

**Learning Consumption: Media, Literacy, and the Legacy of One Laptop per Child**

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## **Abstract**

This paper examines one of the largest interventions in computer-based learning currently underway, the One Laptop per Child (OLPC) project, with 2.5 million laptops in use worldwide. Drawing on 2010 and 2013 fieldwork investigating a project in Paraguay with 10,000 of OLPC's "XO" laptops, I explore the ways in which participants interpreted leisure laptop use as "learning." I show that the most captivating uses of the laptops were not 'productive' or programming-centric, as OLPC's developers hoped, but 'consumptive' and media-centric, focused on music, videos, and videogames. I discuss the learning benefits and drawbacks of this use, as understood by participants and in light of education research, and in light of the broader context of transnational corporations interested in marketing to these children. In the process, I weigh OLPC's utopian dreams against the interests of the child beneficiaries, concerns of media imperialism, and a potential shift in the meaning of computers.

## **Keywords**

One Laptop per Child, ICTD, ICTE, children and media, postcolonial computing, utopianism.

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## Introduction

Education has long been a site of utopian technological intervention. From radio-enabled “classrooms of the world” in the 1920s (Douglas 2004; Tyack and Cuban 1995) to computer-enabled “inverted classroom” or “unlearning” initiatives today (Papert 1993; Khan 2011), the promise of a technologically-driven rebirth of education and, by extension, society has long captivated educators, technologists, and social reformers (Tyack and Cuban 1995). Education researchers themselves are sometimes also seduced by the promises attached to new technologies (e.g. Druin et al. 2013), which can make critical examinations of these technologies difficult or unpopular. And with technological interventions proposing to radically change or even do away with classroom-based learning, traditional education research focused on the classroom can be ill-equipped to investigate these projects.

However, a growing number of scholars familiar with the promises and realities of technologies – many of them hailing from informatics, media studies, and related disciplines – have also been investigating the use of new technologies for learning. These disciplines often focus on the broader social and historical contexts of technological systems, turning a critical eye to utopian discourses about technology’s promise to radically change the world (e.g. Mosco 2005). By examining the role of technology in learning and in everyday life, scholars familiar with these theories and methods can provide insights to both education and their own disciplines.

In this vein, I use a critical ethnographic and historical lens to examine one of the largest interventions in computer-based learning currently underway: the One Laptop per Child (OLPC) project. Two and a half million of OLPC’s “XO” laptops are in use around the world, 85% of them in Latin America. The project has been both lauded and critiqued for its utopian rhetoric, including its promises to revolutionize education via out-of-classroom learning (Ananny 2005; Winters and Ananny 2007; Luyt 2008; Vota 2007a; Negroponte 2006; Papert 2006; Bender

2007; Bender et al. 2012). Drawing on seven months of fieldwork in 2010 and 2013 investigating a project of 10,000 XO laptops in Paraguay, in what has been called one of the most successful OLPC projects (Derndorfer 2010; Warschauer and Ames 2010; Bender et al. 2012), I explore the ways that various actors interpreted XO laptop use – both in and out of the classroom – as “learning.”

In particular, this article examines the implications of what I observed to be the most captivating uses of OLPC’s XO laptop among the students and teachers using them day-to-day. I found that most use was not programming-centric, as OLPC’s developers hoped, or ‘productive’ in the sense that educational researchers promote. Instead, their use was media-centric, focused on the consumption of music, videos, and videogames. I unpack the implications of this kind of use, which may well turn out to be one of the most important and lasting legacies of the project. On the one hand, I demonstrate that children, in pursuing their own interests with the laptop, exhibited more agency than those hopeful or fearful of OLPC’s cultural imperialism thought. On the other hand, I complicate this by also showing that the tone of engagement was often set by the advertising efforts of transnational corporations, such as Nestle and Nickelodeon, who were interested in capturing the attention of these young consumers via an avenue that parents and teachers often legitimated as educational. I also suggest that the media-focused uses I witnessed are part of a larger shift in computers from ‘programming machines’ of the 1980s to portals for online media today.

After all of the hype and mystery surrounding One Laptop per Child for the last decade, this research provides a thorough and critical look at what children are actually doing with these laptops in a larger OLPC project (rather than a pilot, where use may never really stabilize due to ongoing attention, feelings of exceptionality, and limited timeframes). It also provides scholars a

framework for identifying, contextualizing, and critically assessing the utopian dreams and more mundane realities that often accompany educational reform projects, especially those involving new technologies. Though OLPC has faded from the public eye, other technological interventions in education have rushed in to claim the same revolutionary potential that it claimed in 2005 (e.g. Khan 2011), just as it claimed the same revolutionary potential as previous educational technologies (Tyack and Cuban 1995). Drawing on both education and media studies, this research invites us to critically examine the role technology plays in children's lives, what counts as learning, and the sometimes fuzzy divide between education and entertainment.

### **Background on OLPC and Paraguay Educa: utopian ideals, messier realities**

In 2008, two young Paraguayans – one a recent graduate of Tufts University in Boston and the other of a computer science program in Paraguay's capital Asunción – started Paraguay Educa, a non-governmental organization (NGO) with a mission to bring One Laptop per Child's specially-designed computers to children in their country. The organization was not able to secure financial support from the Paraguayan government, but with donations from the Swift Group, Itaipú Dam, the Inter-American Development Bank, and others, the NGO purchased and distributed 4000 first-generation laptops in April 2009 and 6000 second-generation laptops in May 2011. They then gave these laptops to every elementary-school student and teacher in a small town about 50 kilometers east of the capital Asunción. Per OLPC's recommendations, these laptops became the personal property of these children and teachers.

In September 2008, as the project in Paraguay was just getting off the ground, the NGO Paraguay Educa explained its motivations for giving OLPC's XO laptops to Paraguayan children in an article in *ABC Color*, one of Paraguay's two major newspapers (ABC Color staff 2008).

Their professed dreams for technologically savvy, passionate learners with their own laptops was inspiring to many who became involved with the project, but not unique. In fact, much of the vision expressed in that 2008 news article was drawn directly from OLPC's promotional materials, from the hyperbolic list of benefits including low power consumption, customized learning software, rugged construction, and a state-of-the-art screen (OLPC staff 2011; Rosner and Ames 2014) to the project's Five Core Principles of child ownership, low ages, saturation, connection, and free/open source (OLPC staff 2012a).

The vision that Paraguay Educa and the Cambridge, MA-based OLPC Foundation shared in 2008 was that OLPC's specially-designed "XO" laptops could themselves make up for the lack of local educational opportunities and produce children who are adept at the kind of highly individualistic mathematical thinking valued in computer engineering cultures (Papert 1993; Negroponte and Bender 2007; Ames 2014; Ames and Rosner 2014). From the project's announcement in January 2005, OLPC founder Nicholas Negroponte and other OLPC leaders and affiliates often stressed that OLPC's XO laptops were meant to overhaul education in the Global South (Bender 2007; Negroponte and Bender 2007; Papert 2006; Negroponte 2006) and create a generation of technology-literate free thinkers by using MIT professor and OLPC co-founder Seymour Papert's do-it-yourself educational philosophy, *constructionism* (OLPC staff 2012b).

