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The Use of New Technologies in Basic Education: An Approach to Profile of Indigenous Ecuadorians

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Abstract: This article aims to define the profile of Ecuadorian indigenous students who study at different levels of basic education in Ecuador in the context of the application and use of emerging technologies in the last five years. This approach focuses on a comparative analysis between indigenous and non-indigenous students, based on the national data from the National Survey of Employment, Unemployment and Underemployment of Ecuador (ENEMDU) 2006, 2011 and 2015, along with the contribution of other statistical sources, such as the 2001 and 2010 Census of the National Statistics Institute of Ecuador (INEC). The results show a significant difference in the use of ICTs between indigenous students and non-indigenous students, the majority of whom are mixed mestizo with minorities of montubios, blacks, whites, mulattos, afro-Ecuadorians and others. The interest in acquiring knowledge about one of the most precarious social sectors of Ecuadorian society, the indigenous population, is justified by the absence of studies about this subject, by the need to know the possible limitations or barriers, geographic, cultural and economic, and in the characterization of its profile, which will allow in future studies to deepen the process of appropriation of information and communication technologies in the applications, management and impact of ICTs and in the educational process of Ecuadorian indigenous students.

Keywords: Education, ICT, indigenous, Ecuador

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Introduction

The broad development and application of new information and communication technologies (ICTs) have played a key and globalizing role in 21st century societies and have been a transformative element in all areas and fields (Sandoval-Forero, 2013). In this context, a number of studies have been carried out to highlight the impact of these studies, from different disciplines, approaches (Romero, 2006; Chancay, 2009; Roca, 2016) and quantitative- qualitative methods in the academic field (CEPAL, 2014: 314), giving special attention to the Latin American and Caribbean region.

Access to information and communication is a basic and fundamental right of the citizen. Therefore, the United Nations considers access to new information and communication technologies essential in building democratic societies. However, in Latin America this access is characterized by an enormous double inequality: a) an external global gap with respect to the developed countries and b) an internal social divide caused by a digital stratification (CEPAL, 2014; 312).

These studies have also shown how in the last six years the use of the Internet in Latin America and the Caribbean has increased by 20 percentage points, from 14.1% in 2010 to 43.4% in 2015. There has also been a strong growth in broadband connections throughout the population, which has risen from 7% to 58%. There has also been a substantial improvement in the conditions of affordability. Since 2010 the cost of fixed broadband service amounted to almost 18% of average monthly incomes, while in 2016 it was only 2% (CEPAL, 2016).

However, despite these relevant advances, the literature has highlighted the persistence of inequalities (Sunkel, 2006; Sepúlveda and Leguina, n/d) and differences in access, both between in rural and urban areas (Botello, 2015), between income distribution quintiles (CEPAL 2016; 6) and among the various ethnic elements. This digital divide (Hernández, et al., 2003; Lieberman, 2003; Sandoval, 2013) has attempted to combat national policies on ICT in education, such as the Latin American Network of Educational Portals (Sunkel, 2006) or in the context of the digital divide. In Ecuador

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there has been the activation of programs for the spread of ICT, including the National Broadband Development Plan, which has been implemented by the Ministry of Telecommunications and the Information Society (CEPAL, 2016: 38).

The first feature that stands out, after reviewing the supporting bibliographies dedicated to studying Latin American indigenous peoples access to technologies is, on the one hand, an emerging proliferation of monographs about the indigenous population in the region (Becerra, 2012). On the other hand, there are high volumes of scientific production focused on other sectors and dominant groups (Sánchez & Ruzzi, 2011). However, despite this, in the last five years several works have been carried out in the region. On the other hand, in the Ecuadorian context, the studies carried out to date on the access and use of new technologies by indigenous groups are still a completely virgin field for research (Stefos, 2015; Roca, 2016; Castellano, 2017). Although we must highlight the quantitative work carried out by INEC.

