

## 5. The Evolution of the One-Laptop-Per-Child Model in Uruguay

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## ABSTRACT

In this chapter we analyze the changes in the digital divide caused by the implementation of the One Laptop Per Child (OLPC, or “1-to-1”) model in Uruguay under the Ceibal Plan. Our analysis is based on data from the Annual Survey of Households conducted by the National Statistics Institute of Uruguay. Supplementing this is an analysis of the Plan’s contribution to social inclusion through a study conducted in four schools located in impoverished areas of the Montevideo metropolitan region. Through analysis of this empirical information we produce findings and arrive at conclusions that enrich the conceptual discussion. The quantitative data show almost no gap between the richest and poorest households. The qualitative data from 23 interviews confirm some of the expected outcomes of the Plan, but also reveal problematic situations in relation to the availability of the computer for use in the classroom and at home. The poorest children have more difficulties using the technology and deriving benefits from it. Social factors prevent them from taking proper care of their

laptops to keep them in working condition. Another finding at schools is that the teachers experience ongoing tension between the difficulties arising when they lack computers for all the students, including their own challenges in using the technology for education, and the stimulating environment for learning that progressively unfolds when they do use it. Our main conclusion is that a universal policy of access to information and communication technologies, like the Ceibal Plan, from the outset needs to address problems in the schools in the poorest socioeconomic situations that prevent those students from gaining competencies and well-being in the Information and Knowledge Society. We assert that the institution responsible for the Ceibal Plan is continually taking actions intended to overcome such difficulties in the long run.

**Keywords:** *ICT, education, digital divide, social inclusion, inequality, Information Age.*

## INTRODUCTION

Information and communication technologies (ICTs) are among humanity's greatest technological achievements of recent decades. They have penetrated and transformed many areas of the economy, society, culture and politics, and have made profound societal changes possible. Our very social structures have been modified, such that the information and knowledge society is the Network Society, communicated through the Internet (Castells, 2000).

However, this transformation has been neither homogenous nor linear, and brings with it inequalities – the most prominent being the digital divide. This type of inequality, specific to the Network Society, is multidimensional and is not limited to a mere dichotomy between those who have access to it and those who do not. It extends to the interaction with other inequalities, such as economic and social inequalities (Norris, 2001; Mística, 2003; Hargittai, 2004; Sassi, 2005).

ICT access and connectivity are the basic variables, and must be accompanied by the scope of their uses. Various authors have emphasized the important contribution ICT use has made to human development. To achieve this, a “meaningful use” and a social “appropriation” of the ICTs are necessary (Mística, 2003; Sassi, 2005; Gascó et al, 2007; Mansell, 2002).

This more complex view of the digital divide means considering various dimensions of digital inclusion policies as well as those seeking to

promote human development. This implies a process in which the users take ownership of ICTs and incorporate them into daily life. From that point, users produce new actions and practices that change their living conditions in a positive way, thus meeting their needs and resolving problems (Martínez, 2001; Warschauer, 2003; Selwyn, 2004).

This process occurs in a specific social and cultural context. Local cultures undergo changes in their symbolic systems and in the circulation of knowledge, which should be seen as both engines and brakes in the appropriation of ICTs (Bonilla and Cliche, 2001; Cortes and Dubois, 2005). Finally, the capacity for appropriation itself must also be generated (Mansell, 2002). It is here that the various policies and actions for ICT use in different spheres are established. Education is one of the policy pioneers in the development of initiatives for ICT use.

The specific uses of ICTs in education can be categorized in three levels: use by the administration of the educational center; the pedagogical use that enables changes through digital resources and methods more centered on the student's active effort; the complementary curricular use in learning new subjects through the development of skills and abilities linked to meaningful use of ICTs, which facilitate the student's future social and economic integration (Claro et al, 2011).

These possibilities for the educational use and appropriation of ICTs are conditioned by the quality of access (connectivity, equipment availability, among others). The significance relative to education lies in whether the appropriation of ICTs provides new opportunities for the students, and particularly whether the ICTs produce benefits at the educational level. Hargittai, Robinson and DiMaggio (2003) have named this differentiation the "second digital divide", and it refers to the unequal abilities within the population to take advantage of ICTs.

The case of the Ceibal Plan in Uruguay is unusual because despite being an education initiative, from the outset the focus was on social inclusion goals rather than educational goals. It was when the program became more consolidated that it expanded its objectives to include educational transformations. Our aim here is to discuss the extent to which the implemented actions of the Ceibal Plan have contributed to the reduction of the digital divide through more complex ICT uses and greater emphasis on education.

## THE CEIBAL PLAN

The President of Uruguay created the Ceibal Plan in April 2007.<sup>1</sup> A board of directors was established, composed of delegates from various government agencies.<sup>2</sup> The Executive Branch's decree to create the Ceibal Plan was the first public document in which the government's primary motives for the formulation of this policy were expressed. The decree states that the Plan is framed by the need to advance towards becoming a Society of Information and Knowledge in social and educational terms. Because it was designed as a public education policy, it meant advancing in that direction from a pedagogical perspective. And, in Uruguay, because the school is a symbol of social inclusion, the school environment promotes a greater sense of social equality.

Over the years, the institutional traits of the Ceibal Plan have changed, as have the specifics of its objectives. Initially, its goals focused on promoting social inclusion. Beginning in 2010, with the National Budgetary Law in Article 842, the stated purview of the Ceibal Center is to: promote, coordinate and develop plans and programs to support educational policies for children and adolescents developed by the relevant bodies; contribute to the exercise of the right to education and to social inclusion through actions that foster equal access to knowledge; develop informal educational programs for the population directly related to the beneficiaries of the Center's activities.

