration that the crisis caused by the COVID-19 pandemic, forced the closure of educational establishments in the country and, as an alternative, the national government proposed the continuation of academic activities using the internet. In this sense, this study contributes to the characterization of the limitations for the implementation of this strategy.

Studies on the digital divide, scarce in the Colombian context, can constitute an analytical dimension for measuring poverty. In this regard, the multidimensional index applied in Colombia and that reflects poverty reductions over time, according to Angulo et al. (2016)does not yet contemplate the dimension of access to ICTs.

This article is presented as follows: first, the panorama of inequity in higher education in Colombia is presented based on studies on the subject. Subsequently, the literature review about the digital divide is developed with studies of international scope. Then, the methodology section describes the data used for this work, the econometric modeling strategy, and the method of measuring the concentration index. The analyzes will be presented in a differentiated form for internet and computer access. Finally, the discussion and conclusions are presented with some recommendations for public policy coming from the spread of COVID-19.

1.1. Literature review

The inequity in Colombian society is remarkable and there is specific evidence on educational achievement. The indicator that measures how much variability of the standardized tests is explained by out-of-control variables for students, increased four times between 2000 and 2007 (Sarmiento Espinel et al., 2019). The inequity of educational achievement implies that the results of the standardized tests of higher education are correlated with variables of the students that are beyond their control, such as the level of education of the parents or the income of the family (Cuenca, 2016; Lozano et al., 2021). In this sense, cases of inequity occur mainly in the group with the highest incomes and the highest level of education (Medina & Suárez, 2010). Furthermore, in Colombia, educational inequities are also associated with geographical issues (Monsalve, 2021).

ICTs could affect the added value in education, in the way that if ICTs are correctly used for school development, they could positively impact academic achievement. In this way, they are a source of promotion in educational equality, bearing in mind that differences in quality are inherited from secondary education (Camacho et al., 2016). On the other hand, the COVID-19 pandemic may deepen educational inequalities to the extent that its effects on income are more notable at middle-income levels (Lustig et al., 2020). Consequently, once the economic effects become more noticeable, it is possible that they will be reflected in lower levels of access to ICTs, unless state social assistance programs manage to correct them.

Some authors classify the digital divide as horizontal and vertical (Sedimo et al., 2011; Wei & Hindman, 2011). In the first one, they refer to ICTs access, while the second one focuses on use. In the same sense, the work of Merritt (2011) exposes differentiated results between developed and developing countries. The aspects analyzed are internet access, electricity, telephone lines, personal computers, internet service providers, etc. Alternatively, the factors that affect developed countries classify them as secondary. These are related to variables such incomes, ethnicity, geographic location, education, age and gender. In line with the study of the effects of ICTs on learning achievement, there are investigations focused on the analysis of the digital divide, a concept that has been gaining the attention of researchers and public policy makers. The OECD (2001) defines the digital divide as "The gap between individuals, households, businesses and geographic areas at different socio-economic levels with regard both to their opportunities to access information and communication technologies (ICTs) and to their use of the Internet for a wide variety of activities". (p.5). However, this definition only covers some of the determinants of the digital divide, as De Haan (2004) argues, investigations are generally descriptive since they only focus on internet access but not on its multiple causes.

In this exploration line regarding the different approaches to investigate the digital divide, Toudert (2014) proposes to study the phenomenon from the macro perspective of access, with detailed analysis of the quality and efficiency of the uses of technology. In order to achieve this, microdata from Mexico's National Survey on Availability and Use of Information Technologies in Homes (ENDITUH, for its acronym in Spanish) 2010 survey defines a profile between those who do not have access and those who do. In this, most of the population (around 60 %) surveyed is in the first case, (no access or marginal access), and the description of profiles shows that in this group the majority are women, and, in general, the divide is characterized for the lack of resources and disinterest in the use of technology. On the other hand, the access group is predominantly male, with higher educational levels and access to internet, first at home and then from work.

The present work is guided by the definition of Merritt (2011)in which the digital divide has three stages: 1) first contact, 2) familiarity, and 3) superiority. Therefore, with the available data and the scope of our research, we will limit ourselves to the presentation of a quantitative analysis associated with stage 1. Thus, the divide is measured using the Saber 11 Test survey: specifically, questions about computer use and internet access.

In a comparative study involving Colombia, Mexico and Peru, (Gutiérrez & Gamboa, 2010), it is found that the main determinant of access to ICTs is the lack of education in the low-income population. However, it seems that there is evidence of a closing of the digital and educational divide in the world as a result of a rate of access to ICTs, increasing mainly in the population with lower incomes (Hoffman & Novak, 2012). In the same comparative way among several countries in the region, Banister (2017) collects a good number of successful experiences of educators that improve the results of educational processes at school by using simple and innovative mobile technologies in remote regions. Alternatives have even been explored to bring second-hand technologies, such as viability to budget constraints in the face of the dimension of the divide in Colombia (Streicher-Porte et al., 2009). At the higher education level, the problem is focused on the academic use and exploitation of ICTs in a full access scenario (Berrío-Zapata & Rojas, 2014).

The study by Nishijima et al. (2017) analyzes the digital divide in Brazil through the calculation of a concentration index explained by ethnic variables, educational levels, household size and location in an urban area. These variables, when incorporated into a logistics model, increase the probability of Internet access. The impact of these variables and the size of the digital divide is substantially reduced in the period analyzed (2005–2013). Furthermore, in the results on the capacities for the use of ICTs (digital literacy), they found that access problems due to low literacy correspond to the educational lack of the population measured in the number of years of formal education.

Studies on access to ICTs aimed at finding a way to close the divide, since there is solid evidence on the associated economic and educational benefits, although this depends on cultural factors related to the social appropriation of technology and the access at home or in public places (Baron & Gomez, 2012). The implications of technology use address many areas of social behavior; In this regard, depending on the sociological school that is taken as a base, access to ICTs is an essential component in the explanation of the relations of domination between social classes; it is part of a new way of doing and relating in politics or they favor a rationalized culture that overcomes the difficulties of time and space (DiMaggio et al., 2004, pp. 355–400). In addition, in the legal field, the feasibility of incorporating digital inclusion as a fundamental right in Colombia has been studied in the constitutional jurisprudence (Chacón-Penagos et al., 2017).

On the other hand, the Gini indexes and concentration coefficients are used to measure the digital divide. This is the particular case of Wang and Liu (2004) who use the Gini index to measure digital divides in China, showing marked differences in the three regions analyzed: central, western and eastern regions. The study also showed the relationship between the number of internet users, income levels and education among the different regions of China. They found a correlation between education and internet access, possibly explained by improvements in reading and writing skills. Finally, they made public policy recommendations, including: the reduction of costs, and cooperation between the community, companies, and the government in regions with less access to the internet.

In the present study, we refer to the vertical divide or the first level of integration of ICTs into the school system defined above, given the limitations of the information from Saber 11 Tests, since these focus on computer ownership and access to internet at home. Thus, this study shows the determinants and differences of municipalities in access to ICTs goods among high school students in Colombia.