Developed over some forty years and borrowing tenets from Piaget's theory of constructivism, Papert's (similarly-spelled and often-confused) *constructionism* focuses on child-driven learning-by-doing with the help of "objects-to-think-with," particularly computers (Papert 1980; Papert 1993; Papert and Harel 1991). Papert brought constructionism to a wider audience in his two best-selling books *Mindstorms* (1980), where he describes constructionism in detail

and proposes having a computer for every child, and *The Children's Machine*, where he pushes the idea of one computer per child more strongly and denounces traditional classroom-based education as “slow, boring, and frankly out of touch” (Papert 1993). In both of these books, Papert describes children who took to computers naturally and learned their inner workings with playful gusto when given unrestricted access to a machine with his learning program Logo installed on it. By learning computers' inner workings, Papert argued, these children also learned how to *think* like a computer (Papert 1980, viii, 6, 27) – how to think mathematically – overcoming a culturally-ingrained fear of mathematics. They flew past the clueless adults in their lives (Papert 1993, chap. 1), instead connecting with other like-minded children in person and online to follow their passions and continue to learn.

Constructionism was built into OLPC's XO laptop from the ground up, inspiring its design and core principles (OLPC staff 2012a; OLPC staff 2012c; Bender et al. 2012). Its ruggedized case was designed to withstand the rigors of children's use (though it was not impervious, and breakage plagued the projects I studied; see Rosner and Ames 2014; Warschauer and Ames 2010 for more). Its hardware and software were geared toward encouraging children to explore and create, like the computers and game systems the project's developers used in their own childhoods (Ames and Rosner 2014). The machine was underpowered and had a very small hard drive: one gigabyte in the first generation machine, four gigabytes in the second. These limitations helped keep costs down – and if children were using the content provided, they should not need much more storage or speed; after all, the machines of the developers' youth were much more underpowered.

Many have found OLPC's and constructionism's promises seductive. Like Dewey, Montessori, Piaget, and others before him, Papert's faith in children to direct their own learning

seems admirable, putting children on Romantic-era pedestals as more noble, pure, and true to themselves than the meddling adults in their lives (Ames and Rosner 2014). But in light of OLPC's mission to bring these ideas to children across the Global South, constructionism and OLPC could also be seen as imperialistic, and Paraguay Educa's faithful adherence to OLPC's vision as problematic (Luyt 2008; Winters and Ananny 2007; Ananny 2005; Toyama 2010). After all, the NGO uncritically adopted a set of ideals largely developed at an elite institution, MIT, in a country with a history of both military and cultural imperialism in the region, the United States (Marques, Holmes, and Medina 2014; Takhteyev 2012; Chan 2014), and moreover chose an untested technological intervention instead of investing in food, vaccinations, or any number of other much-needed aid (Toyama 2010).

However, we will see that the day-to-day use of OLPC's XO laptops in Paraguay often did not coincide with the hopes of either OLPC or Paraguay Educa. The findings here bring the agency of those using the technology day-to-day back into narratives about OLPC, which have tended to be dominated by either utopian (Papert 2006; Bender 2007; Bender et al. 2012; Negroponte 2006) or dystopian (Ananny 2005; Winters and Ananny 2007; Luyt 2008; Vota 2007a) predictions of subsuming local cultures and individual practices for a brave new technological world created in OLPC's image. By closely attending to the messy realities of day-to-day use (Suchman 1987; Dourish and Bell 2011) and the meanings developed on the ground, this research balances and contextualizes both utopian and dystopian discourses about OLPC by accounting for children's agency in deciding how to use their laptops.

## Methods

By all accounts (Drake 2010; Paraguay Educa staff 2009), the 10,000 students and teachers in Paraguay Educa's OLPC-based project were thrilled to be given a laptop computer. But what happened when that initial excitement wore off? To find out, I conducted seven months of ethnographic fieldwork in Paraguay: six months from June to December 2010 and one month in November 2013. I also designed and conducted a survey of the technology habits of all teachers in the program in 2010 (with nearly 100% participation).

During both of my field visits, I spent approximately 20 hours per week observing children's undirected play during recess, before and after school, and in their homes (in addition to observing laptop use in the classroom, fieldwork that is not included in this article). I also interviewed 154 children, parents, and teachers – 133 individuals in 2010 and 21 in 2013 – about their laptop use. This group included children and adults from all ten of the Phase I schools and selected Phase II schools (more at larger schools). I aimed for diversity in my data set across urban/rural students, wealthier/poorer students, and students who used their laptops extensively, moderately, and not at all. I stopped recruiting additional interviewees when I reached data saturation (Guest, Bunce, and Johnson 2006). I iteratively coded both fieldnotes and interview transcripts for emergent themes in Atlas.TI, reflecting these themes on broader theoretical considerations in both education and media studies as I went, as described in the Extended Case Method (Burawoy 1998).

During interviews, I asked students to show me their most recent XO use via the *Journal* program, which records which other programs have been opened in the Sugar desktop environment (the software that came with the XO laptops) and any work done in them. I corroborated these observations with the aggregated and anonymized (protecting students' privacy) contents of the *Journal* activity across all 4000 students in Phase I, collected in August

2010. This showed what programs all students in the project had collectively opened since their last software upgrade, which for many students had been at the beginning of the school year the February before. However, some students had received a software upgrade more recently that erased this log, and others manually erased Journal entries, inadvertently avoiding this surveillance.

Finally, in collaboration with Paraguay Educa I designed, validated, and proctored two exams, one for third-grade students and one for sixth-grade students, which tested reading comprehension and mathematical reasoning. Like the PISA test<sup>1</sup>, we designed this test to be independent of school curricula: it did not rely on knowledge of particular concepts but instead tested things like basic literacy (*i.e.* identifying the main character and understanding the storyline of a short story) and basic numeracy (*i.e.* relationships between numbers, spatial relationships, and sequences). In 2010 we tested *all* 529 third- and sixth-grade students in the laptop program, and 988 third- and sixth-grade students in nearby schools without laptops (approximately half of whom joined the laptop program in Phase II the next year).<sup>2</sup> The control group included the same proportion of large/small and urban/rural schools as the experimental group. I included only public school students in this analysis to control for another potential source of variation between the two groups. The results that follow are from a Welch two-sample T-test.

During my 2010 fieldwork, the 4000 students in Phase I of the project had owned their XO laptops for almost a year and a half, and during my November 2013 visit, the 6000 students in Phase II of the project had owned their laptops for two and a half years. The usage patterns I

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<sup>1</sup> <http://www.oecd.org/pisa/aboutpisa/>

<sup>2</sup> We re-tested all third- and sixth-grade students at the same schools in 2013 to enable within-group longitudinal and cohort analyses, though these results are not included in this analysis because major changes in Paraguay Educa's program introduced confounding factors.

saw across my seven months of interviews and observations departed dramatically from the hopes of OLPC and the NGO Paraguay Educa. Notably, I discovered that approximately two-thirds of students hardly used the laptops at all outside of the classroom. This proportion was consistent across my field observations of children's leisure time at school and home as well as in interviews. About fifteen percent of these students had broken laptops, described in detail elsewhere (Rosner and Ames 2014), while the rest either had other responsibilities and interests or found the purposefully underpowered laptop too frustrating to use (Ames 2013; Ames 2014).