As for the educational foundations of the plan, the integration of ICTs into the classroom is not an end in itself, but rather that the integration should occur as a function of the pedagogical goal. For the Ceibal Plan, teacher mediation between the object of knowledge and the active development of meanings by the students is essential for the construction of knowledge (Rivoir and Lamschtein, 2012b).

The implementation of the Ceibal Plan marked the launch of a major organizational structure and logistical system. Based on a pilot

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1 Decree No. 144, 18 April 2007

2 Technological Laboratory of Uruguay (LATU), National Public Education Administration (ANEP), Central Directive Council (CODICEN), Council on Primary Education (CEP), Ministry of Education and Culture (MEC), Agency for Government Development of Electronic Administration and the Information and Knowledge Society (AGESIC), National Agency of Research and Innovation (ANII), and National Telecommunications Administration (ANTEL).

experience in a rural town in Uruguay in 2007, the Plan gradually expanded geographically until it covered the entire country in 2010. In that year, it was also expanded beyond primary schools to include the first three years of secondary education.

By March 2013, approximately 600,000 laptops had been distributed to students and instructors; 2,790 educational institutions were connected to the Internet, which represent 99% of students; 7,014 wireless access points had been installed; 50% of students had Internet access less than 300 meters from their homes; 30,000 instructors had been trained; and 723 public spaces and 332 low-income neighborhoods had wireless signals.

Meanwhile, direct trainings that targeted instructors through optional courses or workshops were conducted with the support of volunteer networks. The figure of “Maestro Dinamizador” (*Dynamizing Teacher*) was created to promote a more effective use of the XO laptops<sup>3</sup> among instructors and children in the educational experience. There is also the “Maestro de Apoyo Ceibal” (*Ceibal Support Teacher*), who numbered more than 400 in 2009, to work with and support their colleagues in providing new teaching ideas for using the XO laptops (Rivoir and Lamschtein, 2012b).

A set of digital resources were developed for teaching and interaction within the educational community, including: the Educational Portal ([www.ceibal.edu.uy](http://www.ceibal.edu.uy)) to support and promote the educational use of the laptop and critical use of information; the Institutional Portal ([www.ceibal.org.uy](http://www.ceibal.org.uy)), where one can find information about the Plan, including news, services, contacts, etc.; a Ceibal Channel on YouTube <http://www.youtube.com/user/canalceibal>, which was later broadcast on both open and subscription television channels. Ceibal also has a radio presence, where listeners have the opportunity to discuss questions about technical issues and computer applications (Rivoir and Lamschtein, 2012a).

There is also the Ceibal bus, which tours the Uruguayan capital, repairing laptops and providing both educational and recreational

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3 The XO of Ceibal Plan is a small laptop by Brighstar with the following properties: AMD processor 400 MHertz , 128 MiB of dynamic memory, 512 MiB flash memory, monitor of 7.5 inches an 1200\*900 resolution, camera, wifi and other network capabilities, low consumption, USB ports.

workshops for the children and adolescents participating in the Ceibal Plan.<sup>4</sup> The maintenance and repair of the XO laptops was decentralized to local businesses and a free telephone help center was created. Software and hardware problems are repaired free of charge if they are not the result of misuse; users receive individualized attention when seeking guidance; laptop chargers are available for purchase; and connectivity problems are resolved.

In short, the Ceibal Plan utilizes a variety of actions in the distribution and maintenance of the laptops, development of infrastructure, creation of digital educational content, training of instructors, and various activities to promote the use of the XO laptops. As such, we share the assertion of Garibaldi and Ibarra (2011) that this Plan differs from other OLPC plans because it is not merely a computer distribution project. In this article we examine whether digital inclusion, as it has developed so far, contributes to the social inclusion of the Plan's beneficiaries who are otherwise society's most excluded.

## METHODOLOGY

Our research question is: *Has the implementation of the Ceibal Plan favored social inclusion through reducing the digital divide and expanding the educational use of XO laptops?*

To answer that question, we chose a combination of quantitative and qualitative techniques. For the quantitative, we studied the Annual Survey of Households from 2001 to 2011 to determine if the divide in digital access has been reduced, as well as its relation to other variables.

For the qualitative side, in-depth interviews were conducted to obtain information about the Plan's implementation and processes at four schools. There were 23 interviews involving educational staff at the selected schools, with approximately five per school: the four school principals, 12 teachers, four Ceibal support teachers, one community teacher, and the two inspectors for those school districts.

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4 <http://www.ceibal.edu.uy/Portal.Base/Web/VerContenido.aspx?GUID=1caaf210-1d64-4fee-804a-e9deb25ca3a1&ID=205763&GUID=ec8a563-fea3-4c32-8c58-521043aa8923-7265-4aed-915b-c8a834e02fbc>

The four schools are in a critical state. Of the Uruguayan schools situated in very unfavorable socioeconomic contexts, we chose those that were not included in the Ceibal Plan pilot programs, and which had not received additional support or complementary resources for implementing the Plan. These schools were designated by the National Public Education Administration as “model schools”.

The four schools are located in areas where the population is primarily of low socioeconomic status, all in the Montevideo Metropolitan Area. Based on previous surveys and in consultation with officials, the study includes schools No. 163, No. 191, No. 245 in the city of La Paz, and No. 180 in the city of Progreso.

The primary lines of questioning in the interviews of the educational staff were: the experience of implementing the Ceibal Plan in the school; how it has contributed to the children’s educational development; the main facilitators or obstacles for working with the Ceibal Plan; changes in learning that the children experienced once the Plan was implemented; changes in the children’s performance, skills and autonomy; whether the Plan benefits the families, and changes that have occurred in the relationship between the school and the households; which activities best ensure that children, teachers and families benefit from the plan; whether the staff see that the Ceibal Plan fosters social inclusion; which educational experiences and practices were successful in the Plan implementation; the main obstacles and problems for the social inclusion of the area’s children and other residents.

