Review of External OLPC Monitoring & Evaluation Reports

One Laptop per Child Foundation
Learning Group

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Abstract

As a relatively new organization, One Laptop Per Child awaits in-depth longitudinal assessments of the program from our partners. Existing literature, however, produced by partners and independent organizations, provides insight into the initial stages of various OLPC projects throughout the world. Evaluations of programs on the ground have been coordinated by a host of diverse organizations with the assistance of government actors and groups. Through the variety of different mechanisms for evaluations we have gained understanding of how the XO laptops adapt to work for children in different environments; each evaluation report reflects the rich diversity of each community experience.

The methodology, timing and conduct of the evaluations have been affected by the variations in project implementation models: affirming the individualized approach in the evaluation process so as to reflect program implementation based on the country and region of deployment. Therefore, the findings from existing evaluations range from anecdotal to quantitative, when addressing the specifics of child usage, family impact, and teacher experience. The findings are also largely positive in nature; the impact on childhood education has been considered successful overall, with the use of laptops at home and in the classroom, and we eagerly await more data on specific improvements by subject, by region, and by timing and context.

Future recommendations for OLPC based on evaluations thus far most often concern technology improvements related to battery life of the computers, hardware concerns, and facilitating software development. In many remote regions of the world where OLPC operates, limited access to electricity and Internet connectivity can directly impede achieving the full potential of learning opportunities with the XO laptop. OLPC has enabled a solar panel and hand crank to counteract energy concerns and continues to address technical issues as they are reported back from distributions. Beyond the technical, other suggestions largely focus on improving capacity and knowledge building programs for teachers and children alike. Calls for more training, greater coordination in XO distributions, and overall preparation plans for adopting XOs to classroom use have been strongly voiced. Families and community members have also voiced a desire for more training to assist children at home and in school. Fortunately, however, the ease of learning and education in the informal sector has been flourishing. Community feedback and the demand for more training programs is a large indicator that the laptops are contributing to the active community engagement and broader societal interest in the future of childhood education.

Monitoring and evaluation of the wide array of OLPC programs is an exciting learning opportunity for OLPC. We look forward to continued work with our partners to understand how technology creates educational change.

Objectives of Overview

One Laptop per Child (OLPC) serves to create educational opportunities for the world's poorest children by providing each child with a rugged, low-cost, low-power, connected laptop with content and software designed for collaborative, joyful, self-empowered learning. It aspires to motivate and engage children in their own education through opportunities to learn, share, and collaborate and thereby transform the world of childhood education. Founded as recently as 2005, The OLPC project, launched out of MIT's Media Lab, has already managed to impact millions of children with its mission to enhance childhood education through technology for the most disadvantaged children in the world. As a relatively new organization, the One Laptop Per Child program has had few longitudinal assessments of its impact, however, the existing literature provides expansive in-depth insight into the various OLPC projects throughout the world. Through the variety of different mechanisms for evaluations we have been able to gain further understanding of how the XO laptops transform and adapt to work for children in different environments. From the method of evaluation, to the style of interviews for community members, or the data analysis based on varying community needs, cultural and environmental phenomena have been adequately addressed in the existing literature, which serves as a rich tool for OLPC learning on various projects.

Children in the Rafah Refugee Camp celebrate the arrival of XO laptops in Gaza. UNRWA, The United Nations Reliefs and Works Agency for Palestinian Refugees, OLPC's official partner in Gaza, organized an exciting launch event!

This OLPC report serves to review and summarize the successes and challenges of OLPC programs in different contexts, and provide familiarity on existing external observations and evaluations of OLPC programs. OLPC does not initiate or conduct official evaluations of XO projects in various global communities, but rather seeks now to aggregate the findings in order to aid all of our partners and to drive future OLPC design, research, and development efforts. We recognize the distribution of 2 million XO computers in 40 countries as an unprecedented opportunity to understand what happens when young children are given ownership of a connected, robust, low-power tool for learning. We connect local and national OLPC stakeholders in international childhood education for evaluating progress and development, and use the existing literature as an important learning tool for the future of OLPC. By closely examining the variety of different contexts in which OLPC operates, we glean insight on the different issues facing various communities with respect to learning with the XO and transforming environments of education. This report also hopes to serve as a resource for activating methods for improving monitoring and evaluation based on the existing initial evaluations. Currently lacking more robust longitudinal studies, we hope to inspire efforts for research on new and existing OLPC projects.

The conceptual underpinnings for determining the learning opportunities of OLPC programs are based in furthering the access, quality, and relevance of childhood education and development. The OLPC program strives to provide access to education and connectivity in remote environments, societies in conflict, and developing communities at large with the mission to transform the trajectory of education. Linking children to uninterrupted access to ducation and global networks can be an essential tool for international development and global stability, and most importantly the prosperity of the world's children. Beyond

access, ensuring quality and improving standards is the next step to creating robust educational opportunities for the world's most disadvantaged children, recognizing that the status quo is completely unsustainable. Simply providing school structures and hours of attendance is not enough. Guidance and communal support for the learning and well-being of children demands global sharing of new ideas, findings, and practices such as those of the One Laptop Per Child Foundation in order to support the intellectual and social abilities of children and provide them with an avenue for success. Additionally, a commitment to relevance addresses the importance of promoting the goals and visions of the OLPC mission, designed for "collaborative, joyful, self-empowered learning". Maintaining relevance is key on two important levels: one, ensuring that the XO laptop is relevant to the classroom and community values within specific societies; enabling communities to access and create content that is relevant to their needs, their history, their language, and their context, and two, ensuring that the XO laptop is relevant to providing consistent access to education and preserving its status as an indispensable learning tool in the way that it transforms, galvanizes, and evolves the entire underpinnings of our global system of childhood education.

Methods of Assessment for OLPC Programs

The various external approaches to evaluation have employed a diverse array of methods for gauging the success of XO laptop programs in different schools and communities. Empirical analysis, data collection, focus groups, and general qualitative analysis are merely a few of the approaches discussed in the existing literature on OLPC evaluations.