2. Methodology

2.1. Data

The present work uses information related to high school students in Colombia from Saber 11 Tests, mandatory tests for all students close to finishing that secondary school level. The data used corresponds to the period 2009–2018. This information includes internet access and a computer at home. In the micro-data, multiple socioeconomic variables of the households are also found, which allows analyzing the determinants of access to ICTs goods.

The cleaning process of the database began with the counting of lost data as well as the identification of common variables in the questionnaires throughout the period analyzed. The databases are available in a public repository[1] and they report very few missing values, which were omitted from the analysis. On the other hand, throughout the evaluated period, the names of some variables were subtly changed; this work remains the most recent denominations in a unified way.

This research uses the completeness of the survey information. Besides, Saber 11 Test is mandatory for all high school students: so, we present analysis from then population data without biases induced by the researchers.

2.2. Analysis strategy

A first approximation includes descriptive statistics. Later we run two analyses. First, the estimation of a probabilistic-logit model oriented to the identification of determinants. Secondly, the analysis of concentration index (Fidan, 2016; Nishijima et al., 2017; Song, 2008); specifically its evolution and distribution in the different municipalities. Both approaches are complementary.

2.3. Descriptive statistics (based on the information in Appendix A)

From the total of the students who presented the test in the entire period analyzed (more than two million people), nearly one

[1] Available in https://www.icfes.gov.co/web/guest/investigadores-y-estudiantes-posgrado/acceso-a-bases-de-datos.

million seven hundred thousand, did not have internet access in their houses, and about one million five hundred thousand did not have a computer.

Regarding the individual characteristics of the students in the analyzed period, it is appreciated that 45 % are men, a percentage that has remained in the study period. The foregoing reveals that in Colombia there may be differences in dropout rates due to gender.. Besides, it is observed that male students have a slight advantage in access to a computer at home, compared to women. On average, 51 % of the students completed their studies in the morning day, followed by 20% who completed in the whole day. This conference represents the students who had greater access to the internet and computers at home. Additionally, the students of the “nights, Saturday and Sunday” day have the least access.

It is appreciated that access to internet and computer at home improved over time. In fact, internet access doubled in the period analyzed. However, the results are heterogeneous by socioeconomic strata (See Tables A2 and A3 in Appendix A), given that more than 70 % of the students belong to lower strata (one and two). In the period analyzed only 21 % of the students from stratum one had internet access at home; stratum two, 50 %; stratum three, 70 %, and in the others, internet access is greater than 80 %. The evolution of access has changed. While in 2009, less than 30 % of the students who took the Saber 11 Test had internet access at home, by 2018, that proportion reached 60 %.

However, analyzing the evolution by socioeconomic strata, in stratum one, it is observed that the connection grew more than 400 % in the analysis period, although the lag is significant given that in 2018 only 30 % of the students had internet access at home. In this context, Table 2 of Appendix A shows that internet access in stratum one increased about seven times. However, in this stratum, only 33 % of students have internet access at home. In stratum two, internet access more than doubled. The above results are related to the nature of the educational establishment where they take their high school educational studies, since, on average in public schools, 38 % have internet access at home, compared to their private peers, with 69 %.

Advances in internet access at home by students have doubled in the ten years analyzed. Despite this, there are several divides since in 2018, only 26 % of rural students had internet access in their homes, while 65 % of urban students had. On average, over the ten years, only 20 % of students living in rural areas had internet access at home, compared to 51 % of urban students.

However, in access to computers by high school students, it only grew by 13 percentage points: like internet access. There are marked differences in access by socioeconomic stratum, despite the improving in access throughout the period analyzed. In stratum one, only 38 % have access to a computer at home. The inequalities between urban and rural are also notable. Only on average, 30.7 % of high school students in Colombia have access to computers in homes located in rural areas. There is a slight difference between access to a computer at home between men and women, given that there is greater access for the former.

While in 2009, less than 30 % of the students who took Saber 11 Test had internet access at home; by 2018, it was 60 %. In addition, the results are heterogeneous by socioeconomic strata since more than 70 % of the students are from low strata (one and two). In the period analyzed, only 21 % of the students from stratum one had access to internet in their homes; stratum two, 50 %, and three, 70 %. In the others, access is greater than 80 %. In general, significant inequalities among socioeconomic strata are shown; the lags in the internet access of strata one and two are notable and relevant since they represent more than 70 % of the students who have taken the test.

2.4. *Correlation between computer and internet possession with academic achievement*

Computer possession exhibits a correlation with academic achievement. In 2009, the biserial correlation coefficient between computer possession and the average of the Saber 11 Test was 0.42. In the case of internet tenure, in correlation with the test, the coefficient was 0.43. In 2018, these correlations were maintained at slightly lower values: 0.37 (correlation between computer access and Saber 11 Test) and 0.38 (correlation between internet access and Saber 11 Test). Although, the correlations decreased slightly at both ends of the time, access to technology is accompanied by a better positioning in the Saber 11 Test’s results. (See Table 1 and Fig. 1).

2.4.1. *Empirical specification: determinants of access to ICTs for high school students*

This section shows the specification used to examine the variables that affect the adoption of internet and computer connection in the home of high school students in the period 2009–2018. The presence of a latent variable is assumed, given by:$\boldsymbol{y}*$

$$\boldsymbol{y}_i^* = \boldsymbol{X}_i\boldsymbol{\beta} + \boldsymbol{u}_i \tag{1}$$

Table 1
Distribution of students in each of the quartiles of Saber 11 Test (normalized average), classified by internet and computer possession.

Quartile Saber 11 Test	Computer				Internet			
	NOT		YES		NOT		YES	
	2009	2018	2009	2018	2009	2018	2009	2018
1 (Bottom)	73.80 %	58.40 %	26.20 %	41.60 %	84.80 %	58.40 %	15.20 %	41.60 %
2	66.00 %	48.20 %	34.00 %	51.80 %	79.70 %	47.60 %	20.30 %	52.40 %
3	55.70 %	37.30 %	44.30 %	62.70 %	72.10 %	36.40 %	27.90 %	63.60 %
4 (Superior)	32.80 %	21.20 %	67.20 %	78.80 %	50.20 %	20.30 %	49.80 %	79.70 %