While the story of why these children rejected laptops is itself worthwhile, the focus on this article is instead what those who *did* use their laptops did with them. I found that nearly all of the children who used their XO laptop were most interested in it as a media machine, retrofitting a machine originally designed to teach programming to enable consumption of videos, music, and games instead. Moreover, this use was often strongly socially-motivated: children learned from one another, shared content with one another, and observed each other using their laptops. In the next sections, we will explore the kinds of media that attracted children and the patterns of social use and content-sharing that I observed.

## **A portrait of laptop use**

My fieldnotes from a visit to one of the larger schools using XOs in mid-August 2010 illustrate the range of activities that most laptop-using children used in their free time. When I arrived on foot thirty minutes before the morning session of school started, students in white shirts and blue pants and pinafores were trickling into the schoolyard alongside me, chatting and roughhousing with their friends. Some boys played a pick-up *fútbol* game in the central courtyard. One girl swept out a classroom and the open-air hallway in front of it. Other children

simply ran around the yard pell-mell or stood in small clusters in classroom doorways or hallways facing the courtyard, watching each other and talking with friends. A few lingered around the school cantina in the corner of the courtyard, buying candy or cups of hot, milky tea to combat the still-chilly winter air. A couple of girls recognized me and ran up for a quick hug, a common expression of affection that many Paraguayan adults, especially teachers (which I was considered by many students, who did not really understand “researcher” or “ethnographer”), gave freely to children.

Around one dozen small clusters of boys or girls (rarely a mix – in Paraguay, as in the United States, children were socialized into exclusionary gender roles early and often self-segregated) crouched around sticker-covered XO laptops, giggling and hiding their screens when any adult approached, even though the teachers who occasionally passed by never tried to see what they were doing. When I asked them what they were up to on their laptops, some of these groups replied “nada” – nothing – and hid their screens, but some let me see. Four small groups of boys were playing/watching “juegitos” (little games): two a side-scrolling game called *Vascolet*, one a game called “wear the shirt” (a *fútbol* game), and one *Super Mario Brothers* in WINE, a Windows emulator ported to the XO. This game-playing was quite social: for each boy using a laptop, several more watched his screen that chilly morning. Another boy sitting by himself searched for “juegos con motos” (games with cars) on the XO Planet website. A girl nearby searched for hip-hop music and two boys searched for reggaetón music to play on the tinny XO speakers in the classroom or on the walk home from school. The characteristic “cha, ch-ch-cha” reggaetón backbeat emanated from a few XOs around the courtyard, adding to the din of children’s voices at play.

This vignette shows that the XO's were indeed popular among some students. It also highlights what most unsupervised XO use actually looked like: the one-third of children who used their laptops fairly regularly were almost all only interested in finding ways to use the laptop not as a constructionist tool for teaching themselves mathematical thinking, as OLPC and Paraguay Educa had hoped, but as a machine to consume media.

Are these uses learning? In my research on OLPC, I often saw promotional pictures of children hunched over XO laptops, just like those I saw that chilly morning in August 2010, used as evidence of the kinds of learning that OLPC promised. A closer examination of just *what* children are doing on their laptops, however, brings up more complicated questions of just what we mean by "learning," and whether what these children were doing counts or not. Still, one thing was clear: most voluntary (non-teacher-directed, non-homework-related) XO use that I witnessed – whether before and after school, during recess, at home, or even during class – did not involve engaging with the constructionist programs that OLPC had installed on their laptops. It instead focused on game-playing, video-watching, music-listening, and other media consumption.

The aggregated records of Journal entries across all students in the program – records of what programs were opened – provide quantitative data to corroborate these qualitative results. Fully 32.6% of the program-opening events recorded in the XO's Journal were "unrecognized." This would include both WINE (a WINdows Emulator) and Gnome (an alternate Linux desktop environment), from which students could launch games or video players. The next most popular program opened was the XO's browser, which accounted for 13.4% of events recorded. Jukebox and Tam Tam Mini, the options in Sugar for playing music, accounted for 5.78% of the events recorded, though because I witnessed students also playing songs through Gnome and WINE,

this underestimates music-playing. On the ‘productive’ side, the word processor and office suites, both frequently used in the classroom, together accounted for another 9.38% of events, and the Record program, which allowed students to take and view pictures and videos, rounded out the top five. Overall, these five types of programs, out of the 152 total programs logged, accounted for over two thirds of recorded program-opening events, as summarized by Table 1. Three quarters of the rest were opened less than 0.2% each and half were opened less than 0.02% each (often just once), making up a very long, slim tail.

<i>Program Name</i>	<i># Recorded Openings</i>	<i>Percentage</i>
Unrecognized (Gnome, WINE, etc.)	58828	32.60%
Web Browser	24228	13.42%
Word Processor, Office	16931	9.38%
Record (camera, webcam)	13515	7.49%
Jukebox, Tam Tam Mini	10429	5.78%

**Table 1. The five most popular types of programs opened, as recorded in Journal in February-August 2010, include the browser, office suite, camera/webcam, music players, and unrecognized programs, which together account for 68.67% of events recorded.**

Many of the teachers supervising these children were aware of their leisure activities on the computer. Still, not many wanted to control what children did in their free time, and some felt that any laptop use was teaching the children about technology and was therefore good. “Outside of the classroom,” one teacher at a small rural school explained, “kids will listen to music and play” – and that, in her view, was okay. However, their leisure use had sullied her view of the project at first: she continued, “Last year I thought it was just a toy, not a tool for classes – more for games and music.” Another teacher at another small rural school matter-of-factly described

what students at different ages did, and how it had changed over time, though not without a note of disapproval in her voice. “The older children visit prohibited [pornographic] sites,” she told me, grimacing. “The younger children are interested in games. At first they were interested in downloading rude/gross [*grosero*] things, and they would show me. After that, it was music and video clips.”

### ***Games***

Videogames in particular were wildly popular with the students who used their laptops, boys and girls alike. Almost all children I interviewed and shadowed had their favorite games, whether they were a Barbie dress-up game online or a car-racing game played in a Windows emulator program. For instance, one seventh-grade student explained to me, “I play Flash Internet games. My favorite is Barcelona [a soccer game] – it has matches and two penalties and so on. We use WINE a lot for games.” Other favorites that I saw and heard about during my fieldwork included Vascolet, Super Vampire Ninja Zero, Mario Brothers (which came with the WINE Windows emulator), Tux Kart (an open-source version of the popular Nintendo game Mario Kart featuring Tux, the penguin Linux mascot), and various soccer-playing games. Before my fieldwork started, the classic first-person shooter game Doom circulated into, and then out of, popularity as well; most adults who mentioned it roundly condemned its violence.

Parents and teachers seemed to be divided on whether all of the game-playing their students were doing was educational or not. Many agreed that up to a certain point, games helped students become more proficient using their laptops, but some felt that most students reached that level of proficiency fairly quickly and that further game-playing was just leisure, not learning. One teacher and mother of five children, three of whom were in the laptop program,

noted that games that were too much like studying were not popular, but ones that were easier – like watching television – were:

The educational games are like studying, and they do not like them – they consider them boring. The others they like because they do not require much mental processing – for this they prefer them because they are very easy, like watching television.

