Uruguay’s Plan Ceibal: Can Laptops in the Hands of Primary School Students Reduce the Digital Divide, Improve Education, and Increase Competitiveness?

A report based on observation and interview

The aim and purpose of this report is to answer the question: Will Plan Ceibal, as an investment in Uruguay’s future, help to graduate students with Information Communication Technology (ICT) skills necessary to compete in the information age, and will the plan reduce the digital divide by improving equity and increasing ICT literacy among marginalized students?

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Introduction

“There is a growing trend for schools to equip every student with a computing device with wireless connection. The argument behind this generous investment is that for children to truly benefit from the information age and communication technologies (ICTs), each and every one of them needs to have a computer at all times.”

Uruguay became the first country in the world to distribute a laptop to every public primary school student in 2009. Uruguay, a southern cone country best known for cattle ranching and beach resorts, nevertheless boasts a rapidly growing Spanish-language software industry; and its leaders have come to believe universal digital literacy key to Uruguay’s future competitiveness. In December 2006, then President Tabaré Vázquez announced that Uruguay was considering an initiative to integrate Uruguayan students into the global information age and reduce the digital divide. This idea rapidly took form as Plan Ceibal. The *ceibal* is the national flower of Uruguay, but also an acronym for: Conectividad Educativa de Informática Básica para el Aprendizaje en Línea. The accomplishment of connecting every primary student with a computer and ensuring that every computer is connected to the internet is impressive, yet the long-term question remains: will Plan Ceibal flower?

Our central question: Will Plan Ceibal, as an investment in Uruguay’s future, help to graduate students with Information Communication Technology (ICT) skills necessary to compete in the information age, and will the plan reduce the digital divide by improving equity and increasing ICT literacy among marginalized students?

This report examines the current implementation of Plan Ceibal in Uruguay, and attempts to understand Plan Ceibal’s impact on Uruguay’s students. The first portion of this paper will explain our methodology, explore the theoretical impetus behind Plan Ceibal, and delve into case

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studies of similar endeavors elsewhere in the Western Hemisphere. This section will also examine Plan Ceibal in depth based on research conducted prior to our week spent in Uruguay, including the specific country context of Uruguay and Uruguay’s educational system, its objectives, and current implementation of the Plan. As part of this analysis, we will review how Uruguayan evaluators and international observers have to date evaluated Plan Ceibal. The second portion of this paper will discuss the observations and findings from our week in Uruguay. The concluding section will explain our assessment of Plan Ceibal and its potential as a mechanism for reducing the digital divide in Uruguay, improving the quality of education, and ultimately contributing towards Uruguay’s increased competitiveness in a globalized market.

**Methodology**

Our research focused on evaluating Plan Ceibal’s impact on Uruguayan students from the perspective of increasing technological competitiveness in the global marketplace while also reducing the digital divide domestically. We approached our central research question qualitatively, as we were unable to obtain raw data from the recent national survey of Plan Ceibal, and independently collecting nationally representative data was beyond our means. Plan Ceibal did provide us with their analysis of the national survey data and preliminary summary statistics.

Prior to our field research we evaluated literature on one laptop per student models in an effort to understand the theoretical underpinning of Plan Ceibal, studied examples of other one-to-one laptop projects in Latin America, and examined the use of technology in U.S. classrooms. In conjunction with this study we researched Uruguay’s software sector, educational system, and previous evaluations of Plan Ceibal.

Our field research in Uruguay consisted primarily of interviews and classroom observations. We conducted interviews with key public sector officials and those in the private sector with equities in the program. In conjunction with more formal interviews we also observed classes in four schools and spoke with directors, teachers, and students. Of the schools, two were located in the Florida department (one a small rural primary school with six students, the other a mid-sized primary school with 230 students), and two schools were located in the capital, Montevideo (both urban, one a primary school with 830 students, the other a liceo, or secondary

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3 For our schedule and a list of questions please refer to appendix A and B.
school). We also observed lessons, including several lessons utilizing the XO, the laptop chosen by the Uruguayan government for distribution through Plan Ceibal.

We also studied the one laptop per child program in Paraguay, and one researcher made a short trip to the Caácupe region of Paraguay to meet with stakeholders and observe classrooms, to serve as a reference point for our experiences with Plan Ceibal. As will be discussed in our findings section, the visit to Paraguay also offered insight into the question of whether or not a Plan Ceibal-like program is feasible for other countries.4

We arranged and facilitated our field research with the help and advice of our mentor, Ashley Rosen, the Uruguay/Paraguay/Brazil desk officer at the U.S. Department of Commerce. The Department of Commerce is interested in the human capital development potential of the project along with the project’s link to the software sector. We were further aided by the Uruguayan Embassy and the U.S. Department of State.

**Limitations**

There were several limitations in our approach to this project. One obvious limitation was our reliance on Plan Ceibal’s assistance to schedule meetings and school visits. We did not have the personal connections necessary to organize many of the public sector interviews and school observations independently; thus Plan Ceibal’s support and assistance was critical. However, we are unable to assess fully whether or not we saw a representative spectrum of viewpoints or schools (although we can make an educated guess). A second limitation, due to constraints with regards to travel dates, was that we visited schools at the beginning of the school year, and thus conditions may have been different from the norm. In particular, there may have been an abnormal number of broken laptops as those that broke over the summer were not repaired. A third limitation is that Spanish is a second language for both of us. We had no trouble asking questions and understanding the responses, but we may have missed nuances and our conversations were lacking the easy back-and-forth quality that we could have achieved in English. We were also unable to interview parents, one of the targeted beneficiaries of Plan Ceibal, as we had no means of arranging meetings with parents. Perhaps our most significant limitations were budget and time. With only one week in-country and a limited amount of funds, we were not able to visit enough schools and observe enough lessons with and without the XO to

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4 For the Paraguay schedule refer to appendix C.
build a representative sample. Although we have tried to validate our findings through comparing and measuring them with data other researchers have collected, our observations and findings, as detailed in the pages to follow, should be read with this in mind.

**Stakeholders**

There are many entities and groups invested, involved, and interested in Plan Ceibal. We spoke with representatives of many of these groups to find out who is involved with Plan Ceibal and to understand their roles. For a better understanding of who is involved with Plan Ceibal, see the following stakeholder chart:
Theory: Why put a computer in the hands of every student?

At first glance, it might seem unusual that Uruguay would distribute computers in a one-to-one ratio, when for significantly less money the government of Uruguay could have installed a computer lab in each school, or put several computers in every classroom and still given students access to ICTs. What is the reasoning behind a computer and wireless access for every student?

Plan Ceibal, while undoubtedly a plan for improving the quality of education, also has the clear social goal of reducing the digital divide in Uruguay. The term “digital divide” emerged in the 1990s and came to characterize the chasm between those who have access to ICTs and those who do not. However, researcher Mark Warschauer notes the digital divide is rarely as stark as total access and no access at all; rather there is “a graduation based on different degrees of access.” Proponents of the one-to-one model argue that by giving every student a laptop allows students to bring the laptop into the home and thus provide computer and internet access to an entire family that previously had limited or non-existent ICT access. The theory is that hooking families into the information economy decreases social marginalization and increases inclusion.

Another theory critical to the conceptual development of Plan Ceibal is the idea that when students have computers they become their own teachers, and teach not only themselves, but other students, their parents, and even their official teachers. Nicholas Negroponte, the innovator behind One Laptop Per Child (OLPC), goes as far as to suggest laptops and internet access can fully compensate for serious shortcomings within an educational system. Students can only achieve this educational improvement if, according to Negroponte, they have access to their computer at all hours of the day. Negroponte argues that classroom time alone, even under ideal circumstances, is too limited.

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7 Negroponte, OLPC Talks.
Lastly, the creators of Plan Ceibal hope, through reducing the digital divide and improving education, Plan Ceibal will aid students to become globally competitive. Given the increasing reliance on science, technology, and new forms of global communication, the theory holds that for Uruguayans to compete, their students must develop the primary ICT skills required to profit from ICT innovations and revolutions.\footnote{Warschauer, \textit{Technology and Social Inclusion} 12-21.} This thinking necessitates computers with wireless access in the hands of every child starting at an early age.