Finally, and with the aim of learning about the experience from the perspective of the Ceibal Plan’s direct beneficiaries, a brief survey was conducted of children in different classrooms. The teachers were asked to pose the questions. The younger children were asked to draw pictures, and older children were asked to write a few sentences.

The questions were the following: For some time now, you have had your own XO laptop from the Ceibal Plan. What does this mean to you? Can you use the XO at school, at home, in other places? What do like best about it? Is there anything that is not going so well?

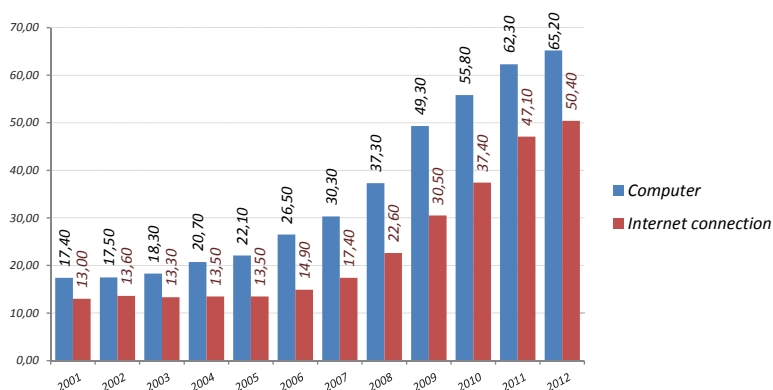
The following numbers of responses were obtained in the survey:

SCHOOL	D	A	C	B
1st grade	45	19	49	31
2nd grade	29	14	39	56
3rd grade	22	14	51	73
4th grade	38	22	16	39
5th grade	24	26	44	21
6th grade	38	29	37	22

The fieldwork was conducted throughout the month of October 2011. The interviews lasted between 30 minutes and one hour and were conducted in the main office of the school or in a room with appropriate conditions for audio recording. The recordings were fully transcribed.

## THE DIGITAL DIVIDE AFTER THE CEIBAL PLAN

To determine whether the Ceibal Plan has produced changes in the digital divide, we conducted an analysis (below) of data from the Annual Survey of Households, from the National Statistics Institute.



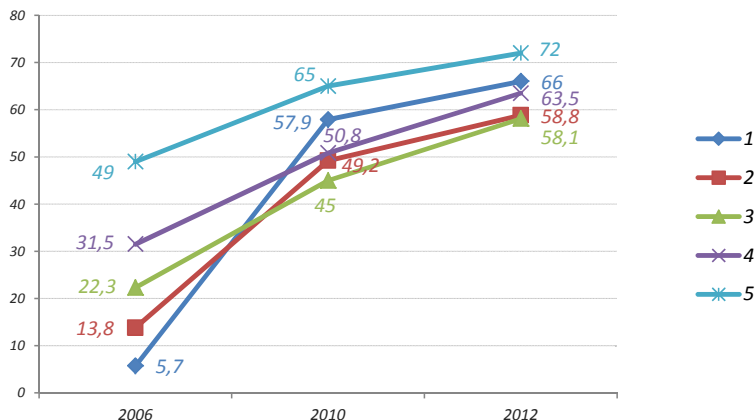
**Graph 1:** Evolution of the percentage of households with computer and Internet from 2001 to 2012 (urban areas, including only cities with more than 5,000 inhabitants).

**Source:** Our own processing of the data, based on the Annual Survey of Households of the National Statistics Institute.



In Graph 1, one can see the percentage of households with access to computers and Internet begins to increase more markedly beginning in 2006. That corresponds both to Uruguay's economic recovery and to the Ceibal Plan.

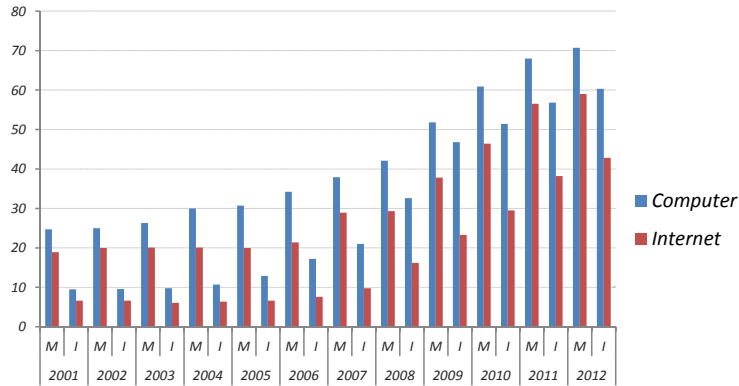
In Graph 2, it is evident that the possession of a computer became more equitably distributed among households under the Ceibal Plan. Quintile 1 represents the lowest-income households, while quintile 5 represents those of highest income. It is worth noting that quintile 1 has higher rates of computer possession than quintiles 2, 3 and 4. This is due to the fact that there are more primary-school age children in the households of quintile 1 than in the households of the other quintiles.



**Graph 2:** Percentage of households with a computer, according to quintiles for total household income per capita, for the entire country, including small towns and rural areas, in the years 2006 and 2012.

**Source:** Based on the Annual Survey of Households of the National Statistics Institute.

The comparison of households in the capital, Montevideo, with those of the country's interior shows that the difference in access to computers and Internet persist throughout the decade, but increases in access have occurred in both geographical areas, as seen in Graph 3. The households of the Uruguayan interior, in towns larger than 5,000 inhabitants, do not lag far behind the capital in terms of computer possession. This is an effect of the Ceibal Plan. However, there is an important gap for households of the Uruguayan interior in terms of connectivity.



Graph 3: Percent of households with a computer and Internet, according to major area (Montevideo-Interior), from 2001 to 2012, for urban areas (towns larger than 5,000 inhabitants).