However, this article does not attempt to analyze the factors that affect the uses, nor the process of appropriation of information and communication technologies, nor the applications, management or impact of ICTs in the educational process of the Indigenous Ecuadorian students. This study is simply a starting point, whose main purpose is to characterize the profile of a particular group. This group is made up of Ecuadorian indigenous students who study at different levels of Basic Education in relation to the use of new technologies, through a descriptive analysis and on the frequencies and percentages of the variables under investigation (Athanasiadis, 1995).

Ecuador is the result of a multicultural country integrated by diverse people and nationalities, whose distribution and ethnic composition draws on different features. The 2001 census placed the indigenous population at 6.8% and in 2010 this population increased to 7% (Table 1). For the first time the 2001 Census included the self-identification of membership for ethnic groups. However, it must be taken into account that the processes of acculturation and social criteria that conceal their indigenous roots and origins conditioned the establishments of these inter-ethnic boundaries.

Table 1. Population of Ecuador according to ethnic self-identification

Ethnicity	2001	2010
Mestizo	77.4 %	71.9%
White	10.5 %	6.1%
Indigenous	6.8 %	7.0%
Mixed	2.7 %	1.9%
Black	2.2 %	1.0%
Afro-Ecuadorian	-	4.2%
Montubio	-	7.4%
Other	0.3 %	0.4%

Source: 2001 and 2010 Census. Self-elaborated

The Kichwa people make up the highest demographic weight with 71.71% (Table 2), followed by 14.24% of people who identify themselves as indigenous, but are unaware of their ethnic affiliation, and third is the Shuar, which represents 7.83% of the indigenous social component (Chisaguano, 2006: 20).

Table 2. Distribution of towns and nationalities in Ecuador

Nationalities	Population	%
Epera	546	0.05%
Zapara	559	0.05%
Siona	611	0.06%
Secoya	689	0.07%
Shiwar	1.198	0.12%
Cofan	1.485	0.15%
Waorani	2.416	0.24%
Tsachila	2.956	0.29%
Awa	5.513	0.54%
Andoa	6.416	0.63%
Achuar	7.865	0.77%
Chachi	10222	1.00%
Shuar	79709	7.83%
Kichwa	730104	71.71%
Unknown	144988	14.24%
Other groups	22899	2.25%
Total	1018176	100.00%

Source: Population and Housing Census 2010. National Institute of Statistics in Ecuador. Self-elaborated

Materials and Methods

The statistical material used in this article is based on the National Survey of Employment, Unemployment and Underemployment of Ecuador in 2006, 2011 and 2015 (ENEMDU). In addition to consulting census data of the National Institute of Statistics and Censuses (INEC), The National Child Labor Survey (ENTI), derived from the report of INEC and UNICEF (2015) on child labor in Ecuador, Child Labor in Ecuador, other sources such as the Economic Committee for Latin America and the Caribbean (ECLAC) and the System Of Educational Trends Information in Latin America (SITEAL). Data analysis was performed using statistical software R, double-entry tables are used for the comparison of the indigenous and non-indigenous population by variables.

Results and Discussion

This section is dedicated to presenting the results and their corresponding analysis grouped into two sections. The first is aimed at characterizing some variables related to demographic weight and its territorial distribution along with other socioeconomic aspects, such as indigenous self-recognition, enrollment rates and rate of attendance, gender distribution, levels of poverty and extreme poverty. The second section is aimed at defining the profile of the use of ICTs by indigenous students between the ages of 5 and 14.

3.1. Population, Geographic and Socioeconomic Characterization of Self-identified Indigenous population

The Ecuadorian student population that studies in basic education between the ages of 5 and 14 and defines itself as indigenous is represented in 2015 as 10.25% of the total student population (Table 3).