Author’s own based on Saber 11 Test data

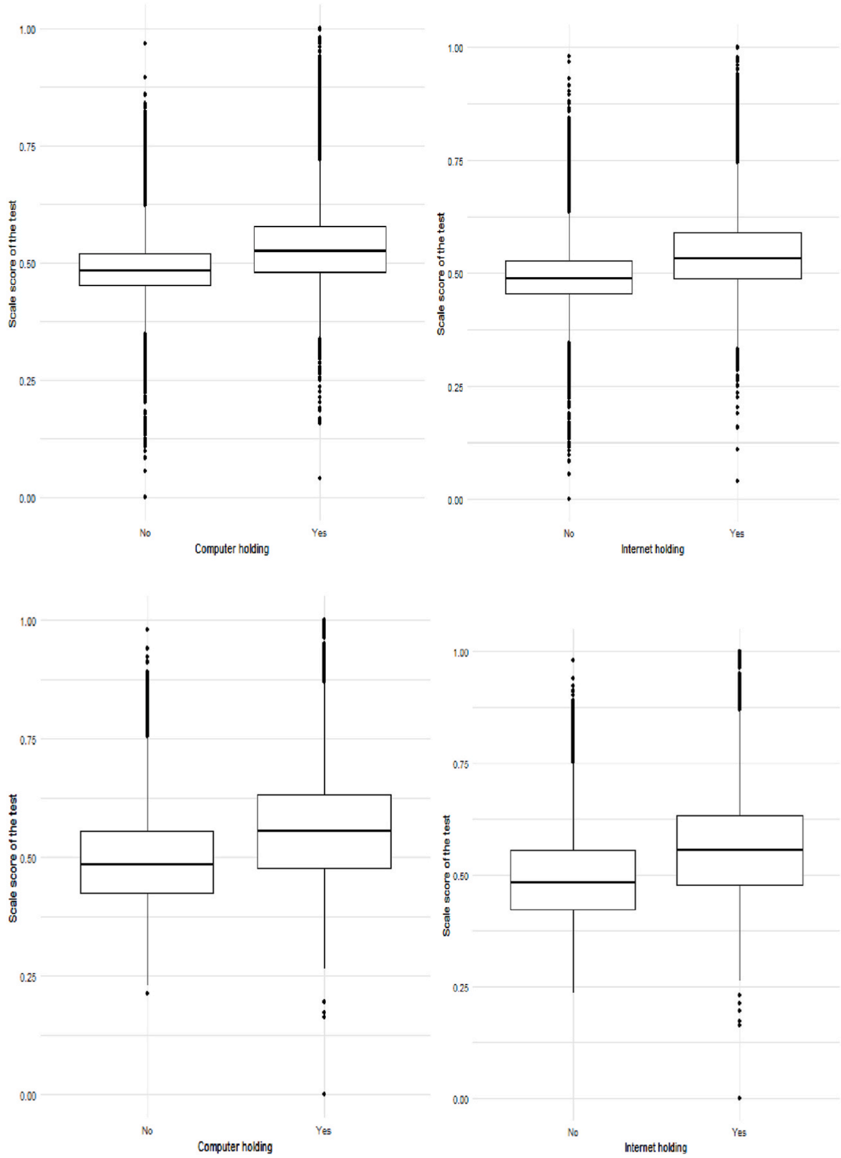

Fig. 1. Boxplots: internet access vs. average results in Saber 11 Test. Period 2009
Source: Author's own based on Saber 11 Test data.

where X_i is a vector k*1 of the control variable for student i. $\boldsymbol{\beta}$ is a vector k*1 of coefficients, and $\boldsymbol{u_i}$ is the error normally distributed for each variable. However, instead of $\boldsymbol{y_i^*}$, only a binary variable $\boldsymbol{y_i}$ indicates the observed sign of $\boldsymbol{y_i^*}$.

The vector $\boldsymbol{X_i}$ contains a series of variables at two levels: homes and educational establishments. At the individual level: dichotomous variable that takes the value of 1 if it is female, and 0 for male. The education of father and mother takes the value of 1 if they have professional studies, with respect to training levels lower than that indicated. Household size is a binary variable that takes the value of 1 when the household has four or fewer members, and 0 when it is larger. Three levels were established in the socioeconomic stratum: 1) Low; 2) medium; and 3) High. The reference group is the low level. On the other hand, the nature of the educational establishment is indicated in a variable that takes the value of 1 when it is public, and 0 when it is private. The variables of the educational establishment included the school day: 1) Complete; 2) Morning; 3) Night, Saturday and Sunday; 4) Afternoon; and 5) Unique. The reference is the full day. Finally, the place of residence was assigned the value of 1 when the student resides in the urban area and 0 when he resides in the rural area. Robust standard errors and fixed effects by municipalities were used to estimate the logit model.

$\boldsymbol{y_i}$ is defined as:

$$y_i = \begin{Bmatrix} 1 \ if \ y_i^* > 0 \\ 0 \ if \ y_i^* \leq 0 \end{Bmatrix} \tag{2}$$

In the latent model and according to (1) and (2) the probability is:

$$\begin{aligned} \mathbf{Pr}\left(y_i^* > 0 / Xi\right) &= \mathbf{Pr}(ui > -Xi\beta / Xi) \\ &= \mathbf{Pr}(ui < Xi\beta / Xi) \\ &= \mathbf{Pr}(y = 1 / Xi) = \psi\left(y_i^*\right) \end{aligned} \tag{3}$$

where y_i takes the value of 1, if the student has access to internet and computer at home. Thus, if the latent variabley_i^* exceeds 0, the event occurs. Otherwise, the event does not occur.

Where $\psi(.)$ is a cumulative distribution function (CDF), for the logit model:

$$\left(y = {}^1\!/_x\right) = \frac{e^{X_i}}{1 + e^{X_i}} \tag{4}$$

For a better interpretation of probabilistic model results, the marginal effects of logit model are estimated since it is a better way to present results as differences in probability, what is more informative than the odd-ratios. According to Baum (2006), the marginal effects are defined as

$$\frac{\partial \Pr(y = 1/x)}{\partial Xi} = \frac{\partial \Pr(y = 1/x)}{\partial X\beta} \cdot \frac{\partial X\beta}{\partial Xi} = \psi'(X\beta).\beta j \tag{5}$$

With the logistic distribution function, the marginal effect varies continuously on each X_i, so the marginal effect $\frac{\partial \Pr(y=1/x)}{\partial Xi}$, is the infinitesimal change effect in X_i, which also means “incremental” or “additional”.

2.5. Concentration index calculation

A very appropriate technique to compare internet access at the municipal level is the coefficient of internet users (Song, 2008), which indicates the degree of concentration of internet users in the municipalities concerning the national total of high school students in Colombia. A value greater than 1 indicates that the municipality has a high level of internet concentration regarding to the national average, while values less than 1 indicate a lag in concentration. The index is defined like this:

$$IC = \frac{NE_i/PM_i}{NET/NP} \tag{6}$$

where.

NE_i = Number of students in the municipality with internet access or computer at homePM_i = Number of students who took the test in municipality iNET = Number of students with internet access or computer at home in ColombiaNP = Number of students in Colombia that took the test

3. Results

Table 2 presents the marginal effects of the logit model where the dependent variable takes the value of 1 if the student has access to a computer, and 0 if he does not. Alternatively, Table 3 shows the determinants of internet access. The regressions are presented by years.

In the last column that includes all the periods observed, being a woman is associated with a decrease of 1.29 percentage points in the probability of having computer access among middle school students. Now, in the mother's education, there is a positive correlation on access to ICTs: it is more likely to access the computer in relation to mothers with a lower educational level by 20 percentage points. A similar result is found for internet access with an increase of 14 percentage points.

Also, parents' education has a positive association with the access to ICTs at home. for parents with higher education in relation to those who do not possess it. The relationship of this variable is less on internet access compared to that of the computer, by about five percentage points.

Regarding the variable household size, it is observed that small households -with four people or less-are positively associated with access to ICTs. Additionally, the relation is slightly greater for accessing a computer at home, which is possibly explained by the rivalry within a home when using the computer.