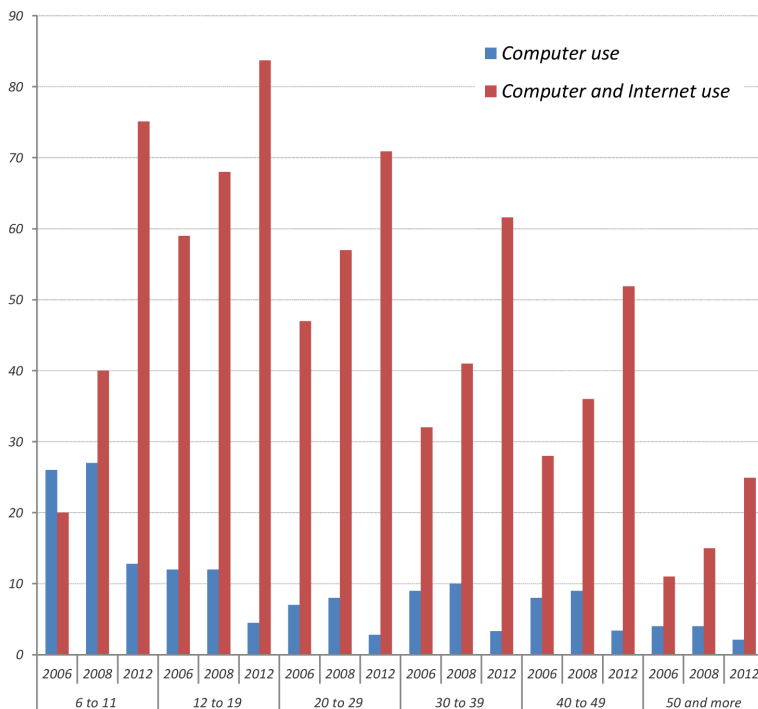
Source: Based on the Annual Survey of Households of the National Statistics Institute

Beginning in 2006, questions about the use of ICTs by each member of the household were added to the Annual Survey of Households. As a result, not only did it become possible to measure the digital divide based on possession of ICTs in the home, but also based on the population's effective use of it.<sup>5</sup>

With the indicators about usage, it is possible to see the generational divide in ICT use. The younger age groups have higher ICT use, and the percentages decline in successively older groups, with the elderly mostly removed from new technologies. However, all age groups have experienced a reduction in the digital divide. Furthermore, we can see the impact of the Ceibal Plan in the approximately 50-point increase from 2006 to 2012 in computer and Internet use in the group of children ages 6 to 11 years.

Regardless of age, and with the exception of children ages 6 to 11, there are very few people who use only a computer, and not the Internet.

5 These indicators encompass not only those who have a computer and Internet at home, but also those who make use of these technologies despite not having them in their homes. It also includes those who have the technology at home but do not use it. In a strict sense, the indicator in the different years is not completely comparable given that the time reference changes from one year to the next. For example, in 2006, those surveyed were asked about computer and Internet use in the past six months, while in 2010 they were asked about use in the past month.



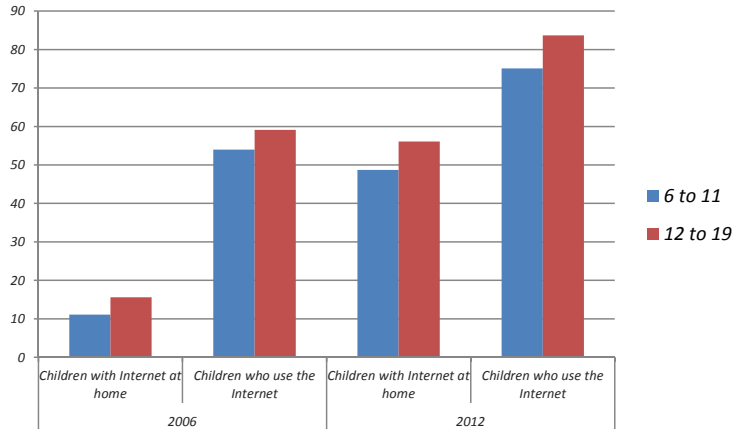
**Graph 4:** Percent of people who use computers and Internet, by age group, for the entire country, including small towns and rural areas, from 2006 to 2012.

**Source:** Based on the Annual Survey of Households of the National Statistics Institute.

(In the graph, the bars to the left for each age group are almost always the smallest.) The vast majority of people who use a computer also use the Internet, which indicates that many access the Internet outside of the home. We are interested here in particular in what is occurring in the youngest groups.

We see in Graph 5 how the number of children who used the Internet at home increased, as did the proportion of those who used the Internet outside the home. From the same household surveys, we can deduce that they use it more at school and less at Internet cafés, which was the preferred location for adolescents in 2006.

In summary, the data confirm the Ceibal Plan's contribution to reducing the digital divide in terms of computer access and connectivity.



**Graph 5:** Percentage of children ages 6 to 11, and 12 to 19, with Internet connection in the home, and who used the Internet, for the entire country, including small towns and rural areas, for the years 2006 and 2012  
**Source:** Based on the Annual Survey of Households of the National Statistics Institute

## VIEWS OF EDUCATIONAL ACTORS ABOUT THE CEIBAL PLAN IN THEIR SCHOOLS

The in-depth interviews of the educational actors in the four schools (mentioned in the methodology section) surveyed their opinions about the execution of the Plan at their school, their main difficulties, and the plan's contribution to social inclusion. We questioned these staff members about the objectives of the Ceibal Plan and the actions that were carried out at the school. Their views of the Ceibal Plan provided us with an approximation of the reduction of the digital divide and in what ways digital inclusion is favoring social inclusion in those schools. Achievements as well as difficulties were surveyed.