Figure 1 : The current global distribution of XO laptops across the world

When considering qualitative analysis, evaluators embarked upon formal and informal methods of data collection in order to gain a robust understanding of the effects of the programs. In Uruguay, evaluations took a creative twist, where evaluators developed a sticky-note activity for younger children, actively engaging them to write key words about how the XO affected their education and their attitudes towards learning. Children were excited to discover the best word that they felt encapsulated their XO experiences in different contexts and shared them with their peers by posting them on the blackboard. On the other hand, in Ethiopia, structured observation was utilized, where for a period of two months two trained observers monitored every lesson that took place with the XO, in order to document teacher and student behavior. In addition to structured observation, the Ethiopian evaluation program also employed structured interviews with teachers and students as well as intensive sessions with both groups to gain as much information as possible within their own standard method of evaluation.

MEHRD's Monitoring and Evaluation Framework served as the basis for ACER's evaluation with a very holistic approach to evaluations with emphasis on anecdotal data from students, teachers, and parents. To best utilize existing local skills and knowledge and to keep costs down, the MEHRD decided to train local interviewers rather than fly in external researchers.

Figure 2 : 'Stick-Note' Children's Evaluation Activity Uruguay

The evaluation undertakings of Uruguay are also particularly noteworthy as a country now saturated with XO laptops for all children 6-12 years old in public school, with heavy local support and a national mandate from the president that established the program. Participants in Uruguay were so pleased with the success of the one laptop program a mandate to extend the project to high-school students was recently issued, with an initial order of 100,000 XO laptops designed for older students. Initial independent monitors and evaluators in Uruguay were largely from the communities affected by the introduction of the XO in 2007, but are now widespread, having documented nation-wide support as well as produced extensive publications, books and articles, in Spanish and in English, in order to illustrate the success of their OLPC program.

For our program in Afghanistan, intensive empirical analysis on test performance before and after the introduction of the XO laptop indicated that there was an average improvement of 21.33% across all students in standardized testing in just two months (Figure 3). The study confirmed that overall there was a large positive impact and clear indicator of improvement in childhood education, as assessed by standardized test performance, as a result of the introduction of the laptops. While this particular method did not assess improvements in others areas of learning or new skills gained by the introduction of the XO, it was a useful tool in realizing the importance of the XO in enhancing the children's general education and knowledge in the local curriculum.

In Ethiopia, empirical methods were developed based on administered tests of familiarity with the various XO activities, while in Uruguay large samples of data were collected illustrating which activities children used the most often and the patterns of age-specific preferences. By simply empirically monitoring usage, evaluators were able to discover that children were expanding their social networks with the chat activity, engaging intensively in reading, math, and science exercises, and spending more time overall on educational activities than they had prior to receiving an XO. In Haiti, throughout their evaluation of a summer camp using the XO, approximately 2,340 hours of daily student usage of the XO laptop were tracked, not including home usage, revealing that students most actively used the "Write" activity. Based on this observational and usage-tracking data, four of the 17 activities available on the XO laptop (Record, Write, Browse Internet, and Paint) represented 88 percent of laptop usage for the XO Camp participants. In the Solomon Islands, interviews and anecdotal data revealed that older children in grades three to six utilize a larger number of the activities and younger children concentrated on skill-building with a smaller number of activities initially. They report using the laptops mainly for academic

School in Afghanistan	Exam Results Before XO	Exam Results After XO	Percent Increase
Safiulha Afzali	24.21	30.08	19.5
Syd Jamaludin	36.87	38.99	5.4
Ariana	36.87	46.59	20.9
Soriya	40.06	56.09	28.6
Total Average	34.55	43.92	21.3

Figure 3: Change in Exam Results Before/After the XO Laptop in Afghanistan

exploration, such as writing stories, learning the correct spelling and pronunciation of words, 'learning new things' from the Internet, or using the laptops to do work at school and to bring schoolwork home.

The standard tools for assessment often consider existing school models for monitoring student progress and standardized local exams to account for overall changes in learning results and practices following the introduction of the XO, as illustrated earlier with Afghanistan. Beyond building new skills and becoming familiar with valuable technology, these methods help illustrate how the XO operates as a general learning resource for basic and necessary subjects such as reading, math, science, and beyond. Evaluations noted that for children struggling in math or science, learning games on the XO helped to supplement teacher instruction and provide more opportunities for needed practice in such subjects. In regards to remedial students, teachers in the Solomon Islands also stated that they believe the program is "intended to increase and equalize access to educational resources, particularly for 'children with poor or low level of literacy', 'who are not able to go to school' or who are 'slow in learning'" as this helps to bring them up to speed with their peers. They also see the program targeting schools that are 'under-resourced or ill-equipped' and situated within rural settings. The concept of using OLPC as a community equalizer, bridging the gap within a community between relatively more advantaged children and disadvantaged children is particularly
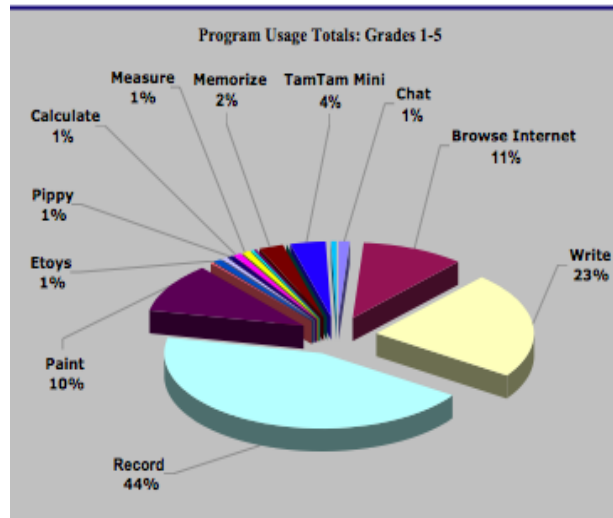

Figure 4: Observed XO Activity Usage from Haiti Summer Camp, Week One

relevant in the case of Uruguay, which is fully saturated with laptops for all of it's children, and will be expanded upon shortly.

An important lesson for the future of quantitative evaluations, particularly when the possibility for long-term analysis arises, might be to consider overall societal literacy rates, school dropout rates, gender parity in education, and so on. While we acknowledge that the novelty of the OLPC project poses limitations on data collection and results analysis, we look to this as an exciting and challenging learning opportunity for the future of our work in the realm of childhood education and the eradication of poverty.