Table 3. Percentage distribution of self-identified indigenous Ecuadorian student population between the ages of 5-14 (2015-2016)

	n	%
Indigenous	343122	10.25%
Not indigenous	3004485	89.75%
Total	3347607	100.00%

Source: ENEMDU 2015. Self-elaborated

Enrollment is one of the criteria used to determine the effectiveness of the education system (Rivers, 2010) and is also seen as tangible evidence that education reaches all sectors of the population (UNICEF, 2011). However, in the case of Latin America and specifically Ecuador, these enrollment and attendance rates (Restrepo & Stefos, 2017) coexist with high levels of poverty (VV.AA., 2016; VV.AA., s / f) and child labor. In this sense, the data provided by the ENEMDU show that work, together with the lack of economic resources, are the main reasons for truancy among children between the ages of 5 and 17 (Almeida, 2014: 32). However, despite the fact that poverty is one of the main reasons for school absence, these indices have been progressively declining from 53.7% to 35.6% between the years of 2006 and 2012.

A defining feature for the enrollment process of the Ecuadorian student population within the age range mentioned above is the lack of differentiated behaviors or tendencies between the indigenous sector and the rest of the ethnic groups. This index was around 98% in 2015 (Table 4), which is eight points higher than it was in 2006-2007 (90.5%) and two points higher than it was in 2011. This evolution is the result of the policies of universal coverage promoted by the Ecuadorian government in primary, secondary and higher education, through the 2006 Ten-Year Education Plan. This plan sought together with the eradication of illiteracy, to improve the quality of life, reduce poverty and promote tolerance (Almeida, 2014).

Table 4. Percentage distribution of 2015-2016 school enrollment for the Ecuadorian population between the ages of 5-14

	Indigenous		Not indigenous	
	n	%	n	%
Yes	334709	97.55	2930497	97.54
No	8414	2.45	73989	2.46
Total	343122	100.00	3004485	100.00

Source: ENEMDU 2015. Self elaborated

A third significant element of this group that was studied is the high rate of attendance in class. This implies a practical absence of a school dropout rate in the totality of the student population analyzed. This can be seen in Table No. 5,

showing indigenous students attendance levels, which stands at 99.89%, compared to 99.63% for those enrolled in 2006. Although we must point out that in 2006, as seen previously, a lower percentage of enrollment and, therefore, there is a difference greater than a quarter of a point.

Table 5. Percentage distribution of class attendance of Ecuadorian students enrolled between the ages of 5-14 according to their self-identified indigenous heritage.

	Indigenous		Not indigenous	
	n	%	n	%
Yes	334341	99.89	2926359	99.86
No	368	0.11	4138	0.14
Total	334709	100.00	2930497	100.00

Source: ENEMDU 2015. Self elaborated

The gender distribution of the group of students studied has a balanced composition in both indigenous and other ethnic groups. Although it should be noted that in 2006 there was an increase of 1.25% in indigenous girls, while the percentages of the non-Indigenous hardly changed (Table 6).

Table 6. Percentage of gender distribution of Ecuadorian students enrolled between the ages of 5-14 according to their self-identified indigenous heritage.

	Indigenous		Not indigenous	
	n	%	n	%
Male	164268	49,08	1486844	50,74
Female	170441	50,92	1443653	49,26
Total	334709	100,00	2930497	100,00

Source: ENEMDU 2015. Self elaborated

As far as the territorial settlement, the Amazon and mountain regions are the main centers and have a greater concentration of indigenous populations. This can be explained as areas linked to the original cultures and characterized by the predominance of a model of agrarian subsistence and by high rates of precariousness (Table 7).

Table 7. Territorial distribution percentage of Ecuadorian students enrolled between the ages of 5-14 according to their self-identified indigenous heritage.

	Indigenous		Not indigenous	
	n	%	n	%
Mountains	199592	59,63	1215551	41,48
Coast	28271	8,45	1600931	54,63
Amazon	106745	31,89	108582	3,71
Insular	100	0,03	5433	0,19
Total	334709	100,00	2930497	100,00

Source: ENEMDU 2015. Self elaborated

However, regarding the territorial distribution of 2011 there were significant changes in the indigenous sector. While the mountain region and island areas suffered a decrease of 11.73% and 0.48% respectively. The Amazon and coastal populations increased by 8.43% and 3.78%, respectively. This data is related to its own population dynamics throughout the territory.