Some teachers still hoped that students could learn to like what they saw as the more “educational” games, many of which came pre-installed on the XO laptop. At one extreme, one school director optimistically explained,

For me, no game is a negative influence. If the children have the right orientation, if they are motivated by the games, that is positive. From the game, our task is to make learning meaningful. There are no bad games; it is just a matter of how you approach them.

Other teachers and parents were unequivocally against videogames, though their reasons were not as simplistic or lacking in understanding as OLPC founders Nicholas Negroponte or Seymour Papert characterized them. Though a few parents did tell me they just did not understand their children’s laptops and were fearful of what they might be doing on them, most parents and all teachers, even if they were against video games, had thought about the benefits and costs and could articulate them to me. “I personally do not like the little games they play instead of doing homework or talking to their parents,” one teacher quipped. “I particularly do not like the violent games.”

### ***Music and videos***

Not far behind videogames in popularity were music and videos, which children downloaded and played on the XO. During fieldwork observations, I found that music in particular was nearly ubiquitous. Some students played music in the background off of their XO while they surfed the Internet during recess, while they walked home from school, while they

played at home, and even while they worked on schoolwork in class (if their teacher was lax enough), adding a soundtrack of their choice to all of these activities – much like many young people in the United States add a soundtrack to their daily activities with phones and MP3 players. One student said that she liked to download music to dance to at home. One mother commented, “They play, watch TV, or use the computer if we are at home to listen to music off of their pendrive [USB memory stick]. ... They just like music and soccer.”

Rap-like reggaetón music was most popular, and students often mentioned “Daddy Yankee” as a favorite musician. In 2010 I also heard a lot of Shakira’s World Cup “Waka Waka” theme song, as Paraguay was gripped with World Cup fever in celebration of their first-ever ascent to the quarter-finals during my fieldwork. I also heard many other pop songs in both Spanish and English, including familiar US-based pop stars such as Lady Gaga, Miley Cyrus, and Michael Jackson. Many of the videos that students played and shared were music videos for favorite songs.

Though music was fairly ubiquitous all around town, not all parents or teachers liked that their children used their laptops to play it. A parent of a second-grade boy complained to me that her son was not interested in learning how to use the laptop – he only wanted to be able to connect his XO to the house Internet connection<sup>3</sup> to download songs at home. “He just wants to listen to music or play games,” she told me. “That is all that interests him.” One teacher objected to the distraction a new song could make in the classroom. “The main negatives are the music and video websites – they will get distracted and not pay attention to class or their work. It is especially when a new song is available – then they will focus on it,” she explained.

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<sup>3</sup> Internet access at home was rare in 2010 – even among teachers, who tended to be more technologically-inclined than the general population, only 13% had home Internet connections.

Teachers also complained that students filled as much of their one-gigabyte hard drive as they could with songs and videos, often deleting activities that teachers wanted to use in class. In fact, one aspect of students' computer use that I found particularly striking, coming as I did from a culture of obsessive data backups, was students' cavalier attitude toward data loss. Not only were many students unperturbed when Sugar software updates deleted all of the school projects and other work on their laptops, some actively deleted them themselves, along with Sugar activities, to make space for memory-hogging media. A few students told me that they had lost the small amount of interest they had in creating when their projects were accidentally deleted in a software upgrade, suggesting that data impermanence accentuated practices of consumption over creation. If students could not trust that their projects would not be accidentally deleted, why should they bother putting lots of time into them?

### ***Pornography***

Finally, I heard stories about one of the most worried-about topics for children on computers: access to pornography. Though every school had an Internet filter in place to block as much sexual content as it could, no filter is perfect and one technician mentioned that the logs on the school server confirmed that not all pornographic sites were effectively blocked. I did not ask students about this directly and none ever talked to me about it or showed me anything, but I did ask parents in interviews whether they had any worries about the Internet, and many talked about "prohibited" or "inappropriate" content, though none knew whether their own children were viewing anything in this category. However, one teacher trainer employed by Paraguay Educa to

encourage classroom laptop use<sup>4</sup> told me about catching a student showing cartoon pornography to friends not once, but three times.

Pornographic content was ubiquitous enough on the Internet that at times it was hard to *avoid*, even with a filter. A fifth-grade teacher described an incident that had happened during a lesson in class, when she had instructed students to research parts of a flower on the Internet. One student found a picture of a penis when he searched for “pistil” (possibly misspelled) and gleefully showed it to the students around him, resulting in uproar. The teacher tried to make students put away their laptops and have an impromptu discussion of boys’ and girls’ body parts, but could not regain control over her classroom. In another incident, a teacher tried her search ahead of time, but for something far less suggestive. She explained,

I was searching for information on the sense of smell, and suddenly these rude things appear! If a child saw that and asked “what is that?,” their innocence would be lost very fast. So that is why I want to monitor – that is my fear. I know you have to learn these things in life, but all in due time – I do not want them to hurry.

This teacher’s thoughtful point that children will have to learn the facts of life in due time, but she still wanted to maintain their “innocence” as long as possible, is in stark contrast to the glib remarks several OLPC employees and contributors made after news of pornography-watching in a Nigerian OLPC pilot program in July 2007 caused an uproar among many American readers (Vota 2007b). Even before that, Seymour Papert claimed in a 2006 interview that children would simply moderate themselves in looking at salacious content (which the interviewer called “weirdness”) on the XO:

We envision 100 million laptops being in the hands of children in a few years’ time. It is impossible for us to even think about moderating what all these children are doing. ... The proper kind of moderator is the children themselves. The

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<sup>4</sup> From 2010 to 2012, Paraguay Educa employed about a dozen teacher trainers to encourage teachers to use XOs in the classroom – a successful, if expensive, program. These trainers, with backgrounds in education and technology, assisted with laptop use in the classroom and helped teachers develop curriculum using the laptops. The program was discontinued due to lack of funding.

children themselves should be the control over the best use of the computers, and preventing what you call weirdness. (Papert 2006)

While the general public was predictably shocked over news of the 2007 pornography scandal and while Paraguayan teachers and parents were understandably concerned about ongoing access to pornography, the (largely male) OLPC community simply shrugged and said that pornography is a large part of the Internet – and since children will encounter it eventually anyway, why try to regulate it? As Papert stated in neoliberal style, these children would learn to regulate themselves.

### **Learning consumption: practices of retrofitting and pathways of information sharing**

What elements of learning appeared in these media-centric uses? XO laptops were not designed to be media machines, so students interested in consuming media on their XO laptops had to install additional programs that enabled media use. Guided initially by OLPC-focused websites in Spanish, they would learn, and then teach each other, how to install alternate desktop environments like WINE (a Windows Emulator) or Gnome (an alternate, and more conventional-looking, desktop environment) to play videogames and open-source media players to watch videos and listen to music over the small XO laptop speakers. Some students had USB flash memory drives, locally called “pendrives,” which allowed content to continue to spread even away from the wireless network. In these ways, students could at least partially work around the limitations of a laptop that was designed to be a programming machine to make it serve their more media-focused interests.