### Opinion of Educational Actors About the Ceibal Plan's Effect on Social Inclusion

At School A, the view of its officials and teachers is that the Ceibal Plan helps reduce inequalities in terms of access to new technologies. They

believe that the new technologies are tools with great potential for developing a pedagogical project that could significantly affect children's learning. They also share the view that the ICTs are a tool for the children's future employment.

Nevertheless, at this school it is believed that the Ceibal Plan is not fomenting social inclusion. The staff members state that while the XO laptops are modernizing elements in their neighborhood, and were well received, in reality the computers are not maintained in full working order. Most of the children's computers are in disrepair. The laptops become damaged; they are repaired, and damaged again. The parents have not taken responsibility, says the staff, and computer care is left to the children and to the school.

At School B, the officials and teachers say that the Ceibal Plan has made possible an unprecedented access to culture. This strengthens some areas of learning and creates opportunities that the children enjoy. The staff believe that access to these cultural sources, whether for instruction or entertainment, is socially inclusive for the school's students. However, there is a lack of consensus as to whether the skills that they are acquiring will make them more efficient and competitive in the future. In that regard, what they do believe is that these children will not be able to close the divide in learning with respect to children in better socio-economic conditions. They believe that the digital divide in terms of access has been reduced, but not the divide in terms of appropriating the ICTs. As they see it, the most important indicator of the latter would be that the children have the ability to keep their computers functioning.

At School C, the assessment of the officials and teachers is that Internet access opened another world for the children and their families, even if it has only been to play games and communicate. They believe that these activities are creating social inclusion. However, the lack of care for the computers is a problem, though to a lesser extent than in the schools mentioned above.

At School D, the view of the officials and teachers is that the Ceibal Plan is favoring the inclusion of the children and families despite the disrepair of many of the computers. But they indicated that resources needed to be channeled toward that problem, that is, they need to work with children and parents on appropriate use of the XO laptops.

Nonetheless, in these four schools nearly all the teachers, with a few exceptions, proved to be very motivated to use the ICTs despite the problems mentioned. This is largely due to the fact that the children are the ones motivated to use them. The students prefer to do their work on the computers rather than using traditional modes.

## The Use of XO Laptops for Social Integration

Another aspect surveyed was the extent to which the Ceibal Plan computers were utilized towards the objective of social integration.

At School A, there are biweekly school-wide activities that favor inclusion. They are intended to create a collective identity through feelings of membership in a group, that is, the school and the community. The XO laptops have served this purpose as a blog was created in which children meet each other and share information. According to the teachers and principal, this has also benefited the children's self-esteem.

At School B, the older children have created a school blog, which has been a very positive experience in integration within the school, with other schools, and with the community. Another specific positive experience, but outside the school walls, are the demonstrations with other Ceibal schools of activities using the XO laptops in classes.

At School C, there have been specific activities that have significantly favored social integration. On Public Education Day, there was an exhibition of work done with XO laptops, which included the participation of many parents. They have had the support of a *Dynamizing Teacher* to participate in the *Ceibal Fair*. They feel that they have an opportunity to formulate projects for which the Ceibal Plan could designate resources. This school has not created a blog because there is no teacher trained to do so.

At School D, there are activities that dynamize the Plan while also favoring social integration. At the school festival, they present electronic books produced using the Etoys application. In addition, they have had other exhibitions of works made on XO laptops in which the parents in attendance have been able to learn how to use this resource. The *Ceibal Fair* is another occasion in which children have participated and carried out XO activities with children from other schools.

The school has a blog but the staff said that the children have shown little interest in it. It seems to be an outdated mode in comparison to

the Internet's social networks. The school staff believes that the use of social networks is attractive for the children but is often a source of conflict, arguments and fights. The staff say they do not see a productive use for them.

### **Difficulties Identified by the Educational Actors, and the Actions to Overcome Them**

The interviews with the school officials and teachers delved into the main difficulties they encountered in executing the Ceibal Plan in their schools.

At School A, nearly all of the teachers say it is difficult to work with the XO laptops in the classroom because many of the children come without their computers. This is because many are broken, or the batteries are not charged because they do not have a charger, or they simply do not bring them to school because they are heavy to carry in their school backpacks.

At this school, the *Ceibal Support Teacher* is focusing on parents and how the computers are used. She has had good results, but her efforts have been insufficient given the scope of the problem. The endeavor has been well received by the parents, but it involves just one teacher, one day a week, and during one school shift, where most of her time is spent working with teachers and students.

To deal with the shortage of computers in the classroom, group activities are carried out with the laptops that are there. Depending on the class, there is one computer for every two to four children. This is an ir-resolvable problem for completing homework. However, the teachers do use them, and while they say it is beneficial that the children share the computers, they also say that situations arise in which children become angry and frustrated, which disrupts the class.

One of the teachers at School A states: *"We can't be so negative that there are few [computers] and therefore not use them. And it is a way for the child who didn't take care of it to realize the problem, and still be included and integrated."*

This reflects the teachers' willingness to take advantage of the resource in itself and as an element for learning in general.

At School B, they also frequently use group work in the classroom. Here they address the problem of poor computer care in the home. The

difference in this neighborhood is that there seem to be more parents who take responsibility when the computer is damaged. In this school, it was noted that more work is needed with the parents in this regard, and that efforts should continue along this line because the parents were not prepared to receive the technology, that is, they do not know how to use a computer, how it works, or how to take care of it to ensure that it continues to function. The school staff also says there are parents who reject the technologies and that some believe that using the Internet in the classroom is not useful for learning.

At School C, we found that there is greater exploitation of the XO laptop. At least half the children bring their computer to class. The teachers note that the parents who do not take responsibility for the computers tend to be the same ones who do not take care of other aspects of their children's lives and have little relationship with the school. The younger children are the ones who best care for the computers and bring them fully charged to school. The older children in general do not comply with such responsibilities.

