Early OLPC Experiences in a Rural Uruguayan School

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Abstract
In this paper, we discuss children's and teachers' experiences in a small rural town in Uruguay where every child in elementary school has received a laptop from the OLPC Foundation. In conducting activities in classrooms, observing children, and speaking with their teachers we found that the laptops have had a positive impact so far, with children accessing information resources that were previously unavailable, creating content for the world to see, collaborating and learning from each other, and increasing their interest in reading and writing. We also noted several challenges that need to be addressed, some directly related to human-computer interaction including problems with input devices, basic interactions, and the conceptual design and localization of user interfaces.

Keywords
Children, laptop, OLPC, Uruguay, developing regions, universal access, digital divide.

ACM Classification Keywords
K.3.1. Computer uses in education: collaborative learning, computer-assisted instruction. K.4.2. Computers and society: social issues. H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Introduction

In an increasingly connected world, the digital divide between those in developed and developing regions threatens to widen the economic gap for future generations. The One Laptop Per Child (OLPC) Foundation has championed the idea of providing children in the developing world with laptops in order to address this problem. The OLPC Foundation is currently developing prototype XO laptops with the goal of producing them for 100 US dollars [7]. Some computer manufacturers have responded to the OLPC challenge by presenting alternatives of their own such as Intel's Classmate PC [3].

In this paper, we discuss the results from a pilot experience with prototype XO laptops in a small rural town in Uruguay from an independent point of view. We found that in spite of infrastructure, hardware, and software problems the experience so far appears to have had a positive effect on the children, the school and the town.

Related Work

Within the human-computer interaction community, there has been an increased interest in designing for and with children in developing countries. Recent examples include the work of Kam, Ramachandran and others in conducting participatory design sessions with children in India [4][5][9], and the work in China and India of Moraveji et al. [6] and Pawar et al. [8] conducting design sessions and evaluations with children.

OLPC in Uruguay

Under Proyecto Ceibal every child in elementary school in Uruguay will receive a laptop by 2009. The children will get to keep the laptops and do not have to return them to their schools. This constitutes the first such commitment by a developing country. The goal is to improve universal access to computer and information resources by all segments of Uruguayan society.

The first step is a pilot experience in Villa Cardal, a town of about 1,500 located about 80 kilometers from Uruguay's capital city, Montevideo. Villa Cardal is situated in a rural area with many dairy farms. In spite of the proximity to the capital city the local culture has a rural flavor, with many inhabitants, for example, having a distinctive rural accent when they speak. Villa Cardal is in the department of Florida, where as of 2004 the birth rate was 14.5 birhts/1,000 people, the mortality rate was 10.1 deaths/1,000 people, the average age of inhabitants was 33.2 years, life expectancy was 76 years, and the annual per capita income was about 2,350 USD (there are no statistics available for Villa Cardal itself). While the population is mostly low-income, this is a safe, low-crime area with no desperate poverty concerns (e.g. there are no problems with malnutrition). Nevertheless, the differences with developed countries are easy to find. For example, the large classrooms in the elementary school have no central heating even though temperatures reach freezing points during school hours several times during the winter. Also, some of the children at the school did not have access to electricity or sanitation at home.

The local elementary school has about 150 students, hosting fourth, fifth and sixth grade in the mornings, and first, second and third grade in the afternoons. In May of 2007, every child received XO-B2 laptops donated by the OLPC Foundation. This brought a lot of

unprecedented attention to Villa Cardal, with the Uruguayan President participating in a ceremony, followed by repeated visits by politicians, the media, foreign researchers, and government employees seeking to learn from the pilot experience. The laptops have also provided a new experience to the children and their families in providing a first computer for most as well as access to the Internet. The laptops were also new to the teachers who were trained on how to use them, but not on what educational activities to conduct with them.

figure 1. A typical street in Villa Cardal

Visiting the Pilot School

We visited the school in Villa Cardal in August of 2007, about three months into the pilot experience. According to the teachers, in the previous three months, the school children had received weekly visits from a teacher who taught them how to use software on the laptops, mostly concentrating on web-related activities. The school's teachers were free to decide how to use the laptops in the classroom.

Our goal in the visit was to assess the experiences of the children and teachers in their use of the laptops. None of us are associated with the OLPC Foundation, so we also sought to bring an independent view on the pilot experience. Our team was composed of a human-computer interaction professor, a computer engineer with a background in teaching children about technology who is supporting the pilot experience, a teacher with 20 years of experience teaching programming and computer skills to children, and a sociologist. All of our team members grew up in Uruguay, so there were no issues in communicating with the children, teachers or other people in the town. In our visit we conducted activities in three classrooms and spoke with teachers about their experiences so far.

