CHAPTER 6

"Empowering the World's Poorest Children"? A Critical Examination of One Laptop per Child*

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> OLPC's mission is to empower the world's poorest children through education
>
> —OLPC Mission statement

Introduction

The worldwide implementation of educational technology is underpinned by a wide range of interests and influences located at international, national, and local levels. Rather than being a globalized and uniformly determining force, any form of "educational technology" is itself dependent upon a number of social, cultural, political, and economic interests. Of course, this is not to deny that educational technologies are associated with some significant changes in education around the world. Yet anyone wishing to understand fully the nature and outcomes of educational technologies' use has to look far beyond the technical specifications and features of specific devices and gadgets. As has been argued by a succession of critical commentators over the past 30 years, educational technology needs to be described and discussed as a set of sociotechnical arrangements (Young, 1984; Kerr, 2003; Selwyn, 2012).

Focusing on the sociotechnical characteristics of educational technology inevitably raises questions of how, why, and in whose interests these devices

and artifacts are used. In this manner, the use of digital technology in education—as with any aspect of society—is a profoundly political concern. There is a pressing need for critical scholars to attempt to look beyond the harmonious portrayals of educational technology that can often be found in popular, political, and academic discussions, and instead examine the areas of tension, contradiction, and conflict that underlie any instance of digital technology use in education. As was reasoned in the opening chapter of this book, educational technology is therefore perhaps best understood as an intense site of struggle across a number of fronts—from the allocation of resources and production of knowledge, to the maximizing of profit and political gain. As such, most of the questions that surround education and technology are the fundamental questions of education and society—that is, questions of what education is, and questions of what education should be. As the scope of these deceptively simple questions suggest, digital technologies are drawn inexorably into the global, national, and local politics of education—for better and for worse.

This chapter offers a critical reading of the politics of educational technology through a detailed examination of what many people consider to be the most significant global educational technology program of recent times. The "One Laptop per Child" initiative (OLPC) is one of the most ambitious, most publicized, and most lauded educational technology initiatives of the past 30 years. This is a program that claims to address many of the issues associated with the field of international development—not least child poverty, health, and universal access to education—yet at its heart has a universal agenda of promoting "technology-enhanced learning" across low-income and high-income contexts. Indeed, throughout the 2000s and into the 2010s, the goal of building and supplying a low-cost laptop computer for children and young people around the world has become a touchstone for progressively minded technologists and educationalists alike. Many people's faith in OLPC as a transformatory example of educational technology persists to this day. The initiative therefore offers an excellent case study through which to refine a critical sociotechnical analysis of educational technology. This chapter now goes on to examine the case of the OLPC initiative in detail—making sense of the rhetoric and the reality of one of the defining global educational technology programs of recent times.

The Technological Allure of OLPC

Many people find it difficult when discussing the OLPC initiative to look beyond the "laptop" device itself. Indeed, over the lifetime of the program

the technological artifacts at the center of the "One Laptop" initiative have inspired many different descriptions. In monetary terms, the initially proposed "$200 laptop" soon became touted as the "$100 laptop" as the expected cost of its production began to fall. During the early years of the initiative, commentators referred playfully to the "Little Green Machine" and the "Children's Computer" as word spread of the devices' striking appearance and simplicity. Yet while prompting a number of different labels, OLPC has remained based around a disarmingly straightforward concept—that is, producing a low-cost, low-specification but highly durable personal computing device that can be handed over to children and young people around the world. As with many educational technology ventures, OLPC is often considered by its advocates to be an intuitive and commonsensical idea that transcends any future debate—what many people would describe as a technological "no-brainer." As Laurie Rowell (2007, n.p.) enthused a couple of years after the public launch of the program,

> Here's an outrageous idea, what if every child in the world could have a free personal laptop? Put some e-books on it, make it web-capable, and add a palette of media tools so children could work on creative projects. Wouldn't that be incredible?