The Ecuadorian indigenous student population that attends Basic Education is also characterized by a high settlement in rural areas of the country, which reaches 82.98%, two points above 2006 (Table 8). While other ethnic groups (mestizos, whites, And Afro-Ecuadorians) totaled 30.96% in this geographical area, one and a half points less than in 2006.

Table 8. Territorial percentage distribution (urban-rural) of Ecuadorian students enrolled between the ages of 5-14 according to their self-identified Indigenous heritage

	Indigenous		Not indigenous	
	n	%	n	%
Urban	56963	17.02	2023135	69.04
Rural	277746	82.98	907362	30.96
Total	334709	100.00	2930497	100.00

Source: ENEMDU 2015. Self elaborated

The level of poverty of indigenous Basic Education students is really high. These rates double the total number of students, with 60.71% compared to 29.13% (Table 9). However, their situation has improved compared to 2006, when the percentage of poor students stood at 72.44%. A similar trend is observed in non-indigenous people, where the poverty rate has changed from 44.09% in 2006 to 29.13% in 2015.

Table 9. Percentage distribution of poverty by income of Ecuadorian students enrolled between the ages of 5-14 according to their self-identified indigenous heritage

	Indigenous		Not Indigenous	
	n	%	n	%
Not poor	128860	38.50	2048822	69.91
Poor	203206	60.71	853520	29.13
NA	2642	0.79	28155	0.96
Total	334709	100.00	2930497	100.00

Source: ENEMDU 2015. Self elaborated

The extreme poverty situation in 2015 of indigenous students reached 38.43% and we must point out that the data for this variable was not available in 2006 (Table 10).

Table 10. Percentage distribution of extreme poverty according to income of Ecuadorian students enrolled between the ages of 5-14 according to their self-identified indigenous heritage.

	Indigenous		Not indigenous	
	n	%	n	%
Not indigent	203453	60.78	2625506	89.59
Indigent	128614	38.43	276836	9.45
NA	2642	0.79	28155	0.96
Total	334709	100.00	2930497	100.00

Source: ENEMDU 2015. Self elaborated

ICT Use Profile of Indigenous Students

This second block of analysis stops to look at some of the main uses of ICT by Ecuadorian indigenous students, but not from the perspective of their learning, skills and competences, but rather from the use and availability of technological resources such as cellular, computers and the Internet.

During 2015, only 10% of the total number of students enrolled in basic education had a cell phone, and of that, 2.46% were self-defined as indigenous. However, this group shows a growth of almost one point compared to 2011, which represents 4508 new indigenous mobile users compared to the half point increase of non-indigenous users.

However, the rate of indigenous students who had a smartphone in 2015 was 0.6%, compared to 0.03 in 2011 (Table 12). A more significant growth occurred in the non-indigenous sector, which rose from 0.77 % in 2011 to 7.55% in 2015 (Table 11).

Table 11. Percentage distribution of Ecuadorian students enrolled between the ages of 5-14 who have activated cell phones according to their self-identified indigenous heritage

	Indigenous		Not indigenous	
	n	%	n	%
Yes	8236	2.46	221377	7.55
No	326370	97.51	2686618	91.68
NA	102	0.03	22501	0.77
Total	334709	100.00	2930497	100.00

Source: ENEMDU 2015. Self-elaborated

Table 12. Percentage distribution of Ecuadorian students enrolled between the ages of 5-14 who have a smartphone according to their self-identified indigenous heritage

	Indigenous		Not indigenous	
	n	%	n	%
Yes	2007	0.60	100514	3.43
No	6229	1.86	120863	4.12
NA	326472	97.54	2709120	92.45
Total	334709	100.00	2930497	100.00

Source: ENEMDU 2015. Self elaborated

The frequency of computer use and the place from which technology is used are two basic indicators that allow us to characterize the use of ICTs. Thus, with respect to the frequency of computer use, both in the indigenous and non-indigenous sectors, there has been a significant increase during the last five years and especially with indigenous students, which has risen from 37.81% in 2011 to 47.71% in 2015. An identical trend is reproduced in the non-indigenous sector, with an upward trend of 51.44% in 2011 to 58.73% in 2015 (Table 13).