\footnotetext[8]{Warschauer, \textit{Technology and Social Inclusion} 12-21.}

\textbf{Description of the XO} The computers the Uruguayan government has chosen to put in the hands of students are little green and white laptops sized perfectly for children. Called the XO laptop by OLPC and ‘Ceibalita’in Uruguay, these laptops run a unique interface called Sugar, an open-source, Linux-based platform. Because the system is open-source, anyone with the technical know-how can develop software programs to run on the XO laptop, offering the potential to adapt the laptops to fit a particular country’s needs. Designed with children in mind, the keyboards and touchpad are covered with a moisture-resistance rubbery membrane and the laptops contain no spinning parts that could be damaged by hard knocks and falls. The XO is supposed to be incredibly sturdy, inexpensive, and power efficient.
ICT Use in the Classroom: Examples beyond Uruguay

Theory, however, can only tell you so much about what will happen when a country implements a one laptop per child program on any scale, from small pilot programs to Uruguay’s country-wide initiative. The relatively recent implementation of one laptop per child programs in Latin America (and elsewhere) and their limited scope has made it difficult to predict the long-term impact of providing each child in a community with a laptop. Additionally, few quantitative evaluations of one laptop per child programs in Latin America exist. However, several key trends have emerged which, combined with the global literature on ICTs in education, provide significant insight into best practices and possible lessons learned for one laptop per child program implementation. This information in turn helps us assess the effectiveness of the implementation of Plan Ceibal and determine policy prescriptions for the future. We will briefly examine several lessons learned from one laptop per child programs in Peru and Brazil (with an analysis of Paraguay’s program later in this paper), and also look at examples of effective technology use in U.S. classrooms.

A Review of ICT use in Peru, Brazil, and the United States

Peru

The large one laptop per child program in Peru has, thus far, had mixed results. Peru suffers from one of the most pronounced rates of educational inequality in the results of learning (as measured by national testing, PISA, and OREALC), as a result of socioeconomic inequality. The challenges of bilingual and multigrade education in rural Peru further exacerbate inequalities.\(^9\) Peru began implementation of its one laptop per child program in 2007, focusing on rural schools nationwide, especially those with only one teacher. By the end of 2008, the program was in place a total of 559 schools. Another 3,000 schools had been selected, using the same criteria, and placed on a waiting list for implementation over the next few years. Teachers receive basic training and user manuals. The computers are given to students pre-loaded with a collection of digital books and educational programs, and have the potential to connect to internet (where available) and to other XO computers (a “mesh network”).

An IDB assessment of the program, in cooperation with the Peruvian Ministry of Education, found several positive impacts, including evidence of better attitudes among teachers and parents; students were more critical of school work and their own performance; and a greater development of technological skills among the students.

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However, the study also discovered areas in need of improvement, including problems with internet connectivity; lack of technical support and pedagogical training; and that few students were allowed to bring the laptops home. The report also noted what looked to be the decreasing use of computers in the classroom as time passed. The authors suggested this could reflect a long-term need for greater teacher support and lesson planning. The qualitative part of the study showed little to no difference between the children with laptops and those without; however, this could be explained by short time frame between implementation and the study. A test of ICT ability showed computer use increased scores.

Brazil

Brazil’s one laptop per child program, Um Computador Por Aluno (UCA), remains in its initial stages, having only recently expanded from five schools to 300 schools. Poor education is arguably one of the biggest challenges to Brazil’s continued economic growth. In 2000, only half of Brazilian children finished primary school. 75 percent of adults were functionally illiterate, with more than 10 percent completely illiterate. Education levels have improved over the past decade, but are still low compared to other middle-income countries. Only one child in 100 ranked as a high performer according to PISA in 2009; the OECD average is nine out of 100. This is largely due to inefficient use of school spending and ineffective teachers. Inequality, including digital inequality also remains a significant problem. The government estimates that approximately 140 million Brazilians (roughly two-thirds of the population) lack digital access.

In 2007 the Brazilian government began a pre-pilot program in five schools with the objective of improving the quality of education and strengthening digital inclusion, as a means of tapping Brazil’s underdeveloped human capital. In 2010, the government launched phase two (the full-fledged pilot program), expanding UCA to 300 public schools across Brazil. The pilot program began two years later than expected because the government had underestimated the price of the 150,000 laptops needed.

An evaluation of the pre-pilot program, sponsored by the Brazilian Federal Chamber of Deputies, published in 2008 provides the most in-depth analysis of the UCA program to date. The evaluation found that young students were quick to adapt to the computers, and took advantage of the mobility offered by a laptop in the classroom to

13 Paulo Henrique Lustosa, Um computador por aluno: a experiencia brasileira (Brasilia: Centro de Documentacao e Informacao, Coordenaca de Publicacoes, 2008), 159.
14 http://www.uca.gov.br/institucional/projeto.jsp
15 Lustosa, 17-18.
engage in collaboration and information sharing. However, the study also found that older students (and even more so the teachers) had greater difficulty adapting to new technologies and showed greater resistance to integrating the laptop into the educational context. Although all the teachers interviewed for the study expressed support for the project, they also expressed discomfort with actually using the computers in the classroom. The researchers suspected this reluctance stemmed from the lack of facility with computers among the teachers; some teachers had, for example, requested additional training sessions. The researchers found that teachers underutilized the laptops, or used them as a substitute. One manner of improving laptop use was for the school to have a technology coordinator – someone who could answer teachers’ questions and help motivate computer use in the school. Although students had access to internet at school, most did not have internet access at home, meaning the program had only a limited impact on increasing digital inclusion beyond the child (families were not gaining internet access). Although the schools attempted to block sites with inappropriate content, in all the schools the evaluators found that students occasionally accessed pornographic sites. Another, more significant issue, was that students frequently used non-educational programs and websites such as Facebook, Orkut, instant messaging, gaming sites, and others. Although these students were becoming adept at using ITCs, they were not necessarily gaining a better traditional education.

**US Technology in Classrooms**

Although examining other one-to-one laptop programs is crucial to understanding Plan Ceibal, it is also important to look at more general technology trends in classrooms. These trends may not necessarily follow the one laptop per child formula, but can demonstrate good uses of ICT in education. Examining technology use in U.S. classrooms, given the relatively early adoption of ICTs in the United States, provides a more long-term perspective on the role computers can play in education.

Since the mid-1980s computers have infiltrated many U.S. classrooms in many shapes and forms, both good and bad. By examining several of the more effective cases it is possible to develop an understanding of what constitutes a “good” use of technology. According to William D. Pflaum, computers are used in the United States as teaching

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16 Lustosa, 133-134.
17 Lustosa, 137.
18 Lustosa, 143.
19 Lustosa, 143.
20 Lustosa, 145.
21 Lustosa, 149.
22 Lustosa, 162.
23 Lustosa, 162-3.
24 Lustosa, 169.
machines, productivity tools, internet portals, data processors, and testing devices.\textsuperscript{25} In his observational study of more than 30 U.S. classrooms he notes several characteristics that seem to indicate ICTs can improve education. Pflaum points to the need for administrators and teachers to support the technology and to promote a sense of ownership within the school. He also highlights how computers can be useful to teachers when it comes to evaluating data on student performance and increase efficiency in testing. Students in turn can benefit from focused purposes such as reading programs, programming classes, or writing tools. Other student benefits relate to connecting students to the internet for research purposes and allowing for individualized educational plans.\textsuperscript{26} Not every classroom that uses technology well is likely to demonstrate every characteristic listed; however, meaningful technology use that improves education will likely contain several elements on Pflaum’s list.

These examples of good technology use in conjunction with lessons learned from the one laptop per child initiatives examined above will provide a baseline for this paper’s assessment of the effectiveness of Plan Ceibal.

\textsuperscript{26} Pflaum.
Drawing on these case studies, we can conclude that there are certain key characteristics for effective and efficient ICT use in education, namely:

- Clarity of educational goals and tailoring of the implementation strategy to fit those goals: is the objective “computer literacy and skills”, general improvement in traditional subjects (math, history, et cetera), or the development of critical thinking skills?
- Availability of timely maintenance and technical assistance.
- Availability (and usability) of age-appropriate software and digital content in the proper language.
- Extensive and effective teacher training: children tend to learn how to use the computers very quickly, but teachers are the ones who determine how the technology is used in the classroom.
- Access to critical infrastructure: internet connectivity, but also access to a reliable power source.