Sticky Note Activity

The first activity we conducted was in the fourth grade classroom. We began the activity by telling the children that we needed their expertise to learn about their laptops. We told them they had a very special expertise that adults did not have: they were experts at being children. We then introduced the activity. We asked the children to write in sticky notes: the three things they liked the most about their use of the laptops, three things they did not like, and three things they would like to change. They were asked to write one item per sticky note. As the sticky notes came in, we organized them in groups and then proceeded to discuss the most popular choices with the children.

The activities that children liked the most were: using the Internet, taking pictures and recording video,

playing games, and drawing. In terms of Internet use, the children said they enjoyed looking for information, sending email messages, playing games, and uploading pictures and text to the school blog. In spite of all this Internet activity, when we asked the children if they ever accessed materials from outside Uruguay or emailed someone in another country, only one child responded affirmatively. This was disappointing since Proyecto Ceibal aims to broaden children's view of the world in order to better prepare them to successfully compete in the global economy.

Children enjoyed taking pictures and recording video of themselves, but also made unexpected uses of the technology such as recording video of favorite television programs and of rural life. For example, they uploaded a video of a cow giving birth to the school's blog.

The children were very excited about playing games; those that came with the computer, but even more so, games that they found on the web. After we completed the activity, we observed the children during free time and most of the boys seemed intent in finding and playing games online with small crowds gathering around computers when someone found a new game.

The children cited many things they did not like about their experience with the laptops, with one problem being the dominant one: connectivity. The children reported problems connecting to the Internet when they went home as well as trouble sometimes connecting while in school. Another issue cited by many was the user interface of the file browser, which the children found difficult to understand. Some children complained about writing and the laptop's keyboard, but after a discussion with their peers, the children saw the advantages of writing with the computer over writing on paper (e.g. editing, sharing), as well as the advantages of the laptop's keyboard over larger keyboards (e.g. smaller, resistant to water). Other, more intriguing dislikes included use of the music authoring program and of Tetris (the children said they much preferred other games).

In terms of things they would like to change, for the most part the children concentrated on asking for more of what they liked: easier connectivity, more games and more music and videos. They also asked for being able to use software that is available for other computers (i.e. available for PCs). One interesting comment that clarified the negative view of the music authoring program was that children wanted to make music that sounded like the popular music they listened to on the radio (e.g. one child mentioned wanting to make music with cumbia rhythms). This emphasizes the need to localize the technology. The children also mentioned the need to change the user interface to the file browser.

Document Authoring and Emailing

For the second activity, we went to the fifth grade class where we asked the children to write briefly about their experiences with the laptop in a document, and then send it as an attachment. The children had little trouble writing on a word processor, except for some difficulty finding letters on the keyboard, but they did have difficulty accessing a web-based email application designed for adults, logging in, and then sending an email with an attachment. In spite of help from the teacher and from team members, only three out of about 20 children were able to complete the task

successfully when working on it for about half an hour. Some of the problems we noticed were misspellings of email addresses, the need to scroll horizontally to access options in the web-based email client, and the difficulty children had using some touchpads that were not working properly and made it very difficult to click on some targets.

figure 2. Results of the sticky note activity

Playing with Squeak

In the third activity, we went to the first grade class where the children were introduced to some basic tasks with the version of Squeak [10] that comes with the laptop. As they received verbal instructions on how to use Squeak (aided by some drawings on a blackboard), the children drew a car and then used some pre-programmed behaviors to make sounds and make the car move and rotate. In spite of the fact that the user interface to Squeak was in English, the children were not afraid to try it out and did not have much difficulty understanding how to get to specific functionality.

What caused the most problems again were issues with pointing and clicking on icons. These problems were caused both by touchpads that were not particularly accurate, and by the graphical interface elements in Squeak being very small. These problems meant that the greatest difficulty was not in terms of understanding concepts, but in being able to click on icons and control the cursor when drawing. In spite of these issues, many of the children were able to draw a car, make it move, make sounds, and some even got it to rotate.

figure 3. Children from the first grade class using Squeak.

Feedback from Teachers

We spoke to the teachers about their experiences with the laptops so far. They were all very positive about the impact of the laptops. Of particular interest were the comments of a very experienced teacher who at first thought the laptops would not make a positive

difference in the classroom. She has changed her mind as she has seen the laptops motivating children to read and write more than they did before the laptops arrived. She thought this was due mostly to children having access to a much wider set of materials from which to read (the school has a very small collection of physical books available), and the opportunity to easily share what they write with classmates and with the entire world through the school's blog.

Other Observations

The fact that every child had a laptop seemed to encourage rather than discourage social interactions. This was in contrast to previous criticism of the use of computers in schools that has centered on the idea that computers isolate children (e.g. [1]). We observed exactly the opposite. When one of the children got to do something before other children, a small crowd would form around the child's computer. Children were particularly interested in seeing how other children got to complete tasks they were having difficulty completing themselves, as well as seeing content of interest that another child found (e.g. a new web-based game). The size, weight, wireless and tumble-proof nature of the laptops also made it possible for children to move around the classroom holding laptops, enabling them to show other children something they did, or to seek help next to another child or their teacher. These social behaviors made it so that knowledge about how to do something or how to access content would quickly spread throughout the classroom.