On the other hand, as the socioeconomic stratum increases,[2] it also increases the probability of accessing ICTs; being a middle-level

[2] According to DANE, the socioeconomic strata in which houses/properties can be classified are 6:1. Low-low, 2. Low, 3. Middle-Low, 4. Middle, 5. Middle-high, and 6. High. From these, strata 1, 2 and 3 correspond to low strata that cover lower-income users who are provided with subsidies in public home services. Strata 5 and 6 correspond to high strata that lodge higher income users, which are to pay overruns on public services. People from stratum 4 do not have any subsidy, nor have to pay overrun, they only pay the value the company decides as the cost of the provision of service.

Table 2
Marginal effects - computer access for middle school students.

Variables/Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Sex (1 = Woman)	−0.0187 ***	−0.0192 ***	−0.0110 ***	−0.00810 ***	−0.00604 ***	−0.00570 ***	−0.00656 ***	−0.0176 ***	−0.0219 ***	−0.0199 ***	−0.0129 ***
	(0.00118)	(0.00115)	(0.00116)	(0.00118)	(0.00118)	(0.00118)	(0.00119)	(0.00124)	(0.00131)	(0.00132)	(0.000386)
Education-Mother (1 professional)	0.197 ***	0.209 ***	0.222 ***	0.223 ***	0.215 ***	0.218 ***	0.206 ***	0.182 ***	0.171 ***	0.187 ***	0.205 ***
	(0.00275)	(0.00288)	(0.00313)	(0.00352)	(0.00356)	(0.00369)	(0.00355)	(0.00327)	(0.00286)	(0.00285)	(0.00101)
Education- Parent (1 professional)	0.173 ***	0.176 ***	0.183 ***	0.188 ***	0.182 ***	0.175 ***	0.168 ***	0.156 ***	0.134 ***	0.144 ***	0.170 ***
	(0.00267)	(0.00277)	(0.00301)	(0.00336)	(0.00342)	(0.00352)	(0.00347)	(0.00329)	(0.00287)	(0.00290)	(0.000988)
Household size (1 if it is ≤ 4)	0.0368 ***	0.0408 ***	0.0404 ***	0.0414 ***	0.0424 ***	0.0408 ***	0.0420 ***	0.0372 ***	0.0416 ***	0.0396 ***	0.0461 ***
	(0.00119)	(0.00115)	(0.00116)	(0.00118)	(0.00118)	(0.00117)	(0.00118)	(0.00123)	(0.00131)	(0.00132)	(0.000384)
Middle stratum	0.271 ***	0.289 ***	0.304 ***	0.300 ***	0.307 ***	0.306 ***	0.300 ***	0.292 ***	0.197 ***	0.195 ***	0.269 ***
	(0.00127)	(0.00133)	(0.00152)	(0.00171)	(0.00187)	(0.00200)	(0.00207)	(0.00210)	(0.00167)	(0.00166)	(0.000531)
Upper stratum	0.471 ***	0.468 ***	0.521 ***	0.509 ***	0.539 ***	0.491 ***	0.445 ***	0.380 ***	0.159 ***	0.150 ***	0.323 ***
	(0.00926)	(0.00986)	(0.0131)	(0.0142)	(0.0164)	(0.0154)	(0.0140)	(0.0141)	(0.00464)	(0.00519)	(0.00256)
Public school	−0.150 ***	−0.143 ***	−0.139 ***	−0.129 ***	−0.130 ***	−0.120 ***	−0.129 ***	−0.141 ***	−0.133 ***	−0.138 ***	−0.135 ***
	(0.00150)	(0.00147)	(0.00151)	(0.00156)	(0.00161)	(0.00161)	(0.00161)	(0.00174)	(0.00186)	(0.00188)	(0.000518)
Day morning	−0.0415 ***	−0.0359 ***	−0.0303 ***	−0.0282 ***	−0.0217 ***	−0.0194 ***	−0.0243 ***	−0.0340 ***	−0.0508 ***	−0.0427 ***	−0.0350 ***
	(0.00175)	(0.00173)	(0.00176)	(0.00182)	(0.00181)	(0.00181)	(0.00182)	(0.00189)	(0.00209)	(0.00212)	(0.000592)
Day Night, Saturday and Sunday	−0.193 ***	−0.211 ***	−0.203 ***	−0.200 ***	−0.201 ***	−0.194 ***	−0.180 ***	−0.186 ***	−0.211 ***	−0.200 ***	−0.201 ***
	(0.00230)	(0.00214)	(0.00213)	(0.00213)	(0.00214)	(0.00210)	(0.00213)	(0.00229)	(0.00254)	(0.00254)	(0.000712)
Afternoon day	−0.0372 ***	−0.0359 ***	−0.0216 ***	−0.0125 ***	#COUNTRYSIDE!	0.00182	#COUNTRYSIDE!	−0.00741 ***	−0.0360 ***	−0.0247 ***	−0.0253 ***
	(0.00209)	(0.00206)	(0.00211)	(0.00219)	(0.00219)	(0.00221)	(0.00223)	(0.00233)	(0.00262)	(0.00270)	(0.000719)
Unique day	0.310 ***	0.710 ***	0.312 ***		0.538 ***	−0.219 ***	−0.189 ***	−0.100 ***	−0.0432 ***	−0.0255 ***	−0.00578 ***
	(0.0494)	(0.108)	(0.0525)		(0.0859)	(0.0396)	(0.0294)	(0.00911)	(0.00325)	(0.00300)	(0.00173)
Urban	0.119 ***	0.139 ***	0.159 ***	0.173 ***	0.208 ***	0.212 ***	0.229 ***	0.228 ***	0.203 ***	0.202 ***	0.198 ***
	(0.00154)	(0.00145)	(0.00141)	(0.00137)	(0.00168)	(0.00160)	(0.00162)	(0.00173)	(0.00179)	(0.00182)	(0.000504)
Pseudo R2	0.2148	0.2100	0.2067	0.1885	0.1867	0.1831	0.1781	0.1582	0.1348	0.1429	0.1761
Observations	517,646	564,967	564,217	553,949	545.51	541,393	540,346	520,087	467,633	461,012	5,276,872

Standard errors in parentheses.
***p < 0.01, **p < 0.05, *p < 0.1.
Source: Author’s own based on Saber 11 Test data

Table 3
Marginal effects - computer access for high school students.