While reassuring in its tone, the homespun enthusiasm that surrounds the project often serves to overshadow the precise nature and form of the OLPC initiative. From its inception, the program has been built around a central belief in developing and distributing devices that are designed specifically to bring networked computing (and, it follows, networked learning) to populations of children and young people who are otherwise living in disadvantaged conditions. While spokespeople for OLPC have constantly reiterated the claim that theirs is ***not*** a technology project, the outstanding feature of the initiative has been the innovative and ever-changing technical specifications of its computerized devices. At present the $100 laptop is in its third incarnation—the so-called XO-3 device that was developed after the program received a grant of over US$5 million from the multinational IT manufacturer Marvell to develop a low-cost tablet device built around low-power silicon chips. The XO-3 followed on from the "XO-2"—a flip-back, touch-screen "handbook" device, which can open flat to provide a square display supportive of writing, typing, and touch-sensitive input. Both these designs, in turn, followed on from the most iconic (and still predominant) OLPC device—the original "XO" laptop. While subsequent designs may have differed in their appearance, the XO laptop continues to embody

the design principles and philosophies of the OLPC program. As such the XO remains the flagship technology of the program—especially in terms of the numbers of devices being used. Thus, before going on to consider the OLPC program in sociotechnical terms, it is important to first be clear about exactly what the XO is as a technological device.

The XO certainly stood out in terms of its appearance when introduced into the 2000s' consumer electronics marketplace. Described at the time of its launch as "a striking little green machine" (Naughton, 2005, p. 6), the XO gives the impression of being a sleek but durable child's plastic toy. Housed in rounded toughened plastic casing with a molded handle that resembled a lunch box, the most immediate qualities of the original XO were its size and color. This was a small lime-green and white device—weighing around 1.5 kilograms, and measuring little more than 22 centimeters square and 3 centimeters thick. When opened, a rubber-sealed keyboard, touch pad, and stylus were accompanied by a small pivoting display monitor. The idiosyncratic appearance of the computer was heightened by the inclusion of two extendible antenna "ears," designed to provide network connectivity to the internet as well as to other XO users within a radius of one kilometer.

Much of the initial excitement over the XO came from technology programmers and "hackers" who were drawn to this innovative technical design. Thanks largely to work from in-house developers and the Chinese "Quanta" computer company, the XO housed an impressive array of hardware features for a machine of its size and price—such as a microphone, camera, loudspeakers, "game controller" buttons, and USB and audio ports. Many of these technical features were intended to allow the XO to operate in inhospitable outdoor conditions. The laptop's keyboard, for instance, was rubber sealed and designed to be resistant to dirt and moisture. The plastic casing included built-in shock absorbers that were claimed to have been drop-tested successfully from heights of up to 15 feet. The display monitor was designed to offer low-power but high-resolution displays that altered appearance according to lighting conditions. The XO's screen could appear to be full color, pale color, or monochrome—thereby ensuring a readable display in even the brightest of conditions. Perhaps the most eye-catching components were the options for powering the XO—including windup hand-crank mechanisms and "yo-yo" pull-string power generators. These features, coupled with their nontoxic and fully recyclable design, were reckoned to make the XO computers "the most eco-green laptops that have ever been made" (Tabb, 2008, pp. 338–339).

Another technically appealing characteristic was the XO's innovative software design—in particular its reliance on open-source software and

open-architecture hardware principles. Early incarnations of the laptop ran exclusively on slimmed-down versions of the Linux operating system coupled with a newly designed software interface titled "Sugar." This interface was intended to move beyond the usual "desktop" operating system design and provide users with an abstracted spatial navigation environment that supported navigation and collaboration via four levels of viewpoint labeled "home," "friends," "neighborhood," and "activity." Later versions of the XO offered a "dual boot" system that allowed the Microsoft Windows operating system and familiar "Office" software to also be used.