Another social aspect we observed was that children customized the looks of their laptops. Most had a number of stickers on them, making them easy to identify. It was also clear that the children had become quite comfortable with having the laptops to the point where they were not particularly careful when moving them as they walked, treating them as they would a book or a notebook. We also noted that when using the problematic touchpads, they seemed to have developed techniques that enabled them to be more accurate than we were when we tried to use them to point and click on icons.

We also spoke with the children about how they used the laptops at home. They mentioned their parents used the laptops to play games and look up information (e.g. maps). In at least one case, the use was more sophisticated, with parents using the laptops to coordinate milk pick-ups from their dairy farms. The children also mentioned that they have taken the role of teachers at home, showing parents and siblings how to use the laptops.

figure 4. Laptops with stickers for customized looks.

figure 5. Boys crowding around a computer after one of them found a new web-based game.

Reflecting on the Activities

The fact that all of our team members grew up in Uruguay, where the population and culture are very homogeneous, helped ease communication. The children and teachers had no problems understanding us and we did not have any problems understanding them or the cultural references they made. Everyone felt very comfortable. We also did not notice any power issues, with the children and teachers being very willing to provide information and engage in conversation. This may be partly due to all the attention the school had received. The children felt very important and were not shy to express their opinions or even try to play tricks on some of us (e.g. getting us to give them more sticky notes than they needed).

Given our experience, we believe that the inclusion of HCI experts with strong local ties should be encouraged in this type of projects. Having those that lead activities be local rather than just having local help in translating can make a positive difference. When possible, this should help alleviate issues of communication, which are often cited by others as challenges to be overcome (e,g, [8]).

We also learned that the participatory techniques we used worked well, just as they would have if we had used them in a developed country. For example, the sticky note activity worked very similarly to they way it did when the first author used it at the University of Maryland as a graduate student, with very engaged children and very useful discussions after we clustered the groups of sticky notes on a blackboard based on themes. The only difference was a bit of excitement from children at using sticky notes since they were a rare material for them and became a bit of a collector's item.

Discussion

The impression we brought back from our visit to Villa Cardal was that the laptops appeared to have a very positive impact and transformed the way the children learn in spite of serious hardware and infrastructure problems. The spotty connectivity to the Internet and unreliable input devices did not get in the way of children accessing information resources that were previously unavailable, creating content for the world to see, and increasing their interest in reading and writing. It is certainly possible though, that these positive effects are due in part to the novelty of the technology and to all the attention being paid to the children and the town. It will be interesting to see how

children in similar towns fare without the attention, and how urban children who have greater exposure to computers react to low-cost laptops.

In spite of the positive results, there are clear challenges for Proyecto Ceibal in terms of hardware and software. Connectivity is a challenge, especially when attempting to provide wireless access to children when they are not in school. There were also major issues with input devices. As mentioned earlier, many of the touchpads were not working well and about one in five laptops were being repaired due to problems with the keyboards. These may be growing pains with XO-B2 laptops, but without reliable input devices, the usability and user experience of the laptops is greatly compromised. The software also needs to improve by providing easier interactions for young children (e.g. larger icons), translated user interfaces, concepts more easily understood by children (e.g. easier to use file browser), and localized themes and content (e.g. author music with popular rhythms).

While problems with connectivity and input devices may seem trivial to people in developed regions, they are quite important in this case due to limited resources. If there is not enough money to purchase wireless routers or to incorporate better touchpads and keep the laptop's price the same, these initiatives could fail and many years would likely go by before countries in developing regions would be willing to invest in computers for every child again.

An additional challenge, which may be replicated in other countries, is that while the Uruguayan government is making a great effort in providing funding for the hardware, there is no funding for designing and developing software and content for use with the laptops, or for conducting a thorough evaluation of the educational and societal outcomes of the project. This compromises the effort by limiting the potential of the technology and what we can learn from its use.

Conclusion and Future Work

In our visit to Villa Cardal we found many encouraging signs pointing to the positive impact of providing a laptop for every child. At the same time, we were convinced that human-computer interaction needs to play a larger role in these initiatives if they are to succeed, as many of the problems getting in the way of children making full use of the laptops had to do with input devices and interaction design.

We plan to continue our involvement with Proyecto Ceibal by setting up design partnerships between children, teachers, parents, developers, and academia to design and develop software for use with the laptops. We are particularly interested in designing software to support children being collaborative authors who can easily share their creations. We are also interested in supporting teachers in sharing success stories of their use of the laptops in the classroom and evaluating learning outcomes.

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