Variables/Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Sex (1 = Woman)	−0.0140 ***	−0.0114 ***	−0.00807 ***	−0.00512 ***	−0.00721 ***	−0.00721 ***	−0.0114 ***	−0.0197 ***	0.0128 ***	−0.0162 ***	−0.00878 ***
	(0.00105)	(0.00107)	(0.00112)	(0.00116)	(0.00118)	(0.00118)	(0.00118)	(0.00121)	(0.00142)	(0.00128)	(0.000383)
Educa-Mother (1 professional)	0.116 ***	0.140 ***	0.154 ***	0.155 ***	0.154 ***	0.155 ***	0.164 ***	0.143 ***	0.0613 ***	0.167 ***	0.144 ***
	(0.00190)	(0.00212)	(0.00239)	(0.00270)	(0.00278)	(0.00290)	(0.00295)	(0.00288)	(0.00250)	(0.00276)	(0.000822)
Educa- Parent (1 professional)	0.112 ***	0.124 ***	0.134 ***	0.142 ***	0.136 ***	0.143 ***	0.140 ***	0.127 ***	0.0718 ***	0.140 ***	0.130 ***
	(0.00186)	(0.00208)	(0.00236)	(0.00266)	(0.00274)	(0.00288)	(0.00296)	(0.00294)	(0.00256)	(0.00284)	(0.000823)
Household Size (1 ≤ 4)	0.0201 ***	0.0243 ***	0.0266 ***	0.0299 ***	0.0309 ***	0.0317 ***	0.0307 ***	0.0292 ***	0.0308 ***	0.0314 ***	0.0380 ***
	(0.00106)	(0.00107)	(0.00112)	(0.00116)	(0.00118)	(0.00118)	(0.00118)	(0.00121)	(0.00142)	(0.00127)	(0.000382)
Means, medium	0.212 ***	0.237 ***	0.266 ***	0.273 ***	0.285 ***	0.304 ***	0.312 ***	0.324 ***	0.138 ***	0.235 ***	0.248 ***
	(0.000993)	(0.00106)	(0.00121)	(0.00137)	(0.00149)	(0.00162)	(0.00177)	(0.00192)	(0.00168)	(0.00164)	(0.000456)
High	0.411 ***	0.442 ***	0.472 ***	0.481 ***	0.534 ***	0.497 ***	0.510 ***	0.460 ***	0.203 ***	0.185 ***	0.368 ***
	(0.00549)	(0.00665)	(0.00855)	(0.00971)	(0.0113)	(0.0111)	(0.0122)	(0.0138)	(0.00439)	(0.00516)	(0.00216)
Public	−0.130 ***	−0.134 ***	−0.142 ***	−0.147 ***	−0.159 ***	−0.164 ***	−0.169 ***	−0.178 ***	−0.0958 ***	−0.183 ***	−0.150 ***
	(0.00124)	(0.00129)	(0.00138)	(0.00145)	(0.00151)	(0.00152)	(0.00152)	(0.00163)	(0.00193)	(0.00182)	(0.000489)
Day morning	−0.0333 ***	−0.0255 ***	−0.0229 ***	−0.0100 ***	0.00187	0.0154 ***	0.00709 ***	0.00562 ***	0.0141 ***	0.00426 **	−0.00742 ***
	(0.00147)	(0.00155)	(0.00165)	(0.00175)	(0.00177)	(0.00179)	(0.00179)	(0.00185)	(0.00214)	(0.00208)	(0.000578)
Night, Saturday and Sunday	−0.124 ***	−0.154 ***	−0.165 ***	−0.167 ***	−0.171 ***	−0.156 ***	−0.140 ***	−0.138 ***	−0.146 ***	−0.131 ***	−0.154 ***
	(0.00204)	(0.00201)	(0.00208)	(0.00213)	(0.00220)	(0.00216)	(0.00215)	(0.00227)	(0.00279)	(0.00248)	(0.000718)
Afternoon	−0.0207 ***	−0.0162 ***	−0.00123	0.0201 ***	0.0355 ***	0.0612 ***	0.0556 ***	0.0579 ***	0.0120 ***	0.0519 ***	0.0149 ***
	(0.00182)	(0.00189)	(0.00199)	(0.00211)	(0.00214)	(0.00216)	(0.00218)	(0.00226)	(0.00277)	(0.00262)	(0.000704)
Only	0.331 ***	0.597 ***	0.334 ***		0.599 ***	−0.121 ***	−0.0553 *	−0.0701 ***	0.0237 ***	0.0251 ***	0.0852 ***
	(0.0359)	(0.0630)	(0.0436)		(0.0731)	(0.0408)	(0.0295)	(0.00899)	(0.00351)	(0.00290)	(0.00169)
Urban	0.103 ***	0.130 ***	0.163 ***	0.183 ***	0.252 ***	0.266 ***	0.299 ***	0.306 ***	0.158 ***	0.277 ***	0.231 ***
	(0.00155)	(0.00151)	(0.00151)	(0.00149)	(0.00200)	(0.00192)	(0.00192)	(0.00195)	(0.00210)	(0.00178)	(0.000567)
Pseudo R2	0.2506	0.2286	0.2221	0.2046	0.2046	0.2121	0.2155	0.1997	0.0600	0.1869	0.1833
Observations	517,660	564,981	564,257	554,261	545,510	541,393	540,346	520,087	465,147	462,111	5,275,865

Standard errors in parentheses.
***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.
Source: Author’s own based on Saber 11 Test data

student, compared to a low-level student increases the probability by 24.8 percentage points of access to internet at home.

In the case of belonging to a high stratum, the probability of access increases by 36 percentage points compared to the low stratum.

Similar results are seen with access to a computer at home. The marginal effects have a downward trend in the period analyzed, possibly explained by the improvements that access to ICTs has had, especially for students in stratum two.

Students who belong to public secondary educational establishments are 15 % less likely to access to ICTs, compared to their peers who study in private establishments. However, in the period analyzed, the marginal effects of computer access decreased and increased for internet access. Regarding to the area of housing residence, for students from urban zones the probabilities to internet access increased by around 20 percentage points, in relation to rural zone, that demonstrates great inequalities between location and access to ICTs.

Regarding the school day, it is appreciated that "morning students" are less likely to have access to a computer at home, compared to "full-time students". In internet access, the relation is negative, and, in some periods, it is close to zero. Now, comparing the students in the "night, Saturday and Sunday" modality, and those in the "full day", the percentage points increase of accessing the internet and computer at home is less, in a figure between 15 % and 20 %. In the "unique day", the relation is negative but very small; there are variations in the evolution of the marginal effect that was initially positive, and the opposite from 2014. The above can be explained by the fact that in the 2014–2018 Development Plan, the "unique school day" was implemented in public high school institutions.

Appendix B presents the results of a linear regression model. These are two tables. In the first one, the dependent variable refers to access to a computer, and the second one, to access to internet. The interpretation is consistent with the logit model.

3.1. Spatial distribution of the concentration of computer and internet connection in Colombia

Constitutionally, Colombia is divided into thirty-three administrative divisions, thirty-two departments, and Bogotá, its capital district. Another way to classify municipalities is the one established by the National Planning Department. According to Sanchez et al. (2014), the municipalities are classified according to the different factors presented in Law 1551 of 2012, represented in six components: (i) Urban-regional, (ii) Economic Dynamics, (iii) Quality of Life, (iv) Environmental, (v) Safety, and (vi) Institutional. Three classifications were constructed using the principal components method: (i) Robust development; (ii) Early development, and (iii) Intermediate development. The previous ones have a subclassification from A to G.[3]

The number of students who have access to ICTs is an indicator of the regions' progress towards the era of the digital economy. While in 2009, only 28 % had internet access, by 2018, the proportion grew up to 60 %. However, municipalities differ considerably in the proportion in which high school students have access to ICTs.