In keeping with what OLPC imagined that children would want to do with computers – learning to program, creating content, exploring Wikipedia and other information online, or

connecting with one another – the XO was loaded with educational software and was not designed for playing video or audio. The version of the software in use during my fieldwork in 2010 (which was on the bleeding edge of Sugar software development, thanks to the strong programming team in Paraguay) intentionally could not run content in Flash (a fairly common format in 2010 for online videos, music, games, and interactive websites), did not come with a pre-installed video player, had low-quality speakers, had a one-gigabyte hard drive that was wholly inadequate for song and video file sizes, and by default played audio through either the Jukebox or the Tam Tam music suite programs, both designed to engage children more in *creating* their own music than *consuming* it.

Moreover, in Paraguay YouTube was added to the list of blocked sites relatively early on (before my arrival), removing one of the largest sources of video on the Internet, because students were using it to watch violent videos. Blocking YouTube was a difficult decision, one teacher explained, but necessary because of children watching what she described as “aggressive” videos. “It is too bad for other kids who are not interested in those things,” she lamented. This suggests an interesting cultural difference: while YouTube aggressively filters sexual content to make it “kid-safe” according to cultural values in the USA, the cultural values in Paraguay condemned violence where US cultural values are more equivocal on the topic.

Even so, a number of XO-dedicated websites quickly popped up that explained how to install workarounds and provided installation files for download. Many of these sites were hosted in Uruguay, where a large, active software developer community provided their country-wide project of well over half a million XOs with volunteer technical support (e.g. <http://rapceibal.info>), training classes, and lots of how-to websites in Spanish. Two of the most popular websites during my fieldwork, which I frequently saw in my observations, were “Portal

XO” (<http://www.portalxo.org>) and “XO Planet” (<http://xoplanet.blogspot.com>). These sites were supplemented by (and sometimes drew on) US-based websites by computer enthusiasts who bought XO-1 laptops during OLPC’s “Give One, Get One” programs during Christmas 2007 and 2008 and posted their own workarounds for the XO-1’s hardware and software limitations. Several of the games popular in Paraguay, including Doom (Blizzard 2006) and Super Mario Brothers (Murph 2006), were originally ported to the XO by US-based programmers. Others were developed closer to home, including “Vascolet” (<http://ww1.nestle.com.uy/vascolet>), sponsored by Nestle Corporation, which starred a character the company developed in 1974 to promote chocolate milk powder across Latin America, and Super Vampire Ninja Zero, both created by Montevideo-based Batovi Game Studios (<http://www.batovi.com>).

These sites were easily discoverable through web searches, and their tutorials would spread first to a few of the most technically-savvy children in the school, generally also the oldest that had laptops (sixth and seventh graders during my 2010 fieldwork), and from them to others. Some students also asked Paraguay Educa’s teacher trainers or technicians for tips on what to do an overly-full journal or download and install new programs. For instance, one seventh-grade student had learned how to use the “rm” (remove) command from a technician as a way to clear his computer’s memory from the command line. In an interview he told me, “I just use Terminal to delete my journal and install Flash Player so videos will go faster. In Gnome I use Virtual DJ for music.” Two sixth-grade boys I interviewed together attributed their knowledge of where to find videos to their school’s teacher trainer and from visits by Paraguay Educa’s programming team, following with a wish that they would “unlock” YouTube so they would not have to borrow USB pendrives to obtain videos.

From these sources, videogames, movies, music, song lyrics, jokes, and more often circulated from student to student on pendrives, which also allowed the students who could afford them (a handful at wealthier private schools, though sometimes none at rural public schools) to supplement the small one-gigabyte memory capacity of their XO. One teacher trainer corroborated my own observations of how content circulated around the schools. “There are two or three students in every room that are really good at searching the Internet and finding games and other pages you would never imagine existed,” the trainer explained. “They share with the other students. They also know how to get around the school’s firewalls and download music [some of them doing so with home Internet connections].” In a group conversation, several other teacher trainers commented that new songs or games could spread throughout the schools where they worked within a day, starting before school, continuing at recess, and jumping to the afternoon session via students from the morning session staying late to surf the Internet overlapping with students in the afternoon session coming early to do the same.

Students, too, discussed the social sources of their media with me. “My classmates showed me Vascolet – they gave it to me on a pendrive,” said one fourth-grade student in a larger rural school. A second-grade student in a large private school told me, “My favorite thing to do is download music in WINE. I do not know how to myself, but friends help me at school.” Information also flowed between siblings and cousins, especially from older to younger, which allowed it to jump between school sessions and schools as well.

In sum, these quotes, as well as the groups huddled around laptops before school in my vignette, both attest that students often used their laptops in ways that were not individual, but profoundly *social* – and that much of this social interaction happened face-to-face between friends at school and family members at home, rather than online. Students learned about sources

of media and software, as well as instructions for installation and strategies for memory management, from one another. While the observation that learning is a deeply social process is nothing new to education or sociology (e.g. Brown et al. 1989; Lave and Wenger 1991; Ito 2009; Ito et al. 2010), many technologically-driven education projects – from OLPC to the Khan Academy (Khan 2011) – often talk about technology-assisted education as a primarily individualistic endeavor, something that takes place between the student and the machine.

### **Media and the legacy of OLPC**

Media-centric use may well be the most important legacy of the OLPC project. While I want to avoid a normative statement about this use – I will explore some of the implications of it in this section – I do want to highlight that it does not match what OLPC generally envisioned. XO laptops were not being used as programming machines, like the computers discussed in Papert's books *Mindstorms* or *The Children's Machine* – or like the pre-Internet computers or gaming/programming devices such as the Atari or Commodore systems that many of OLPC's developers used in their youth and continued to nostalgize (Ames and Rosner 2014). Instead, the children in Paraguay that I encountered in my fieldwork were using their XOs like many around the world use computers today: as media-rich, Internet-connected sources of entertainment. Despite the custom-designed laptops coming pre-loaded with lots of educational programs, children were using their XOs like they would use any other computer.

One teacher trainer quipped to me about some students' proficiency in downloading games and other content, even when the same students struggled with using educational programs such as Scratch (<http://scratch.mit.edu>), one of the featured constructionist programs

on the XO. “They are super-smart only when it is convenient for them, when they want to – only when they are motivated,” the trainer observed, with equal parts admiration and exasperation.

It is amazing – kids who cannot read or write know how to download games, sometimes even in English. They memorize what to write – click here, copy and paste there, follow the links. They follow directions well. But if you give them directions on the computer for something *you* want them to do, they cannot do it. It is amazing.

This teacher trainer’s comment highlights that in using their machines for media, these children *are* still engaging with the machine. Though it may not involve using some of the more constructionist programs such as Scratch, Turtle Art, or eToys, they were nonetheless learning about the laptop. Still, the terms for this learning were not set by OLPC or teachers, but by multinational companies who created or sponsored the games, music, and videos that appealed to these children. Papert’s writings often imply that children are using their computers in a cultural vacuum, without large media players such as Nestle and Nickelodeon that have vested interests in steering children’s leisure time toward particular forms of branded consumption that benefit their corporate bottom lines. Even in Paraguay, the products of these companies were well-known, from *The Simpsons* to Michael Jackson to Coca-Cola; there are few places in the world, in fact, beyond the reach of these corporations.