Localized Language

One particular component of note, highlighted by many communities working with OLPC, is the consideration of local languages and

dialects, as well as learning opportunities for a second or even third language. Interview data from students and school staff in Haiti revealed a "perceived improvement in student reading and writing in Haitian Creole and French, as well as a general perception of the XO laptop as a symbol of opportunity and progress." Not only does language localization provide further incentives for community support in education, but it also personalizes the educational process for the children of each country.

The XO laptop has been localized into the Afghan languages of Dari and Pashto and Amharic textbooks were professionally digitized for students in Ethiopia. Arabic keyboards and Spanish language programs and software also facilitate the adaptation of the XO into many other communities and regions. In all of the 40 countries in which XOs are currently on the ground, some form of language localization has taken place and is being further developed. In a remote aboriginal community of Western Australia, the evaluation of the Rawa Community School notes that, "The IT teacher at Rawa has developed content for the laptops taken from the students' everyday lives, the environment in which they live, and aspects of Martu culture. The students, whose first language is Manyjiljarra, mostly use the laptops for literacy, but also for English and mathematics classes. Many of the students use the Speak software to type their weekly spelling words into the program so that

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they can hear the work out loud." A current limitation of the Speak program is that it can only read letters in the Roman alphabet, but this is something we hope to expand upon in the near future. Teachers have also commented that the laptops have increased students' letter recognition and computer literacy skills. Having your own content in your own language has tremendous implications for the improvement of literacy. Low-literacy levels are correlated with the lack of access to books and reading materials, particularly those in local languages and dialects, and this enabled access to a whole host of content libraries with local and international resources for learning directly correlate to enhanced literacy skills.

Further, the XO then becomes a tool not only for improving local literacy and language learning, but also an important potential job skill facilitating the learning other additional languages, reading and writing, and other indispensable tools for the workforce.

Localized Content

Localized content is another area in which the XO serves to facilitate learning that is specialized and relevant to the context in which it is operating. Teachers, administrators, and local developers create their own content by transforming their curricula, understanding how activities on the XO aid in formal learning, and creating activities, both content and programs, that can be used in informal learning activities. The Ethiopia report exclaimed, "One of the greatest assets of Melepo is that its
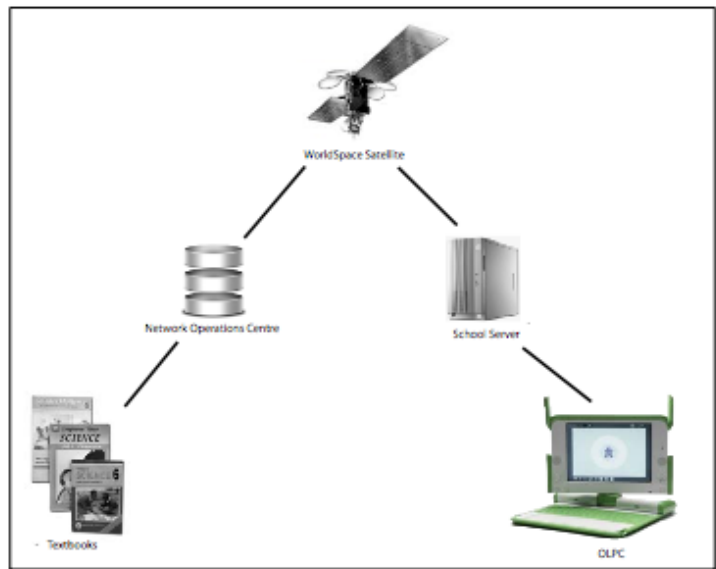

Figure 5: Connectivity and Local Content Access in Ethiopia

functionalities are built around existing material with which the students and teachers are familiar. The familiarity and comfort that this brings to the introduction of a computer into the classroom is something that should not be underestimated."

On another level, the localization process can redefine access to learning resources with the pre-loading or post-loading of local textbooks in electronic format onto the XO, thereby potentially reducing the cost of learning resources and the physical limitations in accessing textbooks for all individual students. In Ethiopia, surveyed participants also felt that the potential to include links to relevant content also acted as a method of redeeming low-quality textbooks. This was thought to add value within the current system without undermining its structure. Beyond digitizing textbooks, in Ethiopia they felt there was significant scope for other educational
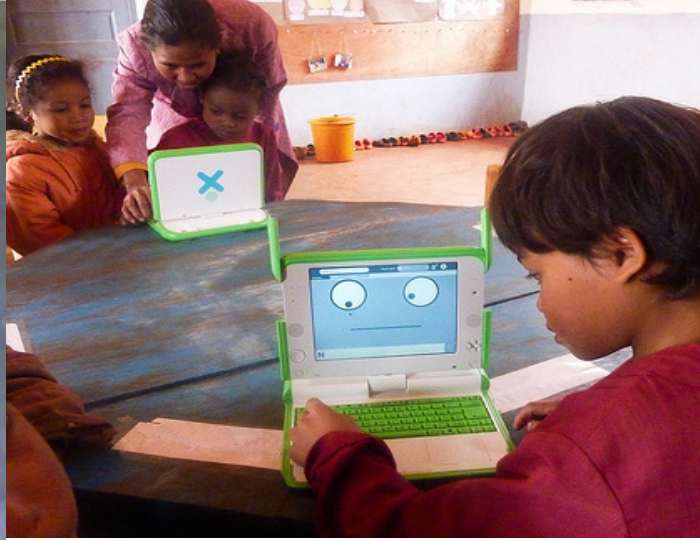
applications to be linked to books and subjects areas, such as dictionaries, thesauruses, and calculators. A drawback that was mentioned was the extremely time-consuming process of digitizing textbooks, thus initially limiting the size of the local content library.