Certain municipalities demonstrate a high degree of concentration in internet and computer access at home in the period analyzed. For example, in the municipality of Envigado, the access to internet was 25 times greater than students from municipalities such as Piojó. It is also notable the decrease in the concentration index of internet access of high school students in Colombia in the municipalities with greater access to the two ICTs goods; since 2009, a decrease in the index and a convergence to 1,5 can be observed. The above can explain the greater access in other municipalities, however, the municipalities with the lowest levels of access have maintained the condition in the period analyzed; in general, they do not exceed the value of 0.4 in the index. These marked divides between municipalities impose important challenges to have a look at social inequalities and the challenges that an education system of high education faces in front of external shocks.

Fig. 2 and Fig. 3 reflect the differences in the social and economic level among municipalities, and in general, between the development of the regions.The map display for all the country is in Fig. 4. For example, the access to a computer at home, which is a requirement for internet access, is highly uneven between municipalities. The digital divide seen between municipalities according to their degree of development shows disadvantages in municipalities with less development. This situation could be more affected by the presence of exogenous shocks - such as COVID 19- in the sense that they are situations that test the capacities of the educational sector and the responses with technological mediations that are proposed as the solution to avoid the spread of the virus..

4. Discussion and conclusions

This research shows the evolution of the digital divide between high school students in Colombia, its determinants, and the spatial distribution, in the period 2009–2018. First, descriptive statistics are carried out. Even though internet access has improved in the period under review, there are still significant divides by socioeconomic strata and between urban and rural areas. The results of the probabilistic model indicate that female students from public schools, strata 1 and 2, are the ones with the greatest barriers to access to ICTs at home. Finally, it is found that the spatial distribution of the digital divide is significantly wide and has been present throughout the analyzed years.

Access to technology in Colombia has improved over time, following a global trend that has made it more affordable in a more competitive market. There is evidence of state programs that encourage mass access in public places and increasing and unequal access, especially in young people (Gómez, 2019; Osaba et al., 2019, pp. 278–293). Despite this, the high inequality indexes in

[3] Typology built based on the six dimensions, where A and B represent the municipalities with a favorable or robust development environment, C, D and E the municipalities with an intermediate favorability in their development environment, and F and G the municipalities with an environment early development. Within the three groups, greater favorability is also perceived in the development environment in municipalities that have a qualified typology with a letter closer to A in the order of the alphabet.

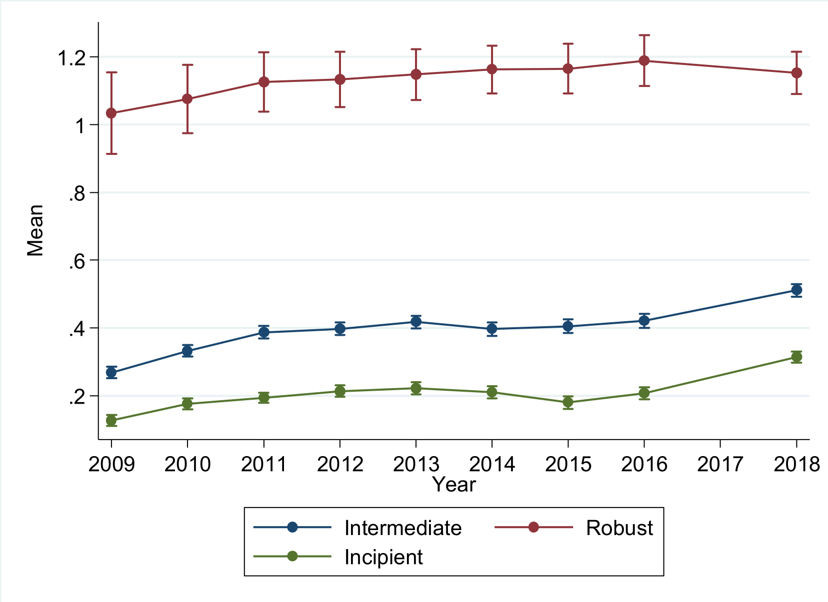

Fig. 2. Evolution according to municipal development levels DNP (average values). Summarized to three categories
Source: Source: Author's own based on Saber 11 Test data.

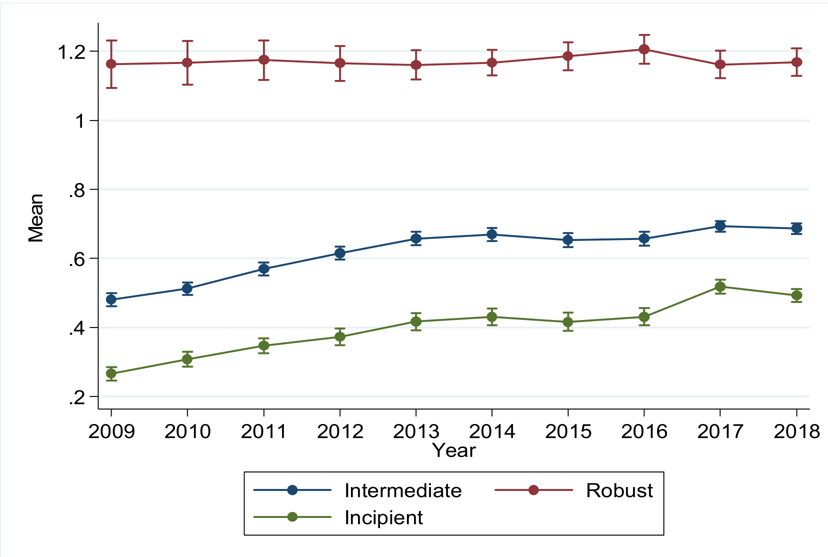

Fig. 3. Evolution of the digital divide (computer) according to the level of development of the DNP municipality. Summarized to three categories.
Source: Source: Author's own based on Saber 11 Test data

Colombia coincide with access divides that are remarked on lower-income population or those who reside in geographical areas with high poverty levels. (Strata 1,2 and 3).

On the other hand, one of the main challenges in basic education in Colombia focuses on access to the "full school day", which allows a greater permanence of students in school by three or 4 h. The benefits regarding to the "half-day", or distance modality are identified while improving academic achievement (the "half-day" is called by ICFES "complete", "morning" or "unique". The "remote day" is known as "Night, Saturday and Sunday"). In fact, in countries of the region such as Chile, a positive effect has been found in school dropouts, young people delinquency and teenage pregnancies (Bonilla, 2011). Apparently, there is also evidence of the quality divide between public and private supply. For example, in the Colombian case, significant differences persisted in the performance of the PISA tests between 2006 and 2012 with a positive effect on private education (Delgado-Barrera Martha, 2014). Therefore, the descriptive ones reflect a differentiated proportion in the access to ICTs between both types of offers.