The *Ceibal Dynamizing Teacher* leads demonstration classes for the parents about what their children do with the computers. The staff says this has produced very positive results. However, these activities are not organized for the parents of all the children, but rather by class, and thus depend on the initiative of the classroom teacher.

"I think that from the moment of implementation it was precisely this instruction that was lacking. The day they handed out the computers, they held a meeting with the parents, with a little book that had three words and then they give us the computers. The idea that I don't drop it on the ground, don't leave it in the sun – these things are not known in the homes because many have never had a computer. A process was needed that just recently is being remedied, and it is evident. But I think there was something missing in the meantime. - A teacher at School C

According to a teacher at this school, it seems likely that an intermediate step was missing: use the computers in the school, and once everyone has attained a certain level of mastery, then distribute the laptops to each child.

At School D, those interviewed say that a large percentage of the parents lack involvement in matters related to their children. At the time



the XO laptops are distributed, there are great expectations but they begin to diminish, which becomes evident in the high number of non-functioning or seriously damaged computers. According to the teachers, 40 to 50% of the computers in their classes do not work.

The *Ceibal Support Teacher* this year has helped distribute the laptops, instructing parents on their care and basic operation, and this seems to be an effort worth continuing. Meanwhile, many families have very precarious living conditions that make the situation difficult. For example, there may be only one electrical outlet in the home, and it is not easy to ask a family to keep the battery charged in their child's computer.

The computer-related problems take up a great deal of pedagogical time and are a bother for the teachers. For the least-skilled teachers, these problems tend to be a strong demotivator because they only add to their insecurities with respect to technology. This has consequences for the frequency and quality of the use of computers in class. The higher-skilled teachers have exploited this resource much more, and are better able to motivate the children to keep their laptops in working condition, although they are not always successful.

## Educational Use of the XO Laptops

The educational use of the laptops was surveyed through questions posed to the teachers about the frequency and type of use in the classroom. They were asked about the educational benefits of usage and about the acquisition of digital skills by the children and themselves. Furthermore, from their responses we have also selected the main difficulties arising in the classroom.

At School A, the staff said that often the lack of computers in operating condition, or problems with Internet connection, or slow computers, make it impossible to complete the teaching plan or take up too much time.

What they utilize most are the computer programs to improve written expression. They also use math programs, as well as a program to draw semantic maps. In the higher grades, they frequently use the Internet to find additional information about the material they are studying. One of the teachers makes photo collages of the school's various activities. The XO laptops are also used to make student evaluations online.

The teachers say they use whatever they know best. If the students are more familiar with a program than the teacher, to a certain degree this can create an uncomfortable situation.

“There are tons of things that are clearer to them than they are to me. They clear up my questions; they are continually looking, searching. It’s the way they learn.” - A teacher at School A

The teachers so far have not seen substantial improvement in school performance but do appreciate the digital skills that the children are acquiring. One type of usage that the children have quickly adopted is the search for news and communication through chat programs or through Facebook.

They said that the children only make Internet searches for educational purposes when the teacher asks them to, and that this does help in the comprehension of concepts. They also said that what students mostly use the computers for outside of class are games. They recognize that the children playing computer games are avid explorers of the XO laptops and are undoubtedly acquiring digital skills that are beyond the teachers’ purview.

The teachers say that the children are more motivated to learn when they use the computer, which then makes it a stimulus to use them. But that is not the case for all teachers. Some only plan activities using the XO laptop when the *Ceibal Support Teacher* is in the classroom, because they otherwise do not feel sufficiently trained to lead a class themselves using ICTs. Nevertheless, this being the case, they do allow the children to play with the computers in class for a short time.

Generally, teachers have not participated much in the Ceibal courses that are available, due to the long distances they would need to travel. While there are many teaching courses available, they are not taken advantage of because of this problem. However, even the courses that they have taken they said were unsatisfactory because they were not practical enough, or assumed a level of prior knowledge that they did not have.

The *Ceibal Support Teacher* is currently someone who is involved in the class of a colleague and supports that teacher’s work with the XO laptops with the normal day’s teaching plan. This was not the case in the beginning. In the first year, the *Ceibal Support Teacher* was in

charge of the XO computer use in the classroom and the regular teacher did not participate. It was found that afterwards, the teachers did not have the capabilities to continue on their own. A 2010 inspection stated that the work should take place with the involvement of both teachers in the classroom based on the day's teaching plan.

At School B, all teachers work with XO laptops in the classroom even when not all students have one. The children share the computers but not all of the children are able to work with them, which proves frustrating for the teachers. In addition, there are frequent problems among the children when they have to share a computer.

The teachers use them in the classroom a minimum of three times a month, and two to three times a week, maximum. One teacher utilizes the XO activities, but the work is done on paper in notebooks. The uncertainty of how many computers will be available any given day in the class affects planning, reducing the number of activities that are conducted on the computer. On rainy days, plans to use the XO laptops are frustrated because children tend not to bring their computers.

In spite of the problems, according to the teachers, the classes are much better now than they were without the XO laptops. They believe the computers are very stimulating for the children. From 2009 to the present, teachers have received training from the *Ceibal Dynamizing Teacher* on some Saturdays, when there are no classes. They have also received assistance from the *Ceibal Support Teacher* to work with the computers in class alongside them, but only during the school's afternoon shift. The morning teachers have not received this support. In 2011, the *Ceibal Support Teacher* became the *Community Teacher*. She continued to serve as an informal consultant to the teachers, but no longer provides support in the classroom.

For some teachers, a negative aspect of the Ceibal Plan was that training came after the arrival of the computers. This was perceived as a lack of appreciation for the teacher. They believe that if the training had occurred from the beginning of the process, it would have been simpler. Some of the teachers interviewed said that an important point for improving the Plan is to emphasize teacher training and work with the families. As for the teacher training, they said it should be more specific, with a clear articulation with curriculum content.