The evaluation of the Solomon Islands also made special note of the fact that schools are being provided with local school servers, which host content libraries in order to further personalize the community experience and add to the vast personal libraries of individual students. It then becomes key and extremely beneficial when local schools and communities design their own content for the XO and attempt to face the needs that are plaguing their communities most direly, whether it be health issues, gender inequality, access, or other specific issues. For example, in Cambodia, a computer game for children has been produced specifically for the XO in order to teach Cambodian children about the dangers of landmines. "Last year almost 250 people were killed or injured by mines and unexploded ordinance, the legacy of decades of conflict in Cambodia." explained the report. "The game teaches children to

read the warning signs of landmines which dot the Cambodian landscape, as they hunt for food for their on-screen pet dog." The game is produced in the local language with culturally appropriate references and the designers note that it can easily be modified and localized to other post-conflict communities. Adaptability to complex environments is a key component of the OLPC mandate, one that is highlighted by every unique evaluation report and lends to the importance of the OLPC project as one of enhancing education, but also promoting a better life and future for children in the world's least developed countries.

Teacher Involvement and Participation

Teacher involvement is also heavily discussed in evaluation reports and their support for the OLPC program is absolutely crucial for its success. Teachers have mentioned in detail the benefits of having a laptop in the classroom, its merits for both indoor and outdoor classroom activities such as "science research," its effects on collaboration, and its support in providing additional materials and resources for remedial students. In the Solomon Islands, "many

teachers and their assistants appreciated the reduced need for blackboard writing and the ease with which they can now prepare and write up 'day to day lessons as well as weekly and term plans'. In the classroom, teachers noted the impact the laptops have had on their interaction with students. A teacher observed that they can 'create more activities (extra) for fast learners' and another observed that teachers can 'have more time with slow learners'." The majority of these teachers also mentioned that the laptops have decreased their workload. "It is easier to prepare lesson plans by typing them up, for example, and to make recordings or take photos as additional materials for their classes; teachers can now distribute homework and administer exams to students by uploading the content on students' laptops."

In terms of student collaboration, "in addition to increased ability and interest in independent learning, principals and teachers have also observed an increase in 'group learning initiatives' among students. Many teachers highlighted improvements in the way students collaborate and share with each other, such as in sharing their findings and ideas and in undertaking 'collaboration with other students'."

Teachers in Ethiopia praised the ease in which they were able to adapt the XO to their existing curricula and its complimentary nature to their lesson plans. They noted that the introduction of the XO forced them to outline a daily schedule and their class objectives each morning, facilitating more effective planning and a more productive day in school. Teachers in the Solomon Islands repeatedly mention how the XO helps them to record children's activities, monitor their progress, and track their assignments. In Haiti, most teachers noted in their interviews that it was much easier to edit their students' work on the XO laptop and as such they were able to spend more time working one-on-one with students and less time lecturing.

Other teachers also highlighted the importance of games in helping with math and reading

skills, such as the speak activity to help with the pronunciation of new words and e-libraries to provide access to more reading resources. The mathematics games represented the clearest example of an educational application being directly applicable to the curriculum in Ethiopia as noted by teachers, "Students were significantly more motivated to do math using this game than when they used a book. In addition, the contents of these game-based applications are almost identical to the textbooks and so the teacher could assign a period of class time for use on the application." Teachers requested more specialized content for older or younger students, and had great ideas for how their older content could be revamped. The XO also helps students when teachers cannot be present and provides more opportunities for individualized attention. For teachers in Birmingham, preliminary findings indicate that there is "significant variation in the impact of teachers on XO laptop usage in the classroom. Having teachers who use the XO more frequently and who are more skilled in this use is associated with greater use, diversity of use, and more positive attitudes of XO laptops by students."

At the same time, it is important to draw attention to the challenges with teacher capacity building on the XO and the limitations of current local training programs. Every teacher interviewed for the various reports indicated a strong desire for additional information and assistance on working with the XO, troubleshooting technical issues, and a larger emphasis on their role in working

effectively with laptops in the classroom. Some teachers also expressed initial fear and reluctance to introduce the machine into their classroom, especially if they had never used technology before and feared being unprepared in front of their classrooms. Children by nature can be more inquisitive and jump right into new learning tools, while teachers sometimes felt they were too old to adapt their methods and learn something new.

Ultimately, teachers were excited about the XO, but voiced desires for better preparation and training with them in advance.

Enthusiasm for additional training seems to indicate general excitement for the OLPC program and the desire to become more

Children in Peru travel to school on horses with their XOs every morning!

deeply engaged with its work. Families and community members have also voiced a desire for more training with the laptops in order to assist and work with their children at home and in school. Many teachers in the Solomon Islands also point to an improved method of communication with parents through working with the XO. "Teachers can use the laptops to send homework home with students and send messages to parents. 'Audio activities, writing activities and video activities make communication easier and much faster'." Community feedback and the voice for more capacity building and background knowledge on the XO is a large indicator that the laptops are contributing to the community at large and that society is interesting in becoming more actively engaged in the future of childhood education.

Attendance and Access

Across the board, evaluations have noted an overall increase in attendance upon the introduction of the XO to the classroom. "The

XO laptop is unique because the design caters to children." According to an expert from the pilot project in Birmingham Alabama. Further she explained, the design of the laptop "is more intuitive for children and how they learn. They are also sturdier, more durable, and more interactive than many other existing laptops." Parents noted that as a result of their introduction attendance had improved, as 'they want to show their teachers what they have done with their laptops regarding their homework'. While the laptops successfully expand education from school to the home, they also created a much stronger link between the two worlds where education can now be a focus in both realms. In the Solomon Islands, "principals commented that they have 'create[d] a lot of curiosity in our students' minds' and that they are 'decreasing boredom and increasing interest/participation in classes', as well as being 'a source of motivation for pupils to attend school'. Teachers have also observed improvements in class and school attendance, and suggest that 'children are

more interested in school and learning now'."
A report from an Aboriginal community in
Australia exclaimed that six months after the
introduction of the laptops into the classroom
students were still insatiably excited about
them and creating new ways to learn with
them! Similarly, in a report from Haiti a school
administrator noted, "This is a very advanced
step for the school. I believe it's very good
to have the laptop in class because students
need something to stimulate their learning...
computers help them stay happy in class"
and "It will also increase attendance, student
interest, and opportunities to do research."