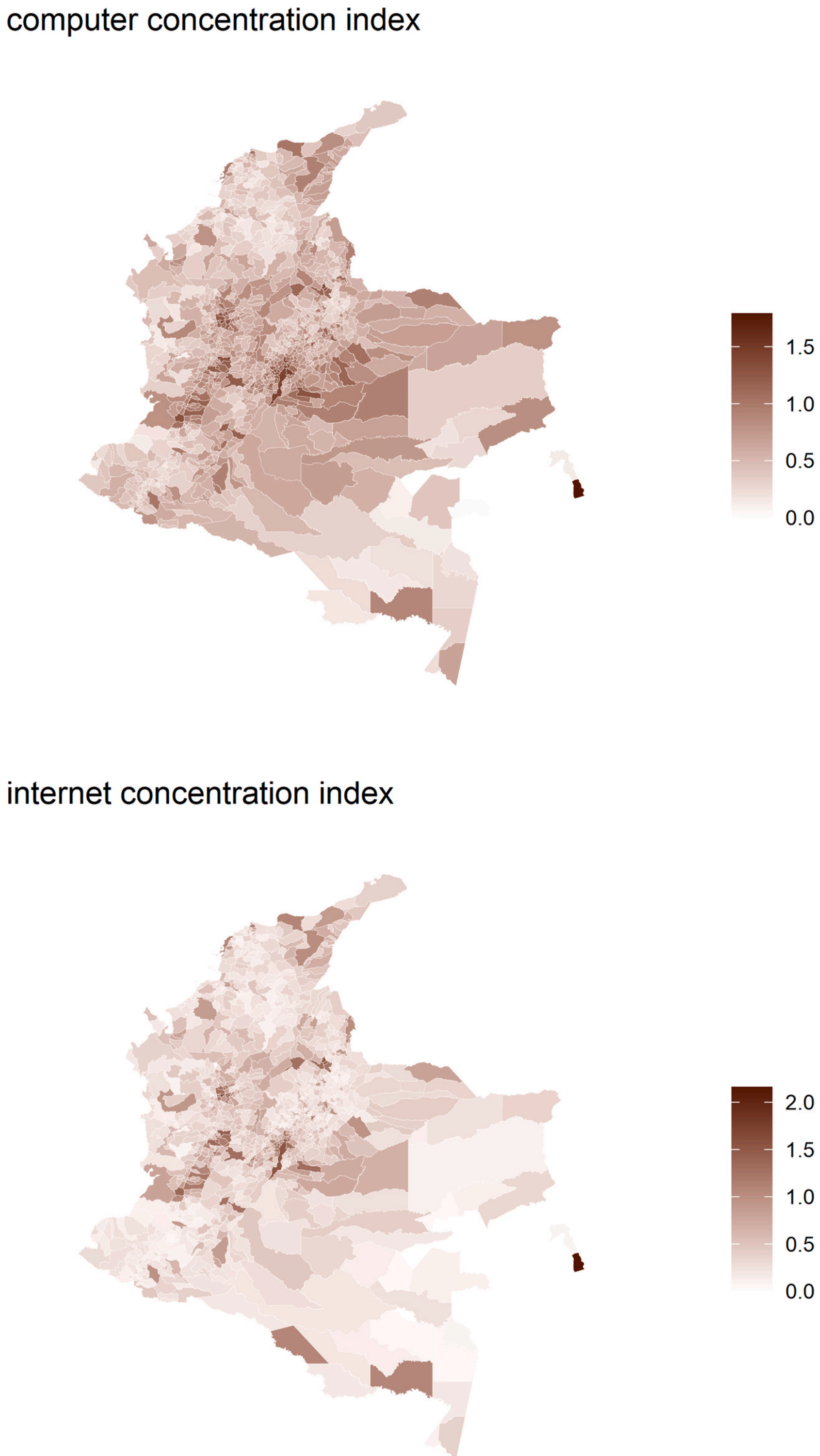

Fig. 4. Computer and internet concentration indexes 2018.
Source: Own elaboration based on data from the Saber 11 Test.

Overcoming the problem of access to ICTs in Colombia is part of the problem that must be addressed, since, as shows Velasquez, (2013), the uses that young people give to technology are varied and, consequently, they can promote a less virtuous leisure time. Therefore, it is required an education in the field of learning to learn skills, at a time when online education is seen as a solution to the health crisis arising from the spread of the COVID-19.

Regarding public policy, this work demonstrates the need to implement plans focused on less robust municipalities. On the other hand, the variables that decrease the probability of internet access and computer connections are associated with the income levels served on special days (nights and weekends). The negative relationship between access and public school is also notable. Further research will help answer: is the digital divide an adequate indicator of inequality for socioeconomic variables in primary and secondary education? Is the public policy effort on access to ICTs correctly focused on the closure of the divide and reduce the impact of being absent from COVID-19? Besides, in future research, data analysis could use other methods: spatial econometrics and classification algorithms as random trees and random forest, instead of logistic regression.

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Declarations of interest

None.

Appendix A

Table A1
General descriptive statistics

Feature/Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Average
Internet	28 %	34 %	40 %	45 %	49 %	52 %	53 %	53 %	49 %	60 %	46 %
Sex (women)	55 %	55 %	55 %	55 %	55 %	55 %	55 %	55 %	55 %	54 %	55 %
Mother's Education (Professional)	10 %	10 %	10 %	10 %	10.55 %	10.85 %	11 %	11 %	12 %	14 %	9 %
Father's Education (Professional)	10 %	10 %	11 %	10 %	10.84 %	11 %	11 %	11 %	12 %	13 %	9 %
Computer	43 %	46 %	52 %	55 %	60 %	63 %	62 %	58 %	60 %	59 %	56 %
Household size (≤ 4)	47 %	49 %	49 %	50 %	52 %	53 %	54 %	55 %	55 %	56 %	52 %
Low stratum	73 %	74 %	75 %	76 %	75 %	76 %	77 %	78 %	71 %	71 %	75 %
Middle stratum	25 %	23 %	23 %	22 %	22 %	22 %	21 %	20 %	26 %	26 %	23 %
Upper stratum	3 %	2 %	2 %	2 %	2 %	2 %	2 %	2 %	3 %	3 %	3 %
Full time	20 %	19 %	20 %	20 %	20 %	20 %	21 %	20 %	19 %	18 %	20 %
Day morning	51 %	50 %	50 %	51 %	51 %	51 %	51 %	52 %	50 %	49 %	51 %
Night or weekend day	12 %	14 %	14 %	14 %	13 %	14 %	14 %	13 %	12 %	13 %	13 %
Late day	17 %	17 %	16 %	16 %	15 %	15 %	15 %	15 %	13 %	12 %	15 %
Single day	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	6 %	8 %	1 %

Table A2
Internet access by strata and years

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Stratum1	7 %	10 %	14 %	18 %	21 %	24 %	25 %	27 %	35 %	33 %
Stratum2	24 %	32 %	42 %	49 %	56 %	61 %	65 %	65 %	51 %	66 %
Stratum3	54 %	63 %	72 %	76 %	80 %	84 %	86 %	87 %	63 %	84 %
Stratum4	85 %	89 %	92 %	93 %	94 %	95 %	96 %	96 %	69 %	87 %
Stratum5	93 %	95 %	96 %	96 %	97 %	97 %	98 %	97 %	71 %	87 %
Stratum6	96 %	96 %	97 %	98 %	98 %	98 %	99 %	97 %	73 %	85 %

Table A3
Computer access by stratum and years

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Stratum1	16 %	19 %	24 %	29 %	34 %	37 %	37 %	36 %	38 %	37 %
Stratum2	43 %	49 %	57 %	63 %	69 %	73 %	73 %	70 %	65 %	64 %
Stratum3	73 %	78 %	83 %	85 %	89 %	90 %	90 %	87 %	81 %	81 %
Stratum4	93 %	95 %	96 %	97 %	97 %	97 %	97 %	96 %	85 %	85 %
Stratum5	97 %	97 %	98 %	98 %	99 %	99 %	98 %	97 %	83 %	85 %
Stratum6	97 %	97 %	99 %	99 %	99 %	99 %	99 %	96 %	81 %	84 %