While OLPC has been relatively silent on the topic of media, their more recent actions have shown that the organization’s current leadership (which, incidentally, has little overlap with its early leadership) does not fully recognize the disparity between the subversive, programming-centric laptop use that OLPC initially championed and the more lightweight, media-focused use that I witnessed and that corporations would likely encourage. For instance, in July 2011 OLPC announced an official partnership with Nickelodeon in a contest “to design multimedia about improving the environment” (Klein 2011), which won a Paraguayan girl a trip to Nickelodeon’s Halo Awards ceremony in Los Angeles, California in September 2011 (Diario staff 2011).

Though few could argue with the goal of improving the environment, Nickelodeon heavily branded the contest and undoubtedly enjoyed public-relations benefits across Latin America for what was likely little cost or effort as a result of the competition. In this way, transnational corporations can move into OLPC projects in Latin America and take advantage of this new market of young proto-consumers. Though most children in Paraguay already had access to a television and were surrounded by the music and products of media corporations before the laptop program started, XO laptops allowed unsupervised media consumption by more children, at younger ages, via avenues that their teachers and parents often sanction as educational.

### **Literacy and the legacy of OLPC**

Media-centric computer use can be problematic, and has in fact been vilified in the United States under the rhetoric of “screen time” (e.g. Guernsey 2007). Still, there is a silver lining in Paraguay. First, the reading abilities of students with laptops had improved over their peers in nearby schools without laptops. According to the results of the cognitive exam that I administered with Paraguay Educa in November 2010, there was a small, but statistically significant ( $p < 0.001$ ), improvement of 5% in third- and sixth-grade reading comprehension scores between students with laptops and students in nearby schools not in the program. The results in mathematics, on the other hand, were mixed, despite constructionism’s focus on promoting mathematical literacy. I also heard stories from teachers and teacher trainers about some students who had been held back in third grade because they could not read and write Spanish were finally motivated to learn because of the laptop program and were able to move to fourth grade, though despite asking to be introduced to these students throughout my months of fieldwork across all schools in the program, I was only able to actually locate one.

Moreover, with almost all students only having access to the Internet at school, teachers and school directors lauded the program for increasing attendance. At times I even found children sitting just outside school buildings after school hours or on weekends for Internet access. Internet access certainly did generate a lot of excitement among this group. Several private school students I interviewed in 2010 were looking forward to Phase II of the project because it meant that a school just down the street from them would have wireless Internet access, and they could go and sit outside of it to connect to the Internet much more conveniently than their more distant private school downtown. Some students asked me to tell the technicians, school officials, and project leaders to leave the school's wireless Internet access points on throughout school vacations, instead of turning them off as several schools did. When I visited Phase II schools and students excitedly asked me when their laptops would arrive, I asked them why they were so excited to receive them, and they unabashedly said to download and play games and music from the Internet – “to play!” Students were not the only ones excited by the Internet. When teachers at two of the 26 Phase II schools learned that Paraguay Educa would not be able to deliver Internet to their schools because a privately-owned hill blocked the WiMax signal, they walked out of training and had to be cajoled into coming back. “What is the point of this program if we do not have Internet?” one teacher quipped to me in an interview.

One teacher corroborated this excitement about the Internet, saying, “Students who did not come to school regularly now do, so they can get on the Internet and download games and music.” Even so, this teacher was not sure about the long-term effects of this media exposure. “Games have their place,” she explained, “but it should be a small part of their lives, so they can practice mathematics, which just is not as fun.” The portrait of laptop use described earlier in this article corroborates this concern, since the laptop was at times a distraction in the classroom. In

my classroom observations I almost always saw at least one child eschew listening to their teacher or doing schoolwork to instead surf the Internet, listen to music, or discuss with classmates the latest song, game, or video that was circulating around the school.

On the other hand, these students had much more technical proficiency than they would have otherwise. Their skill at finding content, installing software, playing media, and teaching one another – even if such proficiency was selective and possibly limited – may well translate into increased comfort with technology more generally, as smartphones and other computing devices become more affordable and popular across Paraguay. The children who are part of this program may have a similar familiarity with technology as middle-class children in the Global North – though they may not all be the programmers that OLPC envisioned, they will be among the technologically-literate. Moreover, though Paraguay's economy is still largely agrarian (Federal Research Division 2005; Hetherington 2009), Paraguayan technologists and futurists hope to develop more demand for computer skills with a shift to high-tech, though it is uncertain whether this will come to fruition.

These results echo other studies on computer use in classrooms, which often find that computer access increases student literacy and decreases truancy and attrition (Silvernail 2005; Warschauer 2008). However, these studies, and the observations and quotes described above, also suggest that there may be some limits to the benefits that computers can confer. In the end, media consumption of any kind – whether via the television, the radio, the game console, or the computer – can be a lot more fun and easy than more intellectually-challenging pursuits.

## Conclusion

Though One Laptop per Child has largely faded from public consciousness, its legacy endures. It has been nearly a decade since the One Laptop per Child (OLPC) project was publicly announced in 2005, and over forty years since OLPC's co-founder Seymour Papert was first awarded NSF funding in 1971 to pursue the dream of children learning with, and from, computers using a theory he called *constructionism*. OLPC may not have been able to distribute the hundreds of millions of laptops it had hoped for (Ames 2014) or overhaul education across the Global South (Vota 2007c), but there are still 2.5 million of their XO laptops in use around the world. OLPC is also often credited with shifting popular focus from ever-faster and higher-capacity laptops to smaller, cheaper, more durable laptops or "netbooks" (Bender et al. 2012).

Moreover, the technologically utopian vision of both constructionism and MIT's Media Lab have continued to influence generations of designers and technologists. They surface via the ongoing popularity of Seymour Papert's best-selling manifesto *Mindstorms* (1980), the famously tech-celebratory *WIRED Magazine* for which OLPC co-founder Nicholas Negroponte was a founding investor and columnist through the 1990s, idealistic tech-education conferences such as Digital Media and Learning and Interaction Design and Children where panelists and keynote speakers reference Papert as inspiration (e.g. Druin et al. 2013), and Negroponte's and Papert's final collaboration on the iconic XO laptop for One Laptop per Child. All are infused with the same enthusiastic conviction that technology, by itself, can produce radical change when put into the hands of children. Other technological interventions in education have rushed in to claim the same revolutionary potential that OLPC claimed in 2005 (e.g. Khan 2011), just as it claimed the same revolutionary potential as previous educational technologies (Tyack and Cuban 1995).

It can be easy to be seduced by this starry-eyed vision just as it can be difficult to assess the learning that actually takes place with a program like OLPC, focused as it is on learning

outside of the classroom. This paper has explored what happens to these ideals when the laptops are actually in use – when these utopian ideas are put to the test in the messy, negotiated realities of everyday life. In Paraguay, the locally-run project, Paraguay Educa, was founded with OLPC's principles in mind. The small non-governmental organization tried to promote these principles to the students and teachers who were using the laptop day-to-day. Even so, approximately two-thirds of students hardly used the laptops at all outside of the classroom, and most of the rest wanted to use the laptop as a media machine, not as a programming machine. Videogames, music, movies, Spanish song lyrics, jokes, and even pornographic images circulated from websites and on USB drives, past the school's Internet content filters and from student to student.