Attendance is also significant when considering
access. For example, in Afghanistan where
circumstances may prevent access to formal
education for girls and women, the XO can
transform the educational environment,
and the physical school building becomes
secondary to carrying out learning. In places
where the wireless Internet connection can
be fully utilized, chat programs, emailing
in homework and assignments, and other
networking opportunities help to re-
conceptualize attendance and the opportunity
to be present for learning. Barriers to access
go beyond gender barriers such as those
in place in Afghanistan and are important
when considering conflict situations, such as
limitations to physical school buildings as in
Haiti following the earthquake, or limitations
to resources in other emergency contexts. In
such scenarios, mitigating the initial emergency
becomes a priority, but the unfortunate reality
is that education can fall to the wayside for

Solar Panels have been developed at OLPC to address electrivity issues in some of the rural communities in which we work. Here, children work outside as solar panels power XO laptops at Roman Catholic School, Sahn Malen, Sierra Leone

months or even years at a time; the XO provides an opportunity for continuous learning, a potential source of psycho-social support in emergency contexts, and redefines participation and attendance in education.

Attendance is closely linked with access to education, as well as access to reading material, technology, and sites for learning, as removing literal barriers to education are only one aspect of existing limitations. The quality of education is often dependent on a variety of key access issues, which is something the XO works specifically to address.

As discussed when addressing localized content, providing access to textbooks through digitizing school books and providing direct access to school servers and content libraries, in addition to a host of new sources of updated information on the internet is key to improving the quality of education and providing access to learning materials to all students. It is also a cost-effective way of ensuring that all children have access to the updated textbooks and information.

Access to education can also be directly linked to access to technology and several of the evaluation reports mentioned discuss difficulties with access to power sources to charge the XO laptops or concerns with the length of the battery life. The XO laptop is at least six times more efficient than a standard laptop, but in order to address the energy issues more directly, a solar panel has been created to directly charge the computers in order to supplement scenarios when access to energy may not be feasible. Still, technical concerns remain with battery life on a daily basis as well

as the limited life span of the battery. Limited access to power sources within a school prevent many laptops from getting charged at a time and oftentimes the lack of access to electricity at home can diminish usage potential further. OLPC remains committed to being as energy efficient as possible and works to address a variety of technical issues that may arise from working in such remote environments.

In the Solomon Islands the evaluation report found that, "children use their laptops both at school and at home, and most children interviewed said they use their laptops every day that the laptop is charged" and that the "frequency of laptop use by children is dependent on the availability of charging facilities." Some children "pointed out that they can use their laptops every day because their school (Batuna) has a generator that allows them to charge their laptops every night. Other children said that they use their laptops most days but cannot always use them because they do not have a school generator and the Distance Learning Centre where they can charge their laptops is 'quite far from the school' (Sombiro)." Outside of the Solomon Islands other children have referenced technical issues with maintaining access to power sources in order to maximize time spent on the XO.

Other technical issues surround complaints with the Mouse and its functions; the first model of the XO featured a Mouse that occasionally ran into problems with its touch sensor, which has now been addressed in the newer model,

however many children currently still have the first version. Technical and maintenance issues, such as software updating, can become a time consuming process. These issues may not currently have the in-country capacity to be addressed and can severely limit the success of the program.

Confidence and Motivation

Evaluation reports have presented anecdotal data regarding child confidence and personal empowerment from working with individual laptop computers at home and in the classroom. In Uruguay, children enjoyed customizing their own laptops and took pride in their ownership. In the Solomon Islands, a student recalled how the XO inspired her to take charge of her education, she explained, "it is a good thing to study alone without our teachers." A group of younger children said that the laptops "helped us learn to print and draw pictures by ourselves … work without our teachers, learn ourselves at home and pronounce the words by ourselves." A parent explained, "There is a feeling of pride and confidence that they have another resource

How do children learn to use the XO?

With the teacher's help 19%

Individual exploration 36%

Exploration among peers 45%

Plan Ceibal Evaluation Area. 2009 National Survey of Teachers

Did the child teach someone to use the XO?

NO 37%

Yes 63%

Whom?

Parents:	73%
Siblings:	46%
Other children	42%
Teachers:	9%

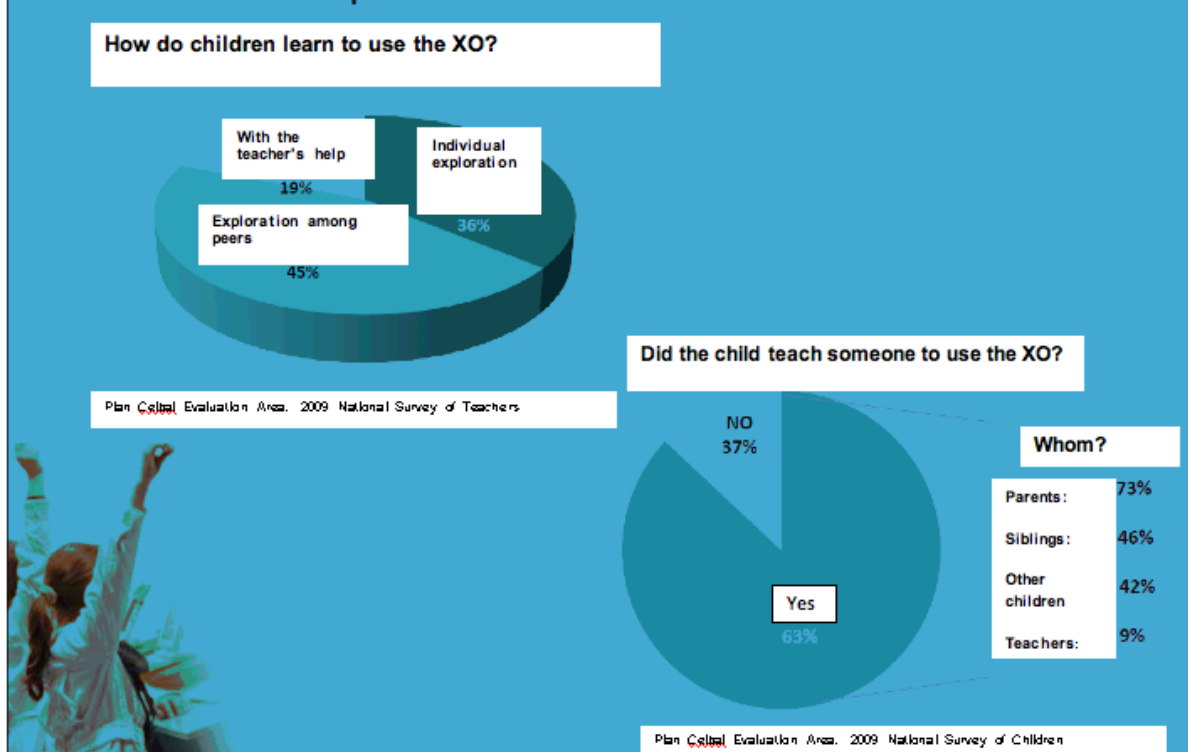Plan Ceibal Evaluation Area. 2009 National Survey of Children