According to some teachers, the students' reading and writing skills have improved and accelerated. Others have not seen substantial improvements among their students.

The ability to access information on the Internet has allowed teachers to develop more creative activities with the children, and has made traditional educational activities more attractive and stimulating for learning. Among the programs commonly used is one that makes conceptual maps (Laberinto), a calculator, and the drawing program Tux Paint. Students also make photo collages and utilize the Dr. Geo program for geometry.

Children seem to be fascinated by anything that has to do with communication. Some classes have blogs, but the use of online social networks or e-mail was not evident in the classroom.

Teachers said that some children, but not all, turn to the Internet for everything they need. They also said there are children who find it difficult to conduct Internet searches on their own because they do not know which search words to use for unfamiliar subjects. Also, for many children it is difficult to determine whether what they find on the Internet is appropriate or not to complete the task the teacher has assigned.

The teachers said the children gain autonomy because they explore by themselves both the applications and the content of the Internet. They learn to make decisions in the usage of ICTs. They navigate the programs alone or with their peers. Some teachers said that their students understand the XO laptops better than they themselves do.

At School C, the teachers ask the children to bring the computers every day, as the Ceibal Plan recommends. But some children fail to do so, and if they do bring the laptop, the battery is not charged. The teachers say that sharing the computers fosters teamwork, which in one sense is good for the students. But as in the other schools, sharing the laptops is also a source of conflict, and not everyone ends up using the computers.

Also similar to the other schools, some teachers criticize the Ceibal Plan because their training took place after the computers had already been distributed to the children. It has taken time to incorporate this new tool, and they still lack the knowledge for enriching the XO laptop experience in the classroom. The *Ceibal Support Teacher* helps to resolve many practical questions that the teachers are unable to themselves.

The most frequent computer activities at this school are: searching for information on the Internet; Etoys, an animation program (often used to create cartoons and foster creativity), Laberinto, a program that can be used to make conceptual maps; TuxPaint, for drawing; Dr. Geo, for geometry; and Memorice, for exercising the student's memory. Less frequently used are the programs for using virtual microscopes or working in virtual laboratories.

According to most of the teachers at this school, the most widespread impact has been in reading and writing. It is believed that information searches require more reading effort. Organizing and summarizing information with a tool like Laberinto is fun and attractive for the students. As for writing, the Ceibal curriculum is accelerating learning among the younger students through the "Habla con Sara" (Talk with Sara) program, in which a voice tells them what they are writing as they are writing it. However, the teachers in the higher grades have not seen obvious improvements in writing.

The teachers say that the children have demonstrated their ability to navigate the computer and the programs on their own. But this is not always the case. The students work together and also need adult assistance. Cooperation and exchange among the children have improved. The youngest children, in first grade, need a great deal of adult help to learn how to use the computer.

The teachers agree that the ICTs have contributed to the children's greater autonomy. By looking for information on a variety of websites, such as educational portals, Wikipedia, or YouTube, they gradually improve their ability to evaluate the information they find, and to incorporate criteria for what is relevant – which the teachers view as greater student autonomy.

At School D, all teachers work with XO laptops in class; some almost daily, others twice a week or less. Groups of two or three children work together.

As in the other schools, the staff said that the first phase of implementation should have included teacher training, with time online, and seeing the contents of the Portal – which currently now are in place.

They said that this criticism is not about the teacher having to know more than the students, but that the children do indeed have questions

that require the teachers to know how to operate the system in order to respond to them.

They believe that if they were better trained they would be able to make better use of the ICTs in teaching and learning. But they work the two school-day shifts and do not have many opportunities to attend training courses outside the school hours.

The XO laptops are most frequently used to make cartoons and e-books, with the Etoys application or with Fototun, drawing with TuxPaint, and making photos and videos. In the younger classes, the students use the memory application Memorice. In the higher grades, the computers are used more for Internet searches, guided by the teacher.

The teachers said the computers foster learning despite the limitations resulting when not every student has a laptop in class. They said the children are acquiring digital skills and are more motivated in developing reading habits, and the older students are incorporating abilities to search, understand and evaluate information. The use of the Laberinto program also helps to that end, given that it organizes information into conceptual maps. Nevertheless, the teachers have not seen big improvements in writing skills, though improvements are more evident among those who have laptops than those without.

In the four schools, it can be seen that the incorporation of ICTs in the classroom has been a boon for children with learning difficulties, whether physical or psychomotor. This is particularly helpful in written and symbolic expression, through drawing, because re-doing work does not become tedious (this was not found to be the case in School D, but in the three other schools). The children with attention deficit disorders can concentrate better and are able to complete their work when they use the XO laptop, while they are less able to do so when using pencil and paper (this was the case in the four schools).

On several occasions in the four schools, the teachers said that they were not trained ahead of the distribution of the XO laptops, which prevented them since the beginning from exploiting all of the possibilities the computers offer. However, to some degree, all teachers were familiarized with the ICTs before the Ceibal Plan's implementation.

The computer-related problems consume a great deal of teaching time and are a bother for the teachers. In the case of the lesser-skilled teachers, this tends to be a considerable demotivation because they are

problems that augment their existing insecurities with respect to technology. This has consequences for the frequency and quality of their computer usage. The teachers with more ICT skills have been much more able to exploit the resource and tend to better motivate the children.

## WHAT THE CHILDREN SAY

At School A, the magnitude of the problem of damaged computers is confirmed among the younger students, but not with the older ones. Nearly all of the children in second and third grade responded that their computers are broken. They describe how the computer was broken or what was broken, or express frustration because the laptop shuts down on its own. In the writings of the children in fourth grade, there is a prevailing fear that the computer will break down, but they also say that they like everything about the XO laptops, except for the fact that they cannot connect everywhere, and that the battery charge does not last very long. Among the children in fifth grade, the most common response in their writings about the XO laptops is that they like being able to use them wherever they are, although they can only connect to the Internet near the school, and sometimes the computer breaks. The responses of sixth grade students were similar, but they more often mentioned the possibilities of studying and looking for things on the Internet.