**Context Behind Plan Ceibal: Education in Uruguay**

In addition to understanding the one-to-one models, both in theory and in practice, it is important to understand also the context of the education system within which Plan Ceibal was planted. Education in Uruguay is divided into six levels: early childhood (3-5 years old); primary (6-11 years old); middle school (12-14 years old); high school (15-17 years old); higher education (18 years or older); and postgraduate (at least 14 years prior schooling required). Public education is the responsibility primarily of the Ministry of Education and Culture, which coordinates education policy, and the National Public Education Administration (ANEP), which is an autonomous agency responsible for developing and implementing education policies up through secondary schooling. A third agency, the Universidad de la República, is responsible for higher education and thus is not currently directly involved in the implementation of Plan Ceibal.
Uruguay was the first country in Latin America to provide free, compulsory schooling through the 1877 Law of Common Education, and the current government under President Mujica has repeatedly reaffirmed its commitment to education.\(^\text{27}\) Uruguay is the only country in Latin America were would-be teachers have above-average grades.\(^\text{28}\) However, though Uruguay’s education system is one of the best in the region, Uruguayan students perform poorly in terms of learning and graduation rates in comparison with other middle-income countries around the globe. Several studies have noted young Uruguayans do not learn the knowledge or skills necessary to compete in a globalized world. Graduation rates are comparatively low for Uruguay’s income level. Grade repetition in all levels of schooling and high dropout rates remain a significant problem. The IDB found in 2007 that only 55 percent of students finish primary school within the expected six years.

The lack of skilled graduates poses a challenge for the continued expansion of Uruguay’s vibrant software industry: an industry that stands to benefit from the increased digital facility Plan Ceibal aims to develop among students.\(^\text{29}\) A study from 2008 highlighted the innovation in Uruguay’s domestic software industry but emphasized the need for Uruguay to build links with the global economy.\(^\text{30}\)

The government is well aware of this need. Government investment in education has increased in recent years in an effort to improve the quality of education. Equity programs targeting the poorest regions, where dropout rates are higher, supplement general funding for education; and in early 2011, the Government of Uruguay announced its commitment to a fundamental reform of the existing school system. Plan Ceibal has been the flagship program for a Uruguayan government eager to improve education and provide better opportunities for its youth in an increasingly competitive, globalized environment.

\(^\text{28}\) “Education in Brazil”
\(^\text{29}\) It is interesting that in the 1980s, the United Nations Development Program (UNDP) concluded that Uruguay would not be able to develop a software industry; by the turn of the millennia Uruguay had a thriving software cluster. For more information see: Jorge Rebella, “Necessity and invention.” \textit{Business Latin America} 35, no. 13 (April 3, 2000): 3. Business Source Premier, EBSCOhost (accessed February 5, 2011).
**What is Plan Ceibal?**

Plan Ceibal as mentioned previously is a country-wide one laptop per child program. It is important to note that while Plan Ceibal uses the XO laptop, which is built by the MIT-based One Laptop Per Child organization, Plan Ceibal is not affiliated with or part of OLPC.

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**Objectives of Plan Ceibal:**

- To contribute to improving educational quality through the integration of technology in the classroom, the school, and the family.
- To promote equal opportunities for all primary school students by providing each student and teacher with a PC.
- To develop a collaborative culture along four lines: child-child; teacher-teacher; child-teacher; and child-family-school.
- To promote literacy and the critical nature of electronic technology in a pedagogical community.

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The overall objectives put forth by Plan Ceibal do not list quantifiable targets. For example, while the program may promote literacy it does not give specifics as to what level of literacy indicates Plan Ceibal is successful. Thus does any increase in literacy level mean success? And what baseline and mechanisms will be used to measure a change in literacy levels? We will revisit these concerns later in this report.

**Baseline for Access to ICTS**

Prior to the implementation of Plan Ceibal, computer access in schools was highly limited in Uruguay. According to an Inter-American Development Bank (IDB) assessment, 43 percent of primary schools did not have computer equipment; 43 percent had between one and four computers; and only 14 percent had five or more computers. Even in the best cases (with roughly 37 students per computer), each student only had access to the computer for approximately 3 hours per month. Furthermore, the presence of a computer in the classroom did not guarantee students useful interaction with ICTs. Of the computers located in schools, 36 percent were more
than six years old; 30 percent did not function; and 74 percent had no connectivity at all (no internet, *et cetera*). Only 17 percent of computers had reliable internet service.

**Implementation**

The Government of Uruguay began implementation of Plan Ceibal in April 2007. The program initially provided one computer to each child and teacher in public primary schools. In 2009 Plan Ceibal began extending into public secondary schools. There are currently approximately 380,000 XO computers in Uruguay’s primary schools. Under Plan Ceibal, the government has also installed a network server at each school (approximately 2,300 total) and provides infrastructure to allow for network connectivity.

The cost of Plan Ceibal to date is roughly US$100 million, or 0.25 percent of Uruguay’s gross domestic product and eight percent of its total education-related expenditures.\(^{31}\) According to the head of Plan Ceibal, Miguel Brechner, the cost per child is approximately US$250 over four years: US$188 for the laptop, and US$60 for other costs (maintenance, the Wi-Fi connection, *et cetera*).\(^{32}\)

**A Review of Previous Studies**

Plan Ceibal is a new educational innovation, and its true measure of success will not be readily apparent until the current primary school students graduate, move on to university, and look for jobs in globally competitive sectors. Only when today’s children prove to employers in 10 or 15 years that their range of ICT skills and education are valuable, or set themselves up as successful entrepreneurs, will we be able to assess the full cycle initiated by Plan Ceibal. Yet we can and should attempt to assess whether or not Plan Ceibal is on track to meet its more long-term goals. Toward this end, Uruguay conducted an evaluation of the program’s initial phases, and independent researchers have put forward their perceptions of the strengths and weaknesses of the Plan Ceibal in academic journals and the news media. This section will examine the existing literature on Plan Ceibal.

In 2009 government evaluators for Plan Ceibal administered a survey of 5,600 children, 1,000 teachers, 200 administrators, and 7,500 family members of the children.\(^{33}\) The evaluation

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\(^{32}\) Fantoni.

\(^{33}\) Evaluación del Plan Ceibal. 
process began shortly after the Plan’s implementation; the 2009 survey is part of the second phase of evaluation. It focuses on social consequences in Uruguay and the populations most affected by increased access to ICTs from a sociological perspective.\textsuperscript{34} This approach is in line with the goals of Plan Ceibal, which has focused on reducing the digital divide and increasing digital inclusion.\textsuperscript{35} As a result, many of the recommendations center on integrating the XO laptop into the student’s family in a more inclusive manner and encouraging creative uses of the XO. The findings for the most part are positive, but they are still preliminary given the short time frame between implementation and assessment of the program.

There are several inherent assumptions in Plan Ceibal, such as the idea that one-to-one computing with student ownership of the laptop is essential. Nicholas Negroponte, founder of OLPC, claims that laptop technology is like “electricity”: everyone should have electricity just as everyone should have a laptop.\textsuperscript{36} Governments, educators, and academics have increasingly challenged this assumption, especially in countries where there are sharp deficiencies within the education system.

Indeed, researcher Mark Warschauer, noted for formulating some of the ideas behind Plan Ceibal’s theoretical underpinnings, and researcher Morgan Ames point out several shortcomings of OLPC programs. They specifically note that XO laptops have yet to reach a level of true affordability and the manner of use of the laptops by students is often differentiated by socioeconomic status. Warschauer and Ames suggest that students who are ‘most marginalized’ often need more support in order to use the computer in a creative and cognitively challenging fashion. The authors also suggest that Negropontes’ idea that laptops are quick fixes to troubled educational systems is fundamentally flawed. The authors argue that laptops in classrooms are effective only if implemented within a broader holistic approach to improve education.\textsuperscript{37}

It is noteworthy that several of the findings in the government evaluation pointed to the need to offer programing classes to students so that they could fully take advantage of the opportunities of the XO’s open-source platform, but also to the need for more basic support for

\textsuperscript{34} Ana Laura Martínez, Diego Díaz, and Serrana Alonso. Primer Informe Nacional de Monitoreo y Evaluación de impacto social del Plan Ceibal. Versión en Proceso de edición para su publicación. (December 2009). p. 5.
\textsuperscript{35} Martínez. p. 12.
\textsuperscript{36} Negroponte OLPC talks
\textsuperscript{37} Mark Warschauer and Morgan Ames. “Can One Laptop Per Child Save the World’s Poor?” Journal of International Affairs. (Fall/Winter 2010, Vol. 64, No. 1).
families and children at a lower socioeconomic level. This also may reflect a bifurcated use of the laptop; students who are better-off use the laptop in different ways than students with comparatively less.