Figure 5: Survey Data from Uruguay on Child Learning on the XO. Most children learn on their own and go on to expland their knowledge base through working with other children!

more complicated than the books or exercise books, biros and pencils." The confidence factor also seemed to trickle down to families who began to lend more support and involvement for their children's education, according community member who noted that, "laptops also help parents to see the importance of their children's education."

The existing literature has also demonstrated an overall increase in student motivation closely linked with confidence and trust in their futures, which can have lasting positive effects on tertiary education matriculation rates and the reduction of general dropout rates. Computer ownership was also discovered to link to motivation as children began to have a larger visible personal investment in their educational success. Principals and teachers in the Solomon Islands, noted a major principle of the program was introducing children to technology; they see it as very important that children are able to 'see, touch and also feel [the laptops] for

themselves', as this allows children to 'prepare themselves for the future use of modern technology'. They also think that an aim of the program is to 'motivate' and 'stimulate' children, which in turn 'reduces [the] high percentages of children not attending school'.

In building upon the notion of skill building and the preparation for a more achievable future, thereby stimulating confidence, a teacher in Haiti explained, "The kids will be more responsible and more independent because they'll learn about researching with the computer early on. They will be better prepared when they go to the university… This is a new way to learn."

Further, in the Solomon Islands report, "one principal noted that the program has made learning 'more focused and concentrated'. Classrooms have come 'alive' by 'providing teachers with a dynamic, lively and resourceful learning aid' that gives them more time
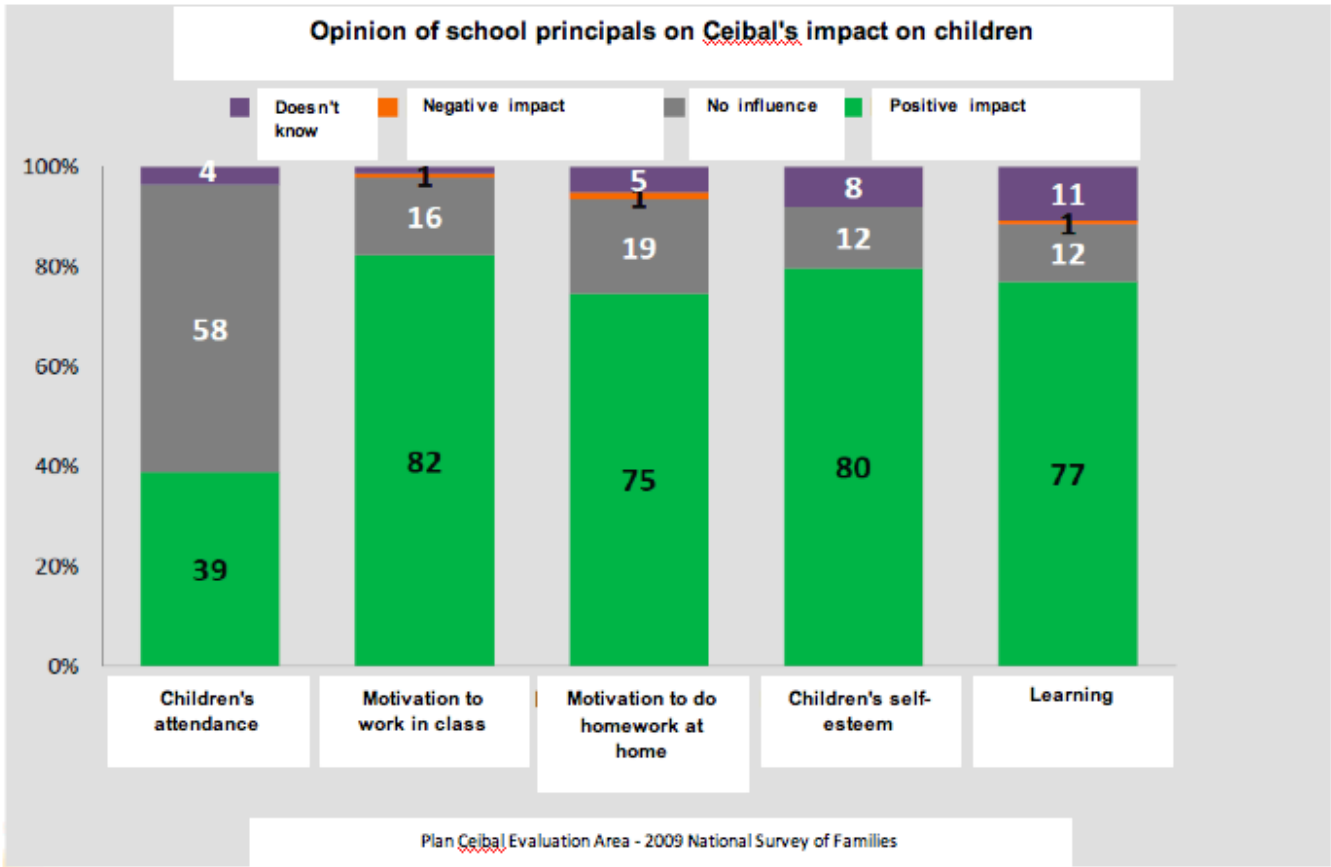
Opinion of school principals on Ceibal's impact on children