Though educators and parents in the United States may critique and limit consumption-oriented, media-centric computer use as “screen time” (e.g. see Guernsey 2007), and though Paraguayan teachers and parents often had mixed feelings about this consumptive focus as well, there were several aspects of this use that were considered positive locally, and would generally be considered ‘learning’ in the educational community. As we have seen, the reading abilities of students with laptops showed a small, but statistically significant, improvement over the reading abilities of students at nearby schools not in the program. Moreover, with almost all students only having access to the Internet at school, teachers and school directors lauded the program for increasing attendance, even as it increased distraction. Finally, students who engaged with the laptop generally did gain a moderate level of technical proficiency, an opportunity many of them may not have had otherwise. These results are similar to those of reasonably well-supported non-OLPC school laptop programs in the United States, where such initiatives have been extensively

studied (Warschauer, Cotten, and Ames 2011; Warschauer et al. 2004; Warschauer and Ames 2010).

Overall, media-centric computer use among children who would otherwise not have had access to computers may be the most important legacy of the OLPC project. The disconnect between OLPC's vision and Paraguay's reality may also indicate a larger shift in the meaning of computers, from the programming machines popularized in 1980s media on "hacker culture"<sup>5</sup> – the time when many of OLPC's contributors came of age or defined their careers – to their present mainstream use for media consumption. Though I do not want to suggest historical determinism, this shift also echoes the path that other technologies – from radio (Tyack and Cuban 1995; Douglas 2004; Segal 2005; Mosco 2005) to cable television (Mosco 2005) – have taken as early idealism focused on radically reshaping education and eradicating social inequalities made way for more mundane, consumer-oriented realities. Indeed, instead of helping children unlock the potential of programming to help them overhaul their country's economy as OLPC hoped and promised (Vota 2007c; Negroponte and Bender 2007; Bender 2007; Papert 2006), XO laptops have primarily connected children to music, videos, and games distributed by transnational conglomerates. Previous critiques of OLPC's ideological imperialism (Luyt 2008; Winters and Ananny 2007; Vota 2007a; Vota 2007c) have not accounted for how little the project's vision is taken up in practice, as other uses of XOs are negotiated in the classroom and in students' leisure time. In this way, children exhibited more agency in their laptop use than these technologically-determinist narratives suggested, even though the tone of engagement was set by corporate interests instead.

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<sup>5</sup> This media includes nonfiction books like *Hackers: Heroes of the Computer Revolution* by Steven Levy (1984), novels like *Neuromancer* by William Gibson (1984), and movies like *War Games* (1983).

This article has explored general use practices, which – because children owned their XO laptops and took them home – includes but is not limited to the classroom, and includes but is not limited to ‘learning’ in its myriad and contested forms. Thus, while it may contribute to the literature on laptops *in* the classroom, it sets its goals more broadly to contribute to the literature on how learning and technology use both are social and cultural processes. In detailing what children are actually doing with OLPC’s famous laptops, it also provides scholars a framework for identifying, contextualizing, and critically assessing the utopian dreams and more mundane realities that often accompany techno-educational reform projects. Drawing on both education and media studies, this research invites us to question common assumptions about what role technology plays in children’s lives, what counts as learning, and the sometimes fuzzy divide between education and entertainment – or, as the title suggests, how children learn consumption.

## References

- ABC Color staff. 2008. “El Proyecto ‘Una Laptop Por Niño’ Comenzará a Funcionar En Paraguay.” *ABC Digital*, September 25.
- Ames, Morgan G. 2013. “From MIT to Paraguay: A Critical Historical and Ethnographic Analysis of One Laptop Per Child”. Stanford University.
- . 2014. “Translating Magic: The Charisma of OLPC’s XO Laptop in Paraguay.” In *Beyond Imported Magic: Essays in Science, Technology, and Society in Latin America*, edited by Ivan da Costa Marques, Christina Holmes, and Eden Medina, 369–407. MIT Press.
- Ames, Morgan G., and Daniela K. Rosner. 2014. “From Drills to Laptops: Designing Modern Childhood Imaginaries.” *Information, Communication & Society* 17 (3) (March 16): 357–370. doi:10.1080/1369118X.2013.873067.
- Ananny, Mike. 2005. “The \$100 Laptop: Trojan Horse, Piñata or Social Movement?” *Europe*: 1–16.

- Bender, Walter. 2007. "One Laptop Per Child: Revolutionizing How the World's Children Engage in Learning."
- Bender, Walter, Charles Kane, Jody Cornish, and Neal Donahue. 2012. *Learning to Change the World: The Social Impact of One Laptop Per Child*. Palgrave Macmillan.
- Blizzard, Chris. 2006. "DOOM on the XO." *Oxdeadbeef Weblog*.  
<http://www.oxdeadbeef.com/weblog/2006/11/doom-on-the-xo/>.
- Brown, John Seely, Allan Collins, Paul Duguid, and And Others. 1989. "Situated Cognition and the Culture of Learning." *Educational Researcher* 18 (1) (January): 32–42.  
doi:10.2307/1176008.
- Burawoy, Michael. 1998. "The Extended Case Method." *Sociological Theory* 16 (1) (March): 4–33.
- Chan, Anita Say. 2014. *Networking Peripheries: Technological Futures and the Myth of Digital Universalism*. Cambridge, MA: MIT Press.
- Derndorfer, Christoph. 2010. "OLPC in Paraguay: Will ParaguayEduca's XO Laptop Deployment Success Scale?" *Education Technology Debate*. <http://edutechdebate.org/olpc-in-south-america/will-paraguayeduca-scale/>.
- Diario staff. 2011. "Alumna Del Cuarto Grado Ganó Concurso Mundial En Nickelodeon." *Diario Impresa*, September 27.
- Douglas, Susan. 2004. *Listening In: Radio and the American Imagination*. University of Minnesota Press.
- Dourish, Paul, and Genevieve Bell. 2011. *Divining a Digital Future: Mess and Mythology in Ubiquitous Computing*. Cambridge, MA: MIT Press.
- Drake, Daniel. 2010. "XO Laptop Deployment Logistics." *Dsd's Weblog*.  
<http://www.reactivated.net/weblog/archives/2009/05/xo-laptop-deployment-logistics/>.
- Druin, Allison, Edith Ackermann, Mike Eisenberg, Mitchel Resnick, and Uri Wilensky. 2013. "Closing Panel on Seymour Papert."
- Federal Research Division. 2005. "Country Profile: Paraguay."
- Gibson, William. 1984. *Neuromancer*. Ace Books.
- Guernsey, Lisa. 2007. *Into the Minds of Babes: How Screen Time Affects Children from Birth to Age Five*. Basic Books.