Alongside the more rigorous, academic studies, the press has eagerly pointed out several of the Plan Ceibal’s initial hiccups, including the fact that the first 50,000 laptops were delivered with English-language software, not Spanish. Yet the majority of journalistic articles also recognize the incredible promise and potential of Plan Ceibal, even if they are critical of the execution. Evaluation for the most part is still in process, although researchers have identified several possible pitfalls, and the public sector evaluation clearly hopes to make Plan Ceibal live up to its promise.

Our Observations and Findings

Observations from the Field

We previously discussed the educational context surrounding the development and implementation of Plan Ceibal and initial evaluations; our time in Uruguay provided the color and dimension necessary to flesh out the full picture. Before examining our findings, there are several scenes and anecdotes from our visit that we believe illustrate the social and cultural environment linked to Plan Ceibal. These scenes provide details of note about the schools we visited, but also provide evidence of a society rapidly connecting to the information economy.

The schools we visited appeared well-maintained but crowded. The exception was the rural school, which had only six students. Students attend school for only four hours a day and all but the small rural school had two shifts of students and teachers. In the Montevideo primary school, several separate classes shared classrooms; the school was in process of building an addition.

All the schools had a physical education teacher (with the exception of the rural school, which had only one teacher), and the Liceo also had two computer teachers. In the Montevideo primary school, one teacher shared her lesson plans with us. These plans were very detailed and organized, and included individualized lessons for the three special needs students in her class.

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She emphasized that she and her colleagues had to teach to a wide range of students, with different abilities and backgrounds. All the teachers and directors we spoke with were passionate about teaching and educating, and were gracious about our presence in their classrooms.

All the schools are connected to the internet as part of Plan Ceibal (although at times there are problems with the equipment), but we also found that many public areas offer internet as well. Many cafes and restaurants advertised WiFi; we frequently noticed “WiFi” emblazoned on windows. Similarly, the Montevideo international airport also offered high-speed, free WiFi. We were told that most small towns support WiFi in the town plaza. The prevalence of internet in Montevideo and its presence in the smaller cities and towns in Uruguay suggest a digitally engaged society.

This theme was also evident during our visit to the National Research and Innovation Agency (ANII). The Head of International Cooperation, María Laura Fernández, explained how the recently created government agency connected research and innovation to industry, fostering dialogue between key stakeholders in a variety of sectors. This speaks to a focus on technology and communication.

**Key Findings Summary**

Our findings are based on interviews with key stakeholders and observations at schools. We looked at the basic execution of Plan Ceibal in terms of hardware/software issues and connectivity. We also focused on assessing the impact of Plan Ceibal in three key areas: the digital divide, human capital development, and education. Lastly we examine the feasibility of transplanting a Plan Ceibal-type program to other countries.39

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39 For a summary of our key findings in Spanish see appendix D
Key Findings

Hardware and Software
• Negative: High rate of breakage among the computers.
• Negative: Limited hard drive space.
• Positive: Open Source Software.
• Connectivity needs work, but Plan Ceibal is in the process of laying fiber optic cable to all schools, which will improve speed and reliability of the connection.

Digital Divide
• Positive: There has been a reduction in the digital divide among those in the lowest socioeconomic strata.
• Positive: Anecdotal evidence of better communication between parents and children and within families separated by distance.
• Positive: Anecdotal Evidence of a reduction of the digital divide between Uruguay and developed nations.

Human Capital Development
• Positive: It is too early to tell if Plan Ceibal will have a positive effect on human capital development, but the private sector is positive about the program.

Education
• Negative: There is no baseline against which to measure Plan Ceibal’s impact on education.
• Positive: Anecdotal evidence of improved reading and writing.
• Positive: Plan Ceibal will implement nationwide testing, facilitated by the laptop.
• Negative: Teachers need more advanced training to fully use the computer.
• Plan Ceibal needs to be one part of broader measures to improve education.

Viability of Transplanting Plan Ceibal to Other Countries
• Plan Ceibal has several advantages in terms of implementing a one computer per child program: a low number of youth as a percentage of population; a relatively high per capita GDP, a centralized education system, and the political will to implement the program.
• Each country faces their own unique challenges, but countries have the opportunity to learn from the experiences of Plan Ceibal.
The Hardware and the Software: XO and Sugar

Plan Ceibal chose One Laptop Per Child’s XO laptop through a competitive bidding process. Fernando Brum, a senior adviser within Plan Ceibal, told us that when they were deciding on which laptop to use, the XO was the best laptop available in its category. Brum notes that the deciding factor was the presence of a camera in the XO; no other computer in this category had one.

Plan Ceibal is inherently dependent – at least for the time being – on the computer they chose, the XO (they have the option of switching computers in the future); and one of the main weaknesses of Plan Ceibal is a high rate of computer malfunction. We were often told that the number was 20 percent, but in classrooms we generally observed more than 20 percent of students were without a computer. In one classroom less than half of the students had a computer with them. This finding should be noted with some caution as it was the beginning of the school year, thus there may have been some build-up in breakage rates as the computers may not have been repaired over the summer (children frequently bring their computers to the schools for repair, and the schools send the more difficult cases on to Plan Ceibal). Furthermore, we were unable to judge how many students had simply forgotten the computers at home and if that behavior would change as teachers utilized the computers throughout the school year.

One of the main complaints of teachers was that it was difficult to assign individual computer work (as the one-to-one model intends) because there were never enough machines. Furthermore, because students owned the computers they were occasionally reluctant to share. Teachers complained of broken keyboards specifically. We observed broken keyboards on many otherwise functional machines and at the rural school one student’s camera did not work. One teacher told us she did not use the laptops in her lessons because too many were broken. Teachers reported that students would become frustrated with the XO because they felt it was too slow or they were unable to get the desired result from the computers, and occasionally because of this frustration they would break the computers. Teachers also complained that the repair process, once a computer was broken, left the student without his or her laptop for too long. It is of note that on the XO 1.5, the next generation of the XO, OLPC altered the keyboard to make it more robust and more like a traditional laptop keyboard.
Additionally, free WiFi is available in many town plazas, which means that the XO laptops may be exposed to the elements, i.e. heat, rain, humidity, sea air, et cetera in addition to the normal wear and tear expected when giving a young child a laptop. Although this is not a weakness per se, it does underscore the need for durability and a robust efficient repair system. One teacher told us about a laptop left in the rain by the child’s mother and about another laptop off of which she cleaned bird poop (the latter was not seriously damaged). We ourselves witnessed an XO narrowly escape being doused in soda, rescued by a vigilant parent.

Plan Ceibal is aware of the repair problem and how the high rates of broken laptops limits the practice of the one-to-one model. Plan Ceibal officials also informed us that they have found that rural areas have higher rates of breakages. Accordingly, Plan Ceibal is launching a campaign directed at the interior to increase awareness of how to care for the XO. One possibility that might help to address the high rate of breakage, although it would mean an additional expense, would be to have computer labs or extra computers that can be checked out by teachers.

Several teachers also complained of the limited hard drive space and that students often deleted school projects to make room. We observed many teachers backing up student work on USB drives.

We also noticed several instances where teachers drew a picture of the laptop interface on the chalkboard in order to give directions and point to various icons. It is evident that a means of projecting the laptop screen so that the entire class could watch what the teacher was doing would be highly useful and likely increase the potential of the laptop as a teaching tool.

One key strength of the XO is its open-source operating system, which allows anyone to develop software for the laptops. Javier Figueroa, the Director of Locomotion Audiovisual Co. which designs software for the XO, noted that this flexibility fosters creativity among children and software writers. He discussed how an eight-year old had received an honorable mention in a programing competition in which companies had competed. Furthermore, the open source platform allows developers to write software tailored to Uruguay. Figueroa’s company produces (for profit) educational games, such as “El Pequeño Héroe y el Tesoro de la Luz,” a game that highlights Uruguayan national history.