Legend: Doesn't know | Negative impact | No influence | Positive impact

	Children's attendance	Motivation to work in class	Motivation to do homework at home	Children's self-esteem	Learning
Doesn't know	4	1	5	8	11
Negative impact			1		1
No influence	58	16	19	12	12
Positive impact	39	82	75	80	77

Plan Ceibal Evaluation Area - 2009 National Survey of Families

Figure 6: Survey of School Principal Attitudes in Uruguay

Number of books in the home by socioeconomic level

Number of books in the home:
- None
- 1 to 10
- Between 11 and 30
- Between 31 and 60
- Between 61 and 100
- Over 100

	Low – Low	Low	Middle – Low	Middle	Middle – High
None	17	9	4	2	0
1 to 10	57	54	43	28	16
Between 11 and 30	17	21	29	31	21
Between 31 and 60	6	9	14	23	23
Between 61 and 100	1	3	6	9	17
Over 100			4	8	23

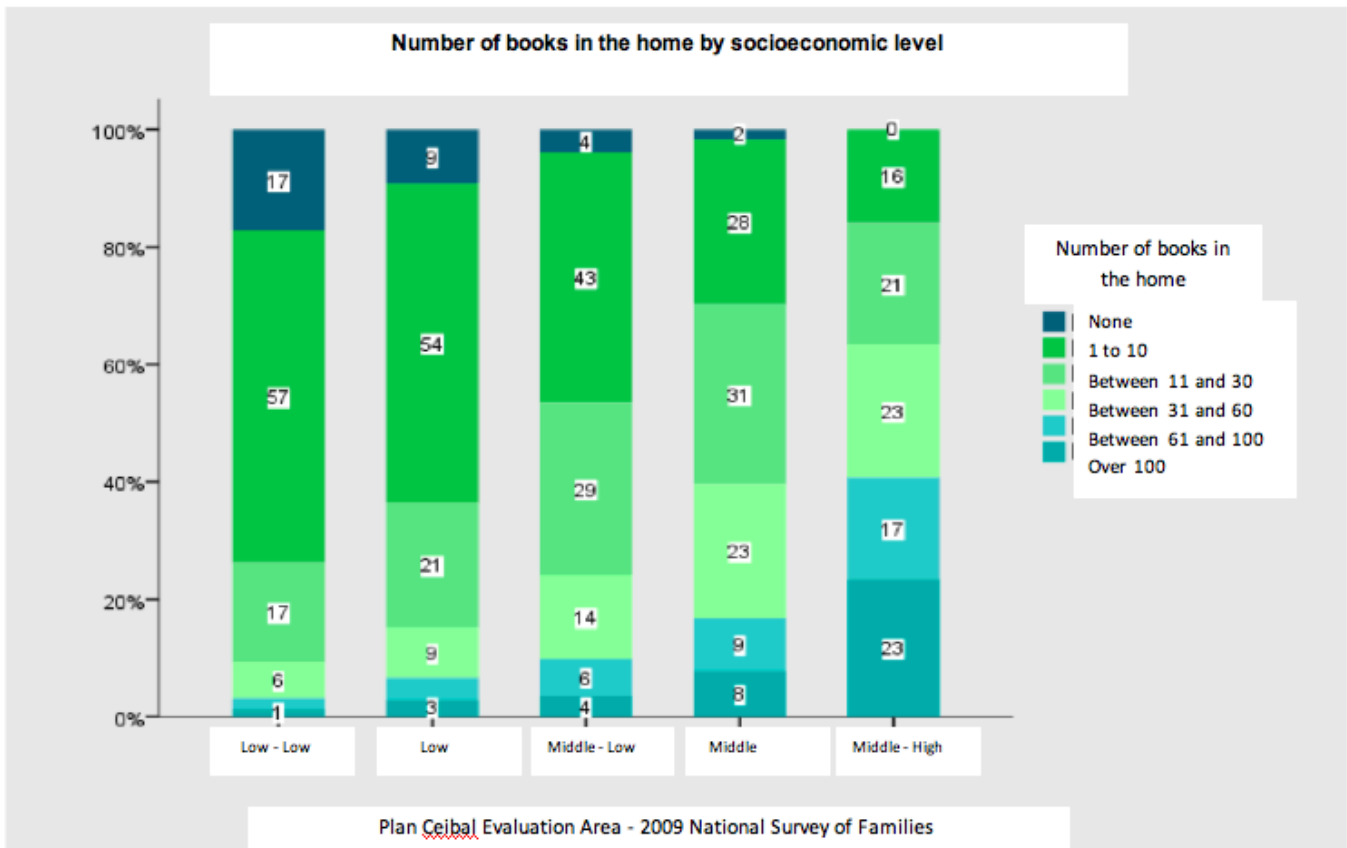Plan Ceibal Evaluation Area - 2009 National Survey of Families

Figure 7: Survey of Educational Resources by Socioeconomic Levels in Uruguay before the XO

to 'attend [to] slow/needy learners'." The structured interviews with teachers in Ethiopia explained that the XO resulted in "positive changes in teaching methods and style, student collaboration, and most importantly more opportunities for teachers to provide individual assistance to students", increasing their motivation and feelings of self-worth. Increased specialized attention, motivation and enthusiasm for learning, and confidence in children's futures as a result of skills and knowledge building are huge components in building child confidence and drastically improving attendance, thereby decreasing dropout rates in the long-run, and producing a more well-educated society. Similar overwhelmingly positive statements about child confidence and the feelings of being "special" and worthwhile as a result of the introduction of laptops into the community for the children are found in reports from Alabama in the United States all the way to remote indigenous communities in Western Australia.

Bridging Socioeconomic Inequality

To date, only one country has been fully saturated with XO laptops fulfilling one of the main principles of the One Laptop Per Child philosophy. While other distributions have ensured that every child in a community or every child in a given school has received a laptop, in order to maintain feelings of inclusion, in Uruguay every single child in primary school has been given their own laptop with recent projects extending this to high-school students as well. Through the direct

support and mission of the President, Uruguay has facilitated this extensive distribution and commissioned many evaluation projects to gauge its success. Uruguay currently serves as our only model to test full saturation and child ownership, however the results of their prolific research and evaluations of the program indicate profound conclusions. Uruguay has found that introducing a laptop to every child has had significant positive effects in equalizing the country and ensuring that both the richest and poorest students have access to both equal and high-quality standards of education.