This leads us to believe that the younger students experience more difficulties in using the computers than the older children. The younger students do not receive as much support from their parents because they do not know how to use the computers themselves, while the older students are more able to resolve the problems on their own as they arise. We can also conclude that the older children, in fifth and sixth grade, are better able to accept the system's limitations, and have more autonomy to move about. The younger students are frustrated because they cannot connect everywhere, while the older students say they connect near the school.

At School B, what the younger children – first through third grade – like best is that they can use the XO laptops everywhere. They can play games, listen to music, do schoolwork and learn. The negative, they say, is that the battery loses its charge quickly; the computer freezes, or breaks down. But the majority sees nothing negative in the XO laptops.

Some did mention that the teachers had not been taught in order to teach them, the students. This all indicates that the younger children at this school have been able to appropriate more from the XO system than those at School A. But there appears to be little difference between the older students at the two schools.

According to the students in fourth through sixth grades, the best thing about the XO laptops is that they can be used anywhere. The computers have defects but many of the students accept them, such as: slow Internet connection, they cannot connect to the Internet everywhere, they have limited capacity, the computer freezes up, or that they are not always repaired well.

At School C, the drawings that the first grade students made about the XO experience reflect a greater appropriation than the children at Schools A and B. Their drawings depict their favorite computer applications. They are similar to the drawings made by second graders at the other schools, while first graders' drawing were limited to being with their laptop, or in the yard with their laptop. What the children in third grade like most about the XO laptops is that they can be used anywhere, they can play games, download music, download information, and chat online. What they like least about the computers: they freeze, the battery loses its charge, they cannot use the computer at home, or the computer breaks. For the fourth grade students, the most frequent response is that they like to use the XO laptops to learn. For the fifth and sixth graders, the most frequent responses mention how they like to learn, work and play on the computers. What they like least is that the battery loses its charge and that they cannot connect to the Internet everywhere.

At School D, the drawings by the first grade students are similar to those of their peers at School C. They depict the XO applications that they like the best. Most are games, but also appearing frequently are drawings about "Talk with Sara", the application for learning to write. The drawings by the second graders depict the games they like, the fact that a computer was broken, that they can use the computer outdoors, and occasionally with friends. The third graders most often responded that they like the games, to work on the computer at home; and what they like least is that the games might have a virus, or that they only have Internet connection at school. Among the children in fourth through sixth



grade, what they mention most often is that they like being able to use the computer anywhere, but they are concerned that it will break, that it will freeze, or that they cannot connect to the Internet at home.

## CONCLUSIONS

First, we can affirm that the Ceibal Plan in Uruguay, as a national 1-to-1 policy with social inclusion goals and implemented in the educational system, is not merely an initiative to distribute computers. This is evident in different types of activities related to teacher training, the production and dissemination of digital content, the combination with other communications media and in situ activities.

Second, we found that the digital divide, in terms of ICT access, was reduced as a result of the implementation of the Ceibal Plan, particularly the inequality in access to personal computers in low-income households. As for Internet access in homes, growth was less pronounced and more difficult to link to the Ceibal Plan.

Third, based on the qualitative analysis of four schools in neighborhoods of low socioeconomic status in the metropolitan area, we can confirm that the execution of the Plan has had positive effects on the children in terms of social inclusion. The elements that demonstrate this are the introduction of educational uses of these resources, the development of digital skills among students and teachers, the improvement in some curricular areas (reading and writing), as well as greater motivation among all children to learn, including those with learning difficulties.

However, the general improvements that are evident in the reduction of the digital divide mask the great inequalities existing within these data. The contributions to inclusion mentioned above are not homogenous among or within the schools studied.

We concluded that the existing social inequalities affect the children's capacity for ICT appropriation in a differentiated way. One indicator of this is whether the child maintains the computer in working condition, because it is a factor that would exclude him or her immediately from the activities, and therefore from the opportunities provided by this resource. This factor is related to the parents' interest in the XO computer and the importance they place on it, which is also related to their socio-cultural

status and to their involvement in the child's education in general.

The quantitative information from the secondary sources we referred to in the introduction does not take into account the problem of computers that break down, whether temporarily or permanently. The secondary data do not provide information about the effective usage of the XO laptops. In three of the four schools studied, there are problems with connectivity that limit Internet access, and in the four schools nearly half of the students do not have laptops in working condition. This alters the classroom activities and does not facilitate the educational use or exploitation of the computers.

The training of teachers to exploit this ICT resource and to resolve problems as they arise is limited, although the process is evolving. Some initiatives are seen as positive for promoting the appropriation and educational use of the technologies, such as the involvement of the *Ceibal Support Teacher* and the *Ceibal Dynamizing Teacher*, the free repair of the computers, and the workshops for the parents.

In summary, the elements collected here show that in order to ensure access to and maximize use of the ICTs in very unfavorable socio-economic contexts, more specific actions are necessary to resolve problems that do not occur in more favorable socioeconomic contexts. The Ceibal Plan, as a universal policy, did not foresee this differentiation. The contrast is reflected in the varying degrees to which the students make use of this resource, according to their living conditions, such as the socio-cultural level of their household.

Finally, the testimonies of the first beneficiaries of the XO laptops, the children, reveal the significance of the Ceibal Plan. The XO laptops belong to them, and can be used anywhere; that is, the laptops are available when they want them, regardless of where they are. They learn, their playtime is enriched, and they are upset when the computer breaks, and when the battery loses its charge. For them, the XO laptop is valuable – and that is what gives it added value as a resource for their education and for their social inclusion.

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