Table A4
Access to ICT, according to the school day

School day	ICT Access/year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Complete	Internet	49,1 %	53,9 %	59,2 %	61,6 %	64,6 %	66,5 %	67,4 %	65,6 %	58,3 %	72,8 %

(continued on next page)

Table A4 (*continued*)

School day	ICT Access/year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
	Computer	63,0 %	65,9 %	69,2 %	70,9 %	74,9 %	76,6 %	75,7 %	72,6 %	75,4 %	74,8 %
Morning	Internet	24,3 %	30,7 %	37,6 %	42,8 %	46,6 %	49,7 %	50,2 %	49,7 %	48,6 %	56,9 %
	Computer	40,0 %	44,7 %	50,1 %	53,7 %	58,9 %	61,5 %	59,9 %	56,2 %	58,0 %	56,9 %
Night, Saturday and Sunday	Internet	17,2 %	19,5 %	24,4 %	28,1 %	30,7 %	34,2 %	38,1 %	38,5 %	34,9 %	47,2 %
	Computer	26,8 %	28,1 %	32,8 %	37,2 %	40,4 %	43,4 %	45,0 %	41,8 %	43,7 %	43,0 %
Late	Internet	23,5 %	30,2 %	39,3 %	46,3 %	51,1 %	56,4 %	57,4 %	57,7 %	49,0 %	63,8 %
	Computer	39,0 %	43,8 %	51,0 %	56,6 %	62,0 %	65,5 %	63,9 %	60,9 %	60,6 %	59,6 %
Unique	Internet	72,0 %	93,2 %	74,7 %	99,1 %	94,9 %	35,2 %	59,1 %	43,0 %	48,4 %	57,4 %
	Computer	78,0 %	97,1 %	81,3 %	99,1 %	96,4 %	40,0 %	56,9 %	50,6 %	57,2 %	56,9 %

Table A5
Access to ICT by sex

Sex	Variable	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Men	Computer	45 %	49 %	53 %	57 %	61 %	64 %	63 %	60 %	62 %	61 %	58 %
	Internet	30 %	35 %	42 %	46 %	50 %	53 %	55 %	55 %	49 %	62 %	48 %
Women	Computer	41 %	45 %	50 %	54 %	59 %	62 %	61 %	57 %	58 %	57 %	55 %
	Internet	27 %	32 %	39 %	44 %	48 %	51 %	52 %	51 %	49 %	58 %	45 %

Table A6
Access to ICT by type of school (public or private)

Type	Variable	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Private	Internet	54 %	57 %	64 %	68 %	73 %	75 %	77 %	78 %	62 %	83 %	69 %
	Computer	67 %	68 %	73 %	75 %	80 %	81 %	81 %	79 %	79 %	79 %	76 %
Public	Internet	19 %	24 %	31 %	36 %	40 %	43 %	44 %	44 %	44 %	51 %	38 %
	Computer	34 %	38 %	43 %	47 %	53 %	56 %	54 %	51 %	53 %	52 %	48 %

Table A7
Access to ICT by type of residence (Urban or rural)

Type	Variable	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Rural	Internet	12,8 %	15,8 %	18,7 %	21,8 %	19,7 %	20,5 %	19,2 %	17,9 %	31,7 %	26,0 %	20,0 %
	Computer	24,5 %	26,6 %	29,3 %	32,6 %	32,5 %	34,5 %	32,4 %	29,5 %	35,2 %	34,0 %	30,7 %
Urban	Internet	32,3 %	38,3 %	46,2 %	51,5 %	53,3 %	57,0 %	58,7 %	58,3 %	52,0 %	65,5 %	51,6 %
	Computer	47,7 %	51,6 %	57,7 %	61,6 %	64,4 %	67,2 %	66,5 %	63,0 %	64,2 %	63,1 %	61,0 %

Appendix B

Table B1
Linear regression: Access to computer

	Coef.	St.Err.	t-value	p-value	[95 % Conf	Interval]	Sig
Sex (1 woman)	−0.014	0.000	−35.90	0.000	−0.015	−0.013	***
Education-Mother (1 professional)	0.118	0.001	155.92	0.000	0.116	0.119	***
Education- Parent (1 professional)	0.094	0.001	124.31	0.000	0.093	0.096	***
Household size (1 if it is ≤ 4)	0.048	0.000	123.76	0.000	0.048	0.049	***
Middle stratum	0.257	0.001	502.39	0.000	0.256	0.258	***
Upper stratum	0.212	0.001	155.01	0.000	0.209	0.215	***
Public school	−0.130	0.001	−249.49	0.000	−0.131	−0.129	***
Day morning	0.000	.	.	.	.	.	
Day Night, Saturday, and Sunday	−0.016	0.001	−28.80	0.000	−0.017	−0.015	***
Afternoon	−0.197	0.001	−273.46	0.000	−0.198	−0.195	***
Unique day	0.022	0.002	12.09	0.000	0.018	0.025	***
Urban	0.220	0.001	416.19	0.000	0.219	0.221	***
Constant	0.401	0.001	523.36	0.000	0.400	0.403	***
Mean dependent var		0.560	SD dependent var			0.496	
R-squared		0.203	Number of obs			5276872.000	
F-test		112280.362	Prob > F			0.000	
Akaike crit. (AIC)		6383526.800	Bayesian crit. (BIC)			6383702.025	

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

Table B2
Linear regression: Access to Internet

	Coef.	St.Err.	t-value	p-value	[95 % Conf	Interval]	Sig
Sex (1 woman)	−0.009	0.000	−24.04	0.000	−0.010	−0.008	***
Educa-Mother (1 professional)	0.116	0.001	154.81	0.000	0.114	0.117	***
Education- Parent (1 professional)	0.102	0.001	135.98	0.000	0.101	0.104	***
Household size (1 if it is ≤ 4)	0.040	0.000	101.93	0.000	0.039	0.040	***
Middle stratum	0.278	0.001	547.56	0.000	0.277	0.279	***
Upper stratum	0.290	0.001	213.93	0.000	0.287	0.293	***
Public school	−0.158	0.001	−306.64	0.000	−0.159	−0.157	***
Day morning	0.000	.	.	.	.	.	
Night, Saturday, and Sunday	0.001	0.001	2.10	0.036	0.000	0.002	**
Afternoon	−0.151	0.001	−212.03	0.000	−0.153	−0.150	***
Unique day	0.107	0.002	60.00	0.000	0.104	0.111	***
Urban	0.222	0.001	423.39	0.000	0.221	0.223	***
Constant	0.295	0.001	388.07	0.000	0.293	0.296	***
Mean dependent var		0.460	SD dependent var			0.498	
R-squared		0.224	Number of obs			5275865.000	
F-test		127218.369	Prob > F			0.000	
Akaike crit. (AIC)		6283557.352	Bayesian crit. (BIC)			6283732.575	

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

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