The chart on the previous page indicates the number of books in children's homes prior to the introduction of the XO electronic library. Extensive research was carried out in Uruguay to demonstrate the former inequality in education level and literacy as a result of socio-economic status, and their new evaluations have found that when every child in the country was able to have their own laptop not only was the bar raised overall, but children now had access to the same number of resources and opportunities in education as each other, which has far-reaching implications for confidence and self-empowerment of individual children as well as the stability and success in of the community overall.

The data also illustrated that the gap between students of advantaged and disadvantaged students who had access to computers, technological resources in general, and job-training skills was extremely wide before the

introduction of the XO laptop, and despite this gap, children from the poorest to the wealthiest backgrounds were able to learn and adapt with the XO at almost the same rate. While Uruguay may be the first example of such a scenario, massive deployments of laptops are being planned and carried out throughout the rest of the world. Our next largest deployment is currently in Peru, and has successfully extended beyond urban rural divides in every region to maximize the number of children and the variety of communities reached with this new form of education technology.

Irrespective of full country saturation, local school saturation in disadvantaged communities has still produced extensive information about equalizing and enhancing access to quality educational opportunities for children. A project designed for Birmingham, Alabama brought laptops to one of the poorest student districts in the United States of America. Birmingham was introduced to the XO laptops in early 2008, when the city government purchased 15,000 XO laptops for the students in Birmingham City schools. Every student in first through fifth grade received their own computer to take home. Sheila Cotten, the local evaluator of the project, explained that the goal was "to decrease the digital divide in Birmingham and to provide students with the technological skills to make them effective participants in our information and technologically driven society."

She goes on, "I can tell you that the students were incredibly moved by receiving these laptops," said Cotten. "The joy was evident

on their faces, and tears were flowing among many of the children. From what I have observed, family members were excited that their children were receiving the XO laptops. This represented an opportunity for their children and their families that they most likely would not have had otherwise." This opportunity was so significant to the children of Birmingham, who were more familiar with the concept of computers due to growing up in the United States, yet were perhaps more aware of their disadvantaged status because of their lack of access to such resources. The introduction of the XO was important to their confidence levels and bridging the achievement gap present in many schools today in America and around the world. The Birmingham analysis also found

Figure 8: Regional Distrubution in Peru

that for these children, more frequent use of computers for research was directly associated with gains in personal expression, freedom and accomplishment.

Child Social Support Networks

A major impact of OLPC projects has been the redefinition of children's social support networks and connectivity at large with the global community. Evaluations have highlighted activities such as chat, video recording, and music sharing, as important tools in building child peer networks and enhancing student collaboration from the classroom to the home. Initial focus groups discussed a potential fear that laptops in the classroom would separate students who would all be working individually -- however, from Ethiopia to Uruguay and in between, teachers have commented on how student collaboration has evolved to children working together and sharing new discoveries on their laptops. Reports on Uruguay added that children became extremely excited to try out activities their peers had excelled in and were quick to turn to each other for help in the event of any difficulties with getting programs to work.

In another report parents commented that

they had observed improvements in children's relationships with other children. It "builds the sharing element with other students … They chat and communicate and share information with each other … There is the element of enhancing and elevating learning, and the idea of cooperative research and finding out." Connectivity is also useful for connecting children, especially those in rural remote areas, to global information technology and the opportunity to learn and communicate with their peers across the world. In Ethiopia an after-school XO club opens up channels for extracurricular participation and furthering these peer networks where other communities embark upon different approaches. Commenting on this, a teacher from Haiti said, "I like the XO laptop because it's very useful for us and for the children. It has a connection with the rest of the world."

The levels of connectivity, from peers, to mentors, to the local and global community broaden children's support networks linking them to key resources and providing another framework for assistance, building a strong sense of empowerment. With millions of laptops in young hands worldwide, we are now facing exciting research opportunities to reevaluate global connectivity through the eyes of children.

Conclusion

With over two million laptops deployed globally and thousands more disseminated with each new project, ongoing monitoring and evaluation projects will be a crucial element in the discovery of the benefits of incorporating new technologies into childhood education. While there are clear linkages between increased literacy rates and the introduction of the XO laptop, it would be beneficial to explore these findings in greater detail over the long-term. Similarly, based on evaluations, we know that the XO laptop has removed many barriers to access for education and increased attendance rates, but further monitoring in the long run and more specific data on the implications for dropout rates will be extremely beneficial.

That being said, the initial setbacks and program limitations such as technical issues, considerations for energy capacity and wireless connectivity, and the call for additional training with the laptops for both students and teachers lend necessary insight into the future deployments of OLPC programs and how to most effectively work within a community. External monitoring and evaluation reports are helpful for the One Laptop Per Child foundation in the way we think about learning and developing partnerships in diverse contexts. These evaluations are also are instrumental for partners on the ground to deepen understanding of how the XO works in different environments and what methods might potentially be ideal to carry out their own projects and evaluations. The rich uniqueness of each individual child's experience and each community's experience is reflected in countless ways and the opportunities for research and improving childhood education are endless.

Main Texts & Evaluation Reports for Analysis and Important Resources

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"Programa Una Laptop por Nino" Peru Ministry of Education. < http://www.perueduca.edu.pe/olpc/OLPC_Home.html>

"OLPC Afghanistan: 2nd Education evaluation Report" October 2009. Paiwastoon   www.paiwastoon.com.af

Useful Links:

OLPC Reports - http://wiki.laptop.org/go/OLPC_research

OLPC Website - http://laptop.org/en/

OLPC Wiki - http://wiki.laptop.org/go/The_OLPC_Wiki

one laptop per child

One Laptop per Child Foundation
Learning Group

The OLPC Foundation Learning Group develops partnerships and designs programs to support education in least developed countries, conflict zones, and emergencies. Our mission is to understand how technology can support children's education by collaborating with local NGOs, ministries of education, and international agencies. Developing programs with our local partners and their communities that address local needs and community aspirations for improving the quality of education is at the core of our work.

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