In short, in terms of hardware the laptop has several critical weaknesses, such as the keyboard. It is of note that OLPC, in part due to feedback from Plan Ceibal, has worked to fix this
weakness in the next generation XO. If the XOs are to be truly utilized as a teaching/learning tool in a one-to-one manner, it is apparent that the broken laptops are a serious problem. Plan Ceibal is aware of this problem and is taking steps to reduce breakage and repair laptops. Hard drive space is also a weakness. A means for teachers to demonstrate the laptop to the whole class would improve its use as a teaching tool, although this type of improvement would have to be weighed against the cost.

**Connectivity: Connecting Students to the Internet**

A fundamental component of Plan Ceibal is not only the physical computer and its software, but also the connection to the internet. Both schools we visited in the Florida department were experiencing problems with connectivity. In the small rural school the director, Ana María Pérez, thought a type of electrical problem (likely a surge or a power outage) had knocked out the internet. The students were clearly disappointed by the lack of internet, but the school’s director mentioned that this was not an infrequent problem. To remedy connection issues, by the end of 2011 the government hopes to complete laying fiber optic cable to all schools. Fiber optic cable should be more reliable and faster, and its greater bandwidth will allow more students to use the internet at the same time. However, neither school in Montevideo had problems with connectivity when we visited. According to those we spoke with at the Montevideo schools, the connection to the internet functioned well nearly all the time.

**The Social Aspect: Reducing the Digital Divide**

As discussed previously, our central research question centers on the relationship between Plan Ceibal and its prospects of fostering digital literacy among the most digitally marginalized sectors. From our conversations, interviews, and classroom observations, it was clear that everyone we spoke with perceived Plan Ceibal as an innovative intersection of social and education policy. Indeed, the social aspect of Plan Ceibal was discussed with more frequency than the educational aspect, and the majority of the initial assessments of Plan Ceibal have focused on evaluating the Plan’s ability to reduce the digital divide.

There are several possible explanations for the social focus, the first being that Plan Ceibal has no educational baseline against which it can measure educational results. Uruguay does, however, have a baseline for digital access, making this aspect of Plan Ceibal’s impacts easier to measure quantitatively. Another explanation is that it is too early to measure the educational
impact. Elements of the social aspect, such as access to internet, are immediate consequences of Plan Ceibal. However, the broad social goals, like the educational goals (i.e., the goal of reducing or eliminating the digital divide and increasing students’ competitiveness in the world market) are longitudinal. Only once students who received laptops in elementary school are entering college and then the skilled labor markets will we be able to fully assess Plan’s Ceibal’s social and digital impact.

However, even though the hoped-for long term effects are years away, all of the people we spoke with in Uruguay, from government officials to the tech industry in Uruguay were extremely optimistic with regards to the potential of Plan Ceibal to reduce the digital divide and foster social inclusion. Over and over again we heard that access to the computer and, through the computer and internet, access to information, were key to reducing inequality in Uruguay.

In all of our interviews, nearly everyone mentioned increased access to computers and internet as perhaps the single most significant effect thus far. With regards to the specific objective of eliminating the digital divide, by its very nature Plan Ceibal is obviously extremely effective at the basic level, i.e., connection and device. In distributing laptops to every public school student and providing connectivity, Plan Ceibal ensures that all children in Uruguay have access to digital technology and information. This, in and of itself, reduces the digital divide (among families with children) from being between the have and the have-nots to being between those who have an XO and are just learning to use computers and those who have a more powerful machine and more experience with technology. Thus a dramatic increase in access is the first, and perhaps most obvious effect of Plan Ceibal.

Many of our interviewees stated that the introduction of the XO has a much stronger impact among the lower socioeconomic sectors in Uruguay, an observation backed by the 2010 preliminary data, given to us by Plan Ceibal. Children in middle- and upper-income households tended to have access to computers even prior to the implementation of Plan Ceibal, and are more likely to have parents who use computers at work and at home. Among the poorer and less urban sectors, however, the introduction of a computer into the household (as the one-to-one model allows students to bring the laptops home) has the potential to significantly alter a family’s access to information. Héctor Florit of ANEP, among others, emphasized that Uruguay has a deeply stratified society: in many parts of the country access to education, and now, through Plan Ceibal, the ability of each child to own a laptop are two of the few areas of equality.
Related to this idea of promoting equality through giving every child the same computer, is what our interviewees termed an increasing recognition of self-worth among more marginalized children. Many of the people we spoke with stated that when poorer children receive the laptops, and can see that they own the same machine and have the same access as wealthier children, their self-esteem rises. Perhaps a related result, several of the people we spoke with also noted that the students were more motivated to attend school and do homework.

There were other, less obvious social effects mentioned during our interviews (many of which are anecdotal, and would be difficult to measure quantitatively). Several interviewees stated that parents use the computers to stay connected with relatives who have emigrated, through chatting and email. The XO’s camera also allows for the exchange of photos. Gonzalo Graña, the head of evaluation at Plan Ceibal, also mentioned that the computers have affected relationships within the nuclear family, fostering better communication and interaction as children teach their parents to use the laptops and parents help their children with homework assignments.

One of the social goals of Plan Ceibal was to provide not only the students, but also by extension their parents, with access; this however has proven to be more difficult to achieve. Although parents do use the XO to connect with relatives, from our interviews it seems that they primarily use the laptops for games (not unlike their children). Luis Garibaldi, Director of Education in the Ministry of Education and Culture, stated that although parents have access now, they do not always have the skills to really use the computers in the manner that Plan Ceibal envisioned.\textsuperscript{40}

All of the aspects above have been discussed in terms of reducing the digital divide within Uruguay; Plan Ceibal is also intended to reduce the digital divide between Uruguay and the developed countries. Álvaro Lamé, President of the Uruguayan Chamber of Information Technologies (CUTI) stressed that Plan Ceibal gives Uruguay a huge advantage over other developing countries, because all of Uruguay’s children will now grow up with computers. Today, many children and young adults in the United States, for example, cannot remember living in a non-digital age. In Uruguay, in 10 to 15 years, it will be the same; in an increasingly digital world,

\textsuperscript{40} In Paraguay, one of the members of Paraguay Educa mentioned that parent frequently dislike learning to use the computers from their children, as the children are often impatient and easily frustrated when their parents take longer to learn something than the child thinks it should take – i.e., “It’s not that hard, Dad – you’re really slow”
this will be essential for Uruguay’s future competitiveness.

**Human Capital Development: Competing in a Global Marketplace**

Another key component of our central research question, related to the issue of a digital divide, speaks to the goal of Plan Ceibal to develop human capital, especially for the emerging technological sectors in Uruguay. Although it is too early to tell if the current primary school students will be competitive in the global marketplace 10 or 15 years from now, the private sector interviewees we spoke with were for the most part positive. Ricardo Astiazaran, Commercial and Operations director of Microsoft Uruguay pointed out that there is essentially zero percent unemployment in the tech fields in Uruguay. This represents a significant challenge to the software.tech industries as they seek to hire qualified personnel, but something that will become less of a problem if Plan Ceibal can help make students globally competitive.

On a more concrete note, we learned that as the government implemented Plan Ceibal it became aware that in some rural areas of Uruguay there were children without identification cards, making these children essentially stateless. In distributing a laptop to each child attending school, and ensuring that each child receiving a laptop had proper identification, Plan Ceibal’s implementation helped to rectify this problem. This represents a demonstrable human capital gain, as these students will now have the proper papers to move in society, and in particular, apply for college and for jobs. Thus, while it is too early to realize the impact Plan Ceibal will have on Uruguay’s human capital, there is evidence of tremendous potential.

**Quality of Education: An Unmeasured Impact**

Everyone we spoke with emphasized that Plan Ceibal is a social program, and without the school visits (which very visibly linked Plan Ceibal to the classroom) it could have been easy to forget that Plan Ceibal is an education program as well. The first phase of the evaluation mostly ignored education altogether and focused instead on the evidence of a reduction of the digital divide. Yet the budget for the Plan Ceibal is part of the education budget and the program is implemented through the public schools. Thus understanding the impact of Plan Ceibal on education is a critical measure of the program’s success. Unfortunately, with respect to measuring this impact, there is no baseline from before the program was implemented and therefore no rigorous method to assess changes in achievement levels. This is a weakness of the program as it limits the possibility of attributing reading, writing, or mathematics improvements to Plan Ceibal.
And from a more cynical perspective it makes it hard to prove that Plan Ceibal has had no impact on education, if this is indeed the case. However, now that Plan Ceibal is expanding to secondary schools the opportunity exists to form a baseline among secondary school students who have just received a computer or will receive one soon.