Table 13. Percentage distribution of Ecuadorian students enrolled between the ages of 5-14 who in the last 12 months have used computers according to their self-identified indigenous heritage.

	Indigenous		Not indigenous	
	n	%	n	%
Yes	159688	47.71	1721070	58.73
No	174918	52.26	1186925	40.50
NA	102	0.03	22501	0.77
Total	334709	100.00	2930497	100.00

Source: ENEMDU 2015. Self elaborated

With regard to the use of Internet in 2015, there were a low percentage of indigenous students (5.72%) who used computers from home versus non-indigenous students (24.95%). Although there as a tendency for growth in comparison to 2011, which had 0.62% and 10.37% respectively. In any case, this data clearly reflects the lack of availability of this resource in the domestic sphere and, therefore, the impossibility of access from their homes.

However, these differences have disappeared in public hotspots (18.25% in 2011 compared to 18.51% in 2015) (Table 15). This can explain new acquired social habits related to the establishment of new meeting cyber points between young people. They have been progressively joining the indigenous sector in recent years with a growth of almost ten points in 2015.

Table 14. Percentage distribution of Ecuadorian students enrolled between the ages of 5-14 who in the last 12 months have used the Internet according to their self-identified indigenous heritage

	Indigenous		Not indigenous	
	n	%	n	%
Yes	134126	40.07	1625374	55.46
No	200480	59.90	1282621	43.77
NA	102	0.03	22501	0.77
Total	334709	100.00	2930497	100.00

Source: ENEMDU 2015. Self elaborated

Table 15. Percentage distribution of Ecuadorian students enrolled between the ages of 5-14 who in the last 12 months have connected to the internet from their home, work, educational institution, etc. according to their self-identified indigenous heritage.

	Indigenous		Not indigenous	
	n	%	n	%
Home	19132	5.72	731081	24.95
Work	22	0.01	2344	0.08
Educational Institution	51006	15.24	278114	9.49
Hotspots	61086	18.25	542306	18.51
Another Person's Home	2133	0.64	54925	1.87
Other	749	0.22	16605	0.57
NA	200582	59.93	1305123	44.54
Total	334709	100.00	2930497	100.00

Source: ENEMDU 2015. Self-elaborated

In contrast, the greatest difference in computer use in favor of indigenous people occurs in educational institutions, which surpassed non-indigenous people by 6 points in 2015. This is a dynamic similar to that, which occurs in other areas of the Latin American region. However, regardless of all these behaviors reported, the most significant data that remains is the low percentages of general computer use.

The use of Internet in the indigenous sector for education and learning has increased to 25.29% in 2015, compared to 13.75% in 2011 (Table 16). This information has been obtained with an increase of 7.72% in 2015 compared to 2.88% in 2011. The search for general communication has increased to 6.27% in 2015 compared to 1.70% in 2011.

Table 16. Percentage distribution of Internet use for Ecuadorian students enrolled between the ages of 5-14 in the last 12 months according to their self-identified indigenous heritage

	Indigenous		Not indigenous	
	n	%	n	%
Get Information	25833	7.72	379762	12.96%
General Communication	20984	6.27	263155	8.98%
Buy/ Services and products ordered	33	0.01	1365	0.05%
Electronic banking and financial services	1259	0.38	2273	0.08%
Education and learning	84633	25.29	915680	31.25%
Transactions with agencies	0	0.00	275	0.01%
Entertainment activities	624	0.19	53044	1.81%
Get movies, music or software	589	0.18	6889	0.24%
Read / Downloaded electronic books	46	0.01	767	0.03%
Work Related	104	0.03	416	0.01%
Other	22	0.01	1749	0.06%
NA	200582	59.93	1305123	44.54%
Total	334709	100.00	2930497	100.00%