In the years following its launch, the XO has been roundly praised for its appearance, aesthetics, and overall quality of design. Indeed, most aspects of the OLPC program have reflected a high level of attention to design and detail that is often not found in mainstream computer production. While the XO hardware was developed by teams of in-house designers and small independent companies, the innovative design of the Sugar interface software was outsourced to the international product-design company Pentagram. OLPC therefore joined Pentagram's illustrious client list of Timex, Nike, United Airlines, and Swatch as part of the company's commitment to carrying out pro bono work for nonprofit organizations. Even otherwise-skeptical commentators were forced to concede the design qualities of the OLPC machines. As Linda Smith Tabb reported at the time of the laptop's deployment in US urban contexts, "The machines are truly revolutionary in design and almost every possible feature has been thoughtfully planned" (Tabb, 2008, pp. 338–339).

Aside from its high standards, the technical design of the XO is a particularly important aspect of understanding OLPC in sociotechnical terms—especially with regard to the values and agendas that have shaped the project from its start. Indeed, in terms of technical design, everything that has been described so far was influenced strongly by ideological values and intent. One recurring aim of the design of the XO was to produce an engaging and playful device that would appeal especially to young users. For example, the inclusion of the mesh-network antennae ears was intended to give the laptop an animalistic appearance akin to a rabbit (as well as giving it much-needed internet connectivity). Similarly, the software interface was designed deliberately to embody a philosophy of child-centered learning—placing the individual user at the center of a familiar environment that also promoted communal activity and collaboration. In all these ways, the XO devices were the result of a great deal of thought and attention. This was certainly not a profit-making "off-the-shelf" means of increasing levels of educational technology use around the world.

Unpacking the Sociotechnical Background of OLPC

On the face of it, then, OLPC could be seen as being an educational technology project almost beyond criticism—involving an innovative and thoughtfully designed piece of technology with the laudable aim of allowing children and young people to learn regardless of social circumstance. Indeed, many people within the educational technology community have been generally supportive of the promise to "create educational opportunities for the world's poorest children" through the production of a "rugged, low-cost, low-power, connected laptop with content and software designed for collaborative, joyful, self-empowered learning" (OLPC, 2010, n.p.). It is at this point, then, that we need to take a step back from the obvious allure of OLPC as a technological concept. What should be said about OLPC beyond its good intentions and innovative design?

First, it is necessary to place the program within a historical context. While undeniably ambitious, the OLPC was not the first initiative to seek to support low-cost computing for the masses (see Pal, Patra, Nedevschi, Plauche & Pawar, 2009). Even within the commercial confines of the consumer electronics market, US computer manufacturers were developing "low-cost, low-spec" computers throughout the 1980s—notably IBM's 1984 "PC Jr" model and subsequent competitor models such as the Tandy 1000. In terms of the development of low-cost computers for low-income countries, the Indian "Simputer" project was another prominent forerunner of OLPC. This attempt to develop a "Simple Inexpensive Multilingual Computer" also resulted in the nonprofit production of low-cost, open-source handheld computers with touch-sensitive screens. The Simputer was also accompanied by similar claims to the OLPC—as one commentator stated soon after its release, "This nondescript little computer may hold the key to bringing information technology to Third World countries" (Harvey, 2002, n.p.).

Over the past 15 years, a number of low-cost technological devices have also been produced for sale in developing regions. These included the production of "ultrabasic and ultracheap" computing devices based on Linux such as the Taiwanese "ASUSTek" computer and the Chinese "Lemote" laptop. Similarly, in terms of desktop computing, OLPC follows on from programs such as Brazil's Linux-based "Computador Popular" (people's computer), the Chinese "Rural PC," the "SuperGenius" Bharat PC, and the Apna PC—all relatively cheap devices aimed at extending access to computer technology to poor communities. These efforts reflect a long-held enthusiasm within the IT industry and professional technology community to establish "one-to-one" computing around the world—marked by the founding of an international group of high-profile technologists titled

"G1:1" (in full, "Globally, One Computer for One Person"). All of these precedents therefore raise a key point of interest—why has the OLPC initiative progressed so much further than these other ventures, and with what ultimate effect? Here, then, attention needs to be moved away from the technical aspects of OLPC devices and toward the nature of OLPC as a social and political project. As we will see, the OLPC program is as much a global political initiative as it is an educational technology initiative.

The Origins