In spite of a lack of statistical evidence we did hear anecdotally that Plan Ceibal may be improving primary students’ reading and writing skills. Edith Moraes, general director of the National Administration of Public Education, (ANEP), suggested that as students better understood the value of reading and writing, useful skills for accessing and using the internet (blogging, researching, social networking, *et cetera*), those skills improved.

It is important to note that Plan Ceibal is currently implementing nation-wide online testing using the XO; this data will allow for the monitoring of individual students as well as development of longitudinal national education statistics. This is an efficient use for the computer, and will perhaps validate the anecdotal evidence of rising reading and writing skills.

In terms of improving the effectiveness of the XO as an educational tool, we consistently heard in discussions with teachers that there is a need for more advanced training for teachers, for skills beyond the basic use of the laptop. Many teachers mentioned that they felt uncertain and uncomfortable using the XO, and that their students knew more than they did (to the point where the students were teaching the teachers how to use the machines). Teachers also expressed frustration that they lacked the knowledge to use the XO to its full potential in the classroom.

The officials we spoke with at Plan Ceibal recognize these concerns, and Plan Ceibal is taking steps to improve training. For example, several schools already have reference teachers, who aid teachers in creating lesson plans that incorporate the XO in a meaningful manner.

The laptop also has changed the culture of the classrooms as students now have access to information previously only in the teacher's providence. In addition to learning how to use the XO, teachers face the additional challenge of learning how to help students evaluate and process information available online.

A final note on the one-to-one model and education: the laptops have the potential to be a powerful education tool, but other recognized problems in the educational system must also be addressed. The laptops may be an efficient and effective means of improving the quality of education; however, if Uruguayan students are to be globally competitive, educational reform
must be advanced as a broad policy agenda. As many of the people we interviewed clearly recognized, Uruguay cannot rely solely on increasing digital literacy through the one laptop per child model as a solution to the challenges facing its education system.

**Can Plan Ceibal be transplanted to other Latin American Countries?**

The final research question we considered was whether or not a program similar to Plan Ceibal (i.e., a country-wide one laptop per child program) is a viable option for other countries. Plan Ceibal currently provides consulting services upon request for other one-to-one programs worldwide, including advice on the bidding process for computers, teacher training, and evaluation methods. However, as Plan Ceibal officials readily admitted to us, the success of such programs depends heavily on the specific situation in each country. To examine the challenges and possibilities of a Plan Ceibal-like program in another country, we chose to look at Paraguay and its pilot one-to-one program implemented by NGO Paraguay Educa.

**Paraguay: Description and Findings**

Paraguay is a country of approximately 6.4 million people, roughly 28.5 percent of whom are under the age of 15. Spanish and Guaraní are the official languages, and many Paraguayans speak both. Paraguay’s GDP (PPP) in 2010 was US$33.27 billion; approximately 4 percent of its GDP is spent on education.\(^1\)

Paraguay Educa, the NGO that oversees the one laptop per child program in Paraguay, is a relatively small organization with approximately 20 employees at the time of publication. Currently, due to budget and logistical constraints, Paraguay Educa is working with only ten schools: five rural and five urban, for a total of 5,000 XO laptops (with an additional 4,000 to be distributed over the next few months).

**An Account of Anna Prusa’s Experience in Paraguay:**

I traveled to Cáacupe with a representative of Paraguay Educa to observe one of the urban schools currently participating in the program. The school I visited taught 600 students, grades one through eight. XO laptops had been distributed to students in third grade and higher. While at the school I spoke with teachers, observed a class, and also observed a training session for fourth through sixth grade teachers, hosted by Paraguay Educa representatives. As in Uruguay, I observed a significant number of students without laptops, and teachers confirmed that laptop breakage was a widespread problem.

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\(^1\) For the details see: https://www.cia.gov/library/publications/the-world-factbook/geos/pa.html
I also met with Natalia Daporta, a journalist with the widely-read ABC Color who has followed the progress of both Plan Ceibal in Uruguay and Paraguay Educa; and with Ambassador Liliana Ayalde and acting Public Affairs Officer Steve Carroll at the U.S. Embassy in Asuncion.

Overall, many of the findings in Paraguay are similar to those in Uruguay. Laptop breakage and connectivity issues are key challenges for the program. Daporta noted that internet access in Paraguay is far more limited than in Uruguay. Although there is connectivity at the schools participating in Paraguay Educa, there is no WiFi in the plazas or in homes, limiting the impact of the one-to-one model. At the teacher training session, many of the teachers there told Paraguay Educa that it was difficult teaching when so many computers were broken. One pointed out that group work becomes the only possibility, but it is not ideal as many of the students merely copy what others do, instead of learning how to do it themselves. Another teacher, not at the training session, raised similar concerns but also noted that at least now the children and their parents no longer have to pay for repairs (in prior years, they did).

The teachers also requested assistance developing content for the classes that incorporates the XO in an effective manner. They noted that while it is easy to incorporate the laptop during classes with older students (research using the internet, typing up reports, et cetera), it can be difficult to do more than simple games with the younger students. From what I observed and through conversations with teachers and Paraguay Educa representatives, Paraguay Educa clearly understands the importance of training for teachers, and also values speaking with educators to receive feedback. The training session I observed, which was the first in a two-week back-to-school training program (and part of a longer sequence of training programs, each designed to build upon the last), was almost entirely devoted to hearing the teachers’ concerns and discussing how best to address them. I was told subsequent sessions would be more practical. However, Daporta underscored the need for more in-depth teacher training. She noted that while Paraguay Educa has done a significant amount of training, many of the teachers knew nothing about computers before this program. Given this starting point, it is questionable if at this point the training has been sufficient to bring the teachers to the needed level. Daporta also stated that beyond the larger issues of how to incorporate the XO into the classroom, teacher must learn to manage smaller issues, such as gossip (inappropriate internet use) or children distracted by computer games during class.

Paraguay Educa also noted that their ability to expand the program is limited by the size and resources of their organization. The Ministry of Education has given mixed signals regarding its support for the project, and without significant political backing Paraguay Educa will be unable to implement on a large scale similar to Plan Ceibal in Uruguay. Funding is a constant issue. Paraguay Educa bought the first round of XOs with a donation from a group of banks. Itaipú has funded the second round of XO purchases. The main telecom provider in Paraguay donated the labor, equipment and bandwidth to
set up internet connectivity at the schools. Thus, unlike Plan Ceibal in Uruguay, Paraguay Educa does not have a consistent, stable source of funding. However, there are signs of change towards greater political will and unity on this issue. In March 2011 several members of the Paraguayan parliament announced their intention to try to reprogram at least US$ 50 million to use in expanding the one-to-one model in public schools.

In light of these findings regarding Paraguay, we will return to our original question: could a country-wide one-to-one laptop project work effectively and efficiently in another country? Comparisons between Uruguay’s Plan Ceibal and Paraguay Educa suggest Uruguay possesses several advantages that significantly assist the implementation of this type of program, in particular:

1. **Demographics:** Uruguay, as we noted previously in our report, has a small population with relatively low number of youth as a percentage of total population, so fewer laptops are required than in a country with a large percentage of youth or simply a larger population. Not only does this keep costs lower, it also simplifies the logistical aspects of the program. For example, there are fewer computers to repair and fewer schools that need connectivity. Uruguay is also a relatively homogenous population (all Uruguayans speak Spanish) so one standard version of the XO laptop can be distributed to all children.

2. **Economics:** Uruguay is a middle-income country and many of the people we spoke with stressed that for Uruguay, Plan Ceibal is relatively cheap at only eight percent of Uruguay’s education budget. However, for a country with a smaller amount of funding per child, buying and maintain laptops (along with the necessary connectivity) might not be the most effective use of funding, particularly if the government has to carve out that money from important items such as teacher pay. One of the most frequent critiques of the one-to-one model is that in poorer countries, the money spent on computers and maintenance could be better spent elsewhere in education.

3. **Education system:** In a centralized education system, like the one in Uruguay, the executive branch can implement a program like Plan Ceibal in every corner of the country, if it has the political will (see point 4). However, many countries have a more
decentralized education system, as in the United States or Argentina, where each state or province has its own educational authority. In such cases, implementing any country-wide educational program will be challenging, as all the local stakeholders must both approve and cede a certain amount of their authority over to the national education agency.