Source: ENEMDU 2015. Self elaborated

Indigenous youth who used the Internet at least once a day in 2015 represented 13.93% or nine points more than in 2011 (Table 17). This represents a 24.62% increase in weekly frequency or almost thirteen points more than in 2011. There was a 0.07% increase for those who use it at least once a year, compared to 0.09% in 2011. This represents a significant growth, although its is only a few percentages in the non-indigenous sector.

Table 17. Percentage distribution of the frequency of Internet use for Ecuadorian students enrolled between the ages of 5-14 in the last 12 months according to their self-identified indigenous heritage

	Indigenous		Not indigenous	
	n	%	n	%
At least once a day	46619	13.93	952322	32.50
At least once a week	82390	24.62	630566	21.52
At least once a month	4886	1.46	38563	1.32
At least once a year	232	0.07	3240	0.11
Unknown	0	0.00	684	0.02
NA	200582	59.93	1305123	44.54
Total	334709	100.00	2930497	100.00

Source: ENEMDU 2015. Self elaborated.

Conclusions

The main conclusion that emerged from this study, regarding the use and application of ICTs by Ecuadorian indigenous students is that in the basic training stage there is a verification of a double digital divide. This divide is with respect to the low percentages of use and employment of new communication technologies in relation to developed countries and the internal gap between indigenous and non-indigenous youth. Although the status of the other minority ethnic groups is very likely to be in a similar situation, given that the socio-economic constraint is the primary limiting factor for access to and use of new technologies. This is despite all of the great changes, transformations and improvements in living conditions in Ecuador in recent years.

A second key aspect, as a consequence of what was mentioned in the previous paragraph, is the persistence of a double contrast of behaviors in the use of ICTs. One of territorial characteristics is between center, periphery and rural-urban. Another one is of a hierarchical character (dominant culture vs. dominated culture), which, together with marked socioeconomic differences, become conditioning factors for the use and application of new technologies as reflected in the data obtained. Thus, for example, two indigenous students out of every ten students in basic education have cellular telephones and half an indigenous students, for every one hundred students, has a Smartphone. While indigenous computer users reached 47.71% in 2015, which was eleven points less than non-indigenous groups.

A third feature is that indigenous students prefer to connect to the Internet in hotspots (18%) and in educational institutions (15%), whereas the connection from the family home is very low (5, 72%), which is almost twenty points less than non-indigenous groups.

A fourth characteristic highlights a similar behavior in the use of the Internet between the indigenous and non-indigenous groups, which focuses specifically on the process of education and learning (25.29%), in obtaining information (7.72%) and in the search for communication in general (6.27%), although with much lower levels of participation from indigenous students.

A fifth aspect refers to the progressive incorporation of the indigenous sectors in the daily, weekly and yearly frequency of Internet use. However, in 2015 there were still very low percentages, which were represented by 13.93% per day, 24.62% once a week and 0.07% at least once a year.

Finally, the results show the existence of digital divides, both among indigenous students of Basic Education and other ethnic groups. They are associated with other aspects related to their distribution and territorial settlement as well as other structural inequalities, such as income and education, which have a direct reflection on the access and use of technologies. Therefore, such access to technologies has a direct correlation with the overall state of existing inequalities. In any case, it is also evident of the confirmation of an accelerated percentage growth dynamic in the last five years for indigenous students of Basic Education, which is correlated to the use and access to ICTs. Although they still have very low rates and a differentiated behavior with respect to the overall group. In the same sense, it should be noted that this group, together with young people between the ages of 15 and 29, represents one of the population sectors that are more easily incorporated into the use and application of emerging technologies, as an information and communication tool and whose development is imposed on the entire Ecuadorian society.

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