- Guest, Greg, Arwen Bunce, and Laura Johnson. 2006. "How Many Interviews Are Enough?: An Experiment with Data Saturation and Variability." *Field Methods* 18 (1) (February 1): 59–82. doi:10.1177/1525822X05279903.
- Hetherington, Kregg. 2009. "Privatizing the Private in Rural Paraguay: Precarious Lots and the Materiality of Rights." *American Ethnologist* 36 (2) (May): 224–241. doi:10.1111/j.1548-1425.2009.01132.x.
- Ito, Mizuko. 2009. *Engineering Play: A Cultural History of Children's Software*. Vol. 27. Cambridge: MIT Press.
- Ito, Mizuko, Sonja Baumer, Matteo Bittanti, Danah Boyd, Rachel Cody, Becky Herr-Stephenson, Heather A. Horst, et al. 2010. *Hanging Out, Messing Around, and Geeking Out: Kids Living and Learning with New Media*. MIT Press.
- Khan, Salman. 2011. "Let's Use Video to Reinvent Education." *TED Talks*.  
[http://www.ted.com/talks/salman\\_khan\\_let\\_s\\_use\\_video\\_to\\_reinvent\\_education.html](http://www.ted.com/talks/salman_khan_let_s_use_video_to_reinvent_education.html).
- Klein, SJ. 2011. "One Laptop per Child Nickelodeon Partners with OLPC on Multimedia Contest." *OLPC Website*, July 15.
- Lave, Jean, and Etienne Wenger. 1991. *Situated Learning: Legitimate Peripheral Participation*. Cambridge University Press.
- Levy, Steven. 1984. *Hackers: Heroes of the Computer Revolution*. New York, NY: Anchor Press Doubleday.
- Luyt, Brendan. 2008. "The One Laptop Per Child Project and the Negotiation of Technological Meaning." *First Monday* 13 (6).
- Marques, Ivan da Costa, Christina Holmes, and Eden Medina, ed. 2014. *Beyond Imported Magic: Science and Technology Studies in Latin America*. Boston: MIT Press.
- Mosco, Vincent. 2005. *The Digital Sublime: Myth, Power, and Cyberspace*. Cambridge, MA: MIT Press.
- Murph, Darren. 2006. "OLPC XO Caught Playing Super Mario Bros. 3." *Engadget*.  
<http://www.engadget.com/2006/12/25/olpc-xo-caught-playing-super-mario-bros-3/>.
- Negroponte, Nicholas. 2006. "No Lap Un-Topped: The Bottom Up Revolution That Could Redefine Global IT Culture."
- Negroponte, Nicholas, and Walter Bender. 2007. "The New \$100 Computer." *World Bank Group*.  
[http://www.olpctalks.com/nicholas\\_negroponte/negroponte\\_world\\_bank\\_group.html](http://www.olpctalks.com/nicholas_negroponte/negroponte_world_bank_group.html).

- OLPC staff. 2011. "Hardware Uniqueness." *OLPC Wiki*.  
[http://wiki.laptop.org/go/Hardware\\_uniqueness](http://wiki.laptop.org/go/Hardware_uniqueness).
- . 2012a. "OLPC Principles and Basic Information." *OLPC Wiki*.  
[http://wiki.laptop.org/go/OLPC\\_Principles\\_and\\_Basic\\_information](http://wiki.laptop.org/go/OLPC_Principles_and_Basic_information) .
- . 2012b. "OLPC Mission: Frequently Asked Questions." *OLPC Website*.  
<http://laptop.org/en/vision/mission/faq.shtml#faq5>.
- . 2012c. "OLPC's Vision." *OLPC Website*.  
<http://laptop.org/en/vision/mission/index2.shtml>.
- Papert, Seymour. 1980. *Mindstorms: Children, Computers, and Powerful Ideas*. Basic Books.
- . 1993. *The Children's Machine: Rethinking School in the Age of the Computer*. Basic Books.
- . 2006. "Digital Development: How the \$100 Laptop Could Change Education." *USINFO Webchat, via OLPC Talks*. US Department of State.  
[http://www.olpctalks.com/seymour\\_papert/seymour\\_papert\\_usinfo.html](http://www.olpctalks.com/seymour_papert/seymour_papert_usinfo.html).
- Papert, Seymour, and Idit Harel. 1991. "Situating Constructionism." In *Constructionism*. Ablex Publishing Company.
- Paraguay Educa staff. 2009. "Boletin Trimestral de Paraguay Educa, 2009 Verano." *Paraguay Educa Wiki*. [http://wiki.paraguayeduca.org/index.php/Boletin\\_Trimestral](http://wiki.paraguayeduca.org/index.php/Boletin_Trimestral).
- Rosner, Daniela K., and Morgan G. Ames. 2014. "Designing for Repair? Infrastructures and Materialities of Breakdown." *Proc CSCW 2014*, ACM Press.
- Segal, Howard P. 2005. *Technological Utopianism in American Culture*. Syracuse University Press.
- Silvernail, David L. 2005. "Does Maine's Middle School Laptop Program Improve Learning? A Review of Evidence to Date."
- Suchman, Lucy A. 1987. *Plans and Situated Actions: The Problem of Human-Machine Communication*. Cambridge University Press, Cambridge Cambridgeshire. Cambridge: Cambridge University Press.
- Takhteyev, Yuri. 2012. *Coding Places: Software Practice in a South American City*. Cambridge, MA: MIT Press.
- Toyama, Kentaro. 2010. "Can Technology End Poverty?" *Boston Review*.

- Tyack, David, and Larry Cuban. 1995. *Tinkering toward Utopia: A Century of Public School Reform*. Harvard University Press.
- Vota, Wayan. 2007a. "Is OLPC the Only Hope to Eliminate Poverty and Create World Peace?" *OLPC News*.  
[http://www.olpcnews.com/people/negroonte/olpc\\_poverty\\_world\\_peace.html](http://www.olpcnews.com/people/negroonte/olpc_poverty_world_peace.html).
- . 2007b. "One Pornographic Image Per Nigerian Child." *OLPC News*.  
[http://www.olpcnews.com/countries/nigeria/pornographic\\_image\\_child.html](http://www.olpcnews.com/countries/nigeria/pornographic_image_child.html).
- . 2007c. "One Laptop Per Child 'Trojan Horse' Comparison." *OLPC News*.  
[http://www.olpcnews.com/people/negroonte/laptop\\_child\\_trojan\\_horse.html](http://www.olpcnews.com/people/negroonte/laptop_child_trojan_horse.html).
- Warschauer, Mark. 2008. "Laptops and Literacy: A Multi-Site Case Study." *Pedagogies: And International Journal* 3: 52–67.
- Warschauer, Mark, and Morgan G. Ames. 2010. "Can One Laptop per Child Save the World's Poor?" *Journal of International Affairs* 64 (1): 33–51.
- Warschauer, Mark, Shelia R Cotten, and Morgan G. Ames. 2011. "One Laptop per Child Birmingham: Case Study of a Radical Experiment." *International Journal of Learning and Media* 3 (2): 61–76.
- Warschauer, Mark, David Grant, Gabriel Del Real, and Michele Rousseau. 2004. "Promoting Academic Literacy with Technology: Successful Laptop Programs in K-12 Schools." *System* 32: 525–537.
- Winters, Niall, and Mike Ananny. 2007. "Development Ideologies of the One Laptop Per Child (OLPC) Programme." *Interactive Learning Environments*.