4. **Political Will**: From the beginning, Plan Ceibal has received strong political support, with both former President Vasquez and current President Mujica publicly and forcefully affirming its importance. This support has not only provided Plan Ceibal with the authority, via executive decree, to rapidly and universally implement its plans (distributing a laptop to every public school student in Uruguay in less than three years), but also provided a sustainable source of funding. Plan Ceibal's budget is part of the national education budget (funded through taxes) and thus the project is not at the mercy of domestic and international donors and one-time grants. It is also important to note that in Uruguay, the political backing for Plan Ceibal is part of a broader government commitment, expressed at the highest levels, to reduce the digital divide and improve education. Thus Plan Ceibal was envisioned not as a stand-alone project, but as part of a larger government initiative to redress the social and educational challenges facing Uruguay today.

Although the absence of any or all of these characteristics does not preclude a country from implementing a one-to-one program, it will make implementation more challenging. In particular, the lack of political will severely limits the possibility of a country-wide implementation. In Paraguay, for example, a representative of Paraguay Educa stated that he would like to see country-wide implementation, but without government support it would be impossible. Paraguay Educa itself was too small to coordinate and implement such a large project. Fernando Brum, a founding member of Plan Ceibal, agreed that the political decision to support a one laptop per child program is the most important step for a country to take; and the most difficult step is creating an institution filled with people capable of implementing the program and weathering criticism. Brum notes that it is relatively easy to share technical expertise; Plan Ceibal already provides advice and offers all their materials (implementation blueprints, lessons
learned, *et cetera*) to several countries and organizations, including Paraguay Educa, Ecuador, and Armenia. They have also provided information about their bidding experience (for the computer). Countries have the advantage of learning Plan Ceibal’s experiences – but individual countries face unique challenges and each must make the choice to follow through.

Our findings as discussed above demonstrate that Plan Ceibal has had a positive impact in Uruguay. It has noticeably reduced the digital divide and in doing so has advanced Uruguay toward greater social inclusion. Plan Ceibal also shows promise of strengthening human capital development. However, it remains to be seen whether or not Plan Ceibal will have a verifiable positive impact on the quality of education in Uruguay. The achievements of one laptop per child programs – in Uruguay and elsewhere – hinge on a variety of factors. To ensure success, Plan Ceibal will need to continue evaluating and adapting the program as it moves forward.

**Conclusions and Recommendations**

Our time in-country gave us the opportunity to gain a broad overview of Plan Ceibal. Overall, we believe the current implementation of Plan Ceibal for the most part addresses the program’s key objectives, namely:

- **To contribute to improving educational quality through the integration of technology in the classroom, the school, and the family.**

- **To promote equal opportunities for all primary school students by providing each student and teacher with a PC.**

- **To develop a collaborative culture along four lines: child-child; teacher-teacher; child-teacher; and child-family-school.**

- **To promote literacy and the critical nature of electronic technology in a pedagogical community.**

Plan Ceibal has reached its goal of providing each public school student and teacher with a laptop computer, and as noted, anecdotal reports have suggested a rise in self-esteem among more marginalized students. The presence of the computers has also promoted communication. In the classrooms we visited, students frequently interacted with one another and with teachers to
discuss and show off projects. As we discussed in the previous sections, progress on the first point and the last point of the objectives is perhaps the most difficult to assess at this time. Plan Ceibal has clearly made strides in integrating technology into the classroom and the family and gaining acceptance from the pedagogical community; whether or not education quality will improve remains to be seen.

Nevertheless, there are specific difficulties with implementation that Plan Ceibal must overcome moving forward. Specific recommendations include:

- **Improving and streamlining repair process:**
  
  - This may include measures such as providing extra refurbished laptops to schools for use in class while student laptops are being repaired, and/or offering repair workshops so teachers and parents can learn simple fixes.

- **Developing content training for teachers:**
  
  - Attending training sessions can be difficult for teachers in the interior, given the distances between schools. We suggest an emphasis on online courses that not only offer examples for lessons with the XO, but also help teachers develop the skills to plan their own content. Teachers also should be encouraged to share lessons they have created incorporating the computer, perhaps through a government-organized sharepoint site.

- **Better integration of computer interface in classrooms i.e. projection of computer screen:**
  
  - While we understand this would be an added expense for the program, we believe this is something worth considering at least in the long term. Providing teachers with the ability to visually show students what to do (without having to resort to drawing diagrams of the computer screen on the blackboard), would improve efficiency and help teachers keep the class focused. Students could use this technology to present their projects to the rest of the class.
We recognize that many aspects of Plan Ceibal are overlooked or only partial covered in this report, due to our limitations, and in future years we expect to see many more studies on this program. In particular, there is a need for greater focus on understanding and assessing the educational impact of Plan Ceibal. As part of this effort, there would need to be more classroom observations and more interviews or surveys with teachers, parents, and students to gain a nationally representative sample for each group. There is clearly also a need for a longitudinal study of 10-15 years, to follow current primary school students as they progress through school and move into the job market. We think it would also be useful, in the short-to-medium term to conduct control studies of laptops, both hardware and software, to determine if the XO remains the best choice for Uruguay.

Overall, Plan Ceibal has incredible potential in terms of both its educational and social impacts in Uruguay. Much of its success will depend on how Plan Ceibal addresses known challenges and continues to evaluate the program. There are real challenges in streamlining the repair process for laptops, or ensuring teachers feel comfortable using the XO in class. On a systemic level Uruguay needs to follow through with its intention to fundamentally reform the
education system; the laptops are a small but symbolic part of this reform. The laptops alone are not going to solve everything. Nevertheless, the strong dedication to making Plan Ceibal work which was demonstrated by government officials, teachers and school administrators alike gives Plan Ceibal an advantage moving forward.
Appendices

Appendix A: Uruguay Schedule

Lunes 14 de marzo

16:00 hs  Entrevista con el Mtro. Héctor Florit, Consejero del Consejo de Educación Inicial y Primaria y Referente Ceibal (ANEP)
Dirección: Bartolomé Mitre 1309

Martes 15 de marzo

10:00 hs  Entrevista con el ANII Responsable de Cooperación Internacional María Laura Fernández

13:00 hs  Entrevista con el Ing. Fernando Brum, Consejero del Centro Ceibal
Avenida Italia 620, Edificio Los Ceibos, Complejo LATU

15:00 hs  Entrevista con Gonzalo Graña, Jefe de Evaluación y Monitoreo de Impacto Social de Plan Ceibal
Dirección: Avenida Italia 620, Edificio Los Ceibos, Complejo LATU

17:30 hs  Entrevista con Mtro. Luis Garibaldi, Director de Educación del Ministerio de Educación y Cultura.
Dirección: Reconquista 535 Piso 6

Miércoles 16 de marzo

12:00hs  Meeting/Lunch with Jaiver Figueroa, Director of Locomotion Audiovisual Co.

14:00hs  Entrevista con el Sr. Álvaro Lamé, Presidente de la Cámara de la Cámara Uruguaya de Tecnologías de la Información (CUTI).
Tel. (598) 2712 6666 int 500 Secretaria Gabriela Della Vecchia

15:30hs  Meeting with Ricardo Astiazaran, Commercial and Operations Director of Microsoft Uruguay

16:30hs  Meeting with Kevin Skillin, Acting Econ/Pol Counselor, U.S. Embassy Montevideo
Jueves 17 de marzo

8:30hs  Visita a la Escuela Rural Nº 106 de Rincón de Vignoles
Directora: Ana María Pérez
Dirección: Ruta 5 Km 69
Tel. 43309231

10:30hs  Visita a la Escuela Urbana Nº 5 de 25 de mayo
Director: Héctor Moreira
Dirección: Av. Artigas s/n (Frente a la plaza de deportes)
Tel. 43392143

Viernes 18 de marzo

8:30hs  Escuela Urbana 353 "Henry Dunant" - Barrio Manga - Montevideo
Directora: Isabel García
Secretaria: Eliana Sánchez
Dirección: José Belloni 5448
Tel. 22275062

12:00hs  Liceo Nº19
Dirección: 20 de Febrero 2520 esquina Cabrera - Barrio Unión - Montevideo
El contacto es la Prof. María Cristina Fernández
Tel. 099-309-438

16:30 hs  Entrevista con la Mag. Edith Moraes, Directora del Consejo de Formación en Educación (ANEP)
Dirección: Acuña de Figueroa S/N esquina Venezuela
Appendix B: List of Interview Questions

Funcionarios del sector público

1. ¿Cómo se financia el Plan Ceibal? (¿De dónde proviene el dinero?) ¿Qué perspectivas cree usted tiene el Plan en 5 años? Y ¿en 15 años?
2. ¿Ha considerado alternativas al modelo de una computadora para cada uno?
3. ¿Cuáles han sido los efectos del Plan Ceibal, desde su implementación? ¿Beneficios? ¿Problemas? ¿Efectos imprevistos?
4. ¿Está pensando en efectuar algunos cambios al Plan Ceibal? Y en caso afirmativo ¿qué y por qué?
5. ¿Cómo cree que Usted qué Plan Ceibal podría fomentar las habilidades de los estudiantes y así crear mejores oportunidades de empleo en el futuro?
6. Con respecto a la evaluación del programa ¿tiene usted algunos indicadores claves? ¿Qué cree que indica el éxito?
7. ¿Cree que el Plan Ceibal está abordando los problemas reconocidos en el sistema educativo? ¿En caso afirmativo, ¿de qué manera?
8. ¿En su opinión, cuales otras inversiones estratégicas serían beneficiosas para el sistema educativo? ¿Cree que estas inversiones serían más eficaces que el Plan Ceibal?

Alumnos

1. ¿Te gusta la escuela? ¿Por qué?
2. ¿Ha mostrado a tus padres la ceibalita? ¿Tus padres utilizan tu computadora? ¿Ensenaste a tus padres cómo utilizar la ceibalita? ¿Tienes otra computadora en casa?

El Sector Privada

1. ¿Qué piensa usted del Plan Ceibal?
2. ¿Si hubiera tenido la oportunidad de participar (involucrarse)en este proyecto, hubiera hecho otra cosa?
3. ¿Qué está buscando usted en los empleados? ¿En su experiencia, las personas que solicitan empleo con su compañía tienen las habilidades necesarias generalmente?
4. ¿Cree que el Plan Ceibal ayudaría a desarrollar las habilidades que usted busca en sus empleados? ¿Ayudaría este plan en desarrollar el capital humano del Uruguay?

Maestros

1. ¿Para que utiliza la computadora? ¿Cómo incorpora la computadora en su enseñanza? ¿Utiliza la computadora para algunos temas más que otros? Y en caso afirmativo, ¿cuáles?
2. ¿Es más facial de enseñar a través de las computadoras? En caso afirmativo, ¿exactamente cómo?
3. ¿Siente que usted recibió formación adecuadamente con la computadora? ¿Le gustaría tener más capacitación?
4. ¿Usted ha utilizado la computadora para seguir el desempeño de los estudiantes?
5. ¿Qué piensa usted de la computadora y el software? ¿Responde de las necesidades de estudiantes? ¿Funciona bien para usted?
6. ¿Qué es lo que ha funcionado bien? ¿Qué cambios sugeriría?
7. ¿Cree que las computadoras contribuyen a mejorar la educación? ¿Por qué?
8. ¿Siente que usted es parte integrado del Plan Ceibal? ¿Tiende un sentido de pertenencia y participación en el programa?
9. ¿Cuánto tiempo ha estado enseñando? ¿Siempre ha enseñado en esta escuela?

Los Directores

1. ¿Cómo fueron los maestros capacitados?
2. ¿Cuál ha sido el impacto de la educación que reciben los estudiantes?
3. ¿Qué ha funcionado bien con respecto a la implementación del Plan Ceibal? ¿Qué cambios sugeriría?
Appendix C: Paraguay Schedule

Monday, March 21, 2011

8:00am  Depart Sheraton Hotel in Asuncion to go to the city of Caacupé (54 km. from ASU) to see OLPC program in action.

Picked up from the Hotel by Paraguay Educa representative (organization in charge of the development of OLPC in Paraguay)

9:30am (aprx.)  Arrival in Caacupé to visit schools working under the OLPC program

1:00pm (aprx.)  Return to hotel

Tuesday, March 22, 2011

9:00am  Mtg. with Journalist & IVLP Natalia Daporta, at ABC Color, Yegros 745 esq. Herrera.

Natalia is a Journalist from ABC Color that did a series of articles on the OLPC Plan Ceibal project in Uruguay and does follow up on the pilot program here through the PYEduca people.

1:30pm  Courtesy Call with A/PAO, Steve Carroll

2:00pm  Courtesy Call with Ambassador Ayalde and A/PAO, Steve Carroll
Appendix D: Key Findings Summary (Spanish)

The George Washington University
Latin American and Hemispheric Studies M.A. Capstone

Can Laptops in the Hands of Primary School Students Reduce the Digital Divide, Improve Education, and Increase Competitiveness? A report based on observation and interview

Resumen de los resultados y de las recomendaciones

Nuestros resultados sobre el Plan Ceibal surgen de las entrevistas realizadas con los principales interesados y nuestras observaciones provienen de las escuelas. Específicamente hay cinco áreas de interés que analizamos: hardware y software de la ceibalita, la brecha digital, el desarrollo de capital humano, cualidad de la educación, y la viabilidad de programas como el Plan Ceibal en otros países. En general, creemos que el Plan Ceibal es un programa de alta cualidad y con el potencial para mejorar al futuro para los estudiantes.

Los Resultados

Hardware y Software

- Positivo: El código de la computadora es abierto.
- Negativo: El índice de malfuncionamiento es alto.
- Negativo: El espacio del disco duro es limitado.
- Negativo: La conectividad todavía necesita mejoría (pero para el año 2011 va a haber banda ancha a todas las escuelas).

La brecha digital

- Positivo: Hay una reducción en la brecha digital, específicamente en el los ingresos económicamente bajos
- Positivo: Evidencia anecdótica que la computadora mejore la comunicación entre padre e hijo y entre familias a pesar de la distancia.
- Positivo: Existe evidencia que en el futuro el crecimiento de los niños con computadoras va a disminuir la brecha digital entre Uruguay y los países desarrollados.

El desarrollo de capital humano

- Positivo: Es temprano para evaluar el impacto que Plan Ceibal podría tener en el desarrollo de capital humano, pero el sector privado estima que es algo que pueda hacer una diferencia.

Cualidad de la educación

- Negativo: No hay indicadores específicos de referencia por la cual se puede medir definitivamente el impacto del Plan Ceibal en la calidad de la educación.
- Positivo: Existe evidencia anecdótico que haya mejoras en escritura y lectura.
• Positivo: Plan Ceibal va a implementar con las computadoras los exámenes en línea a nivel nacional.
• Negativo: Muchos de los maestros dicen que necesitan más capacitación avanzada para mejorar el uso de las computadoras en las aulas (porque ahora, no tienen la habilidad de usarlas bien).
• Plan Ceibal tiene que ser parte de un movimiento más amplio para reformar y mejorar la eficacia y la eficiencia de la educación en Uruguay.

La viabilidad de programas como Plan Ceibal en otros países

Plan Ceibal y Uruguay tienen algunas ventajas respecto a la implementación y continuación de un programa de una computadora por niño. Primero, Uruguay es un país pequeño con un porcentaje relativamente bajo de jóvenes en la población total. Por tal motivo, hay menos estudiantes y escuelas y es por eso que necesitan menos computadoras. En términos económicos Uruguay es un país de ingreso medio. El sistema de educación es centralizado y por eso es más fácil poner en práctica un programa de ámbito nacional. Pero la ventaja más importante es el apoyo político en todos niveles del gobierno.

Otros países no cuentan con estas ventajas, pero ahora pueden aprender de la experiencia de Plan Ceibal. En definitiva, la decisión de implementar un programa como el Plan Ceibal va a ser el adaptarlo a cada país.

Resumen de las recomendaciones

1. Mejorar y simplificar el proceso de reparación por el XO (la ceibalita).
2. Mejorar el desarrollo del contenido de capacitación para los maestros.
3. Considerar una mejor integración de la interfaz de la computadora en las aulas, es decir, la proyección de pantalla de la computadora.
4. Establecer referencias para la educación secundaria (para hacer una buena comparación antes y después de la implementación del Plan Ceibal en los liceos) y datos sobre el empleo de pruebas estandarizadas nacionales para mejorar las estadísticas educacionales.
5. Distribuir computadoras a los estudiantes que repiten el ciclo secundaria que no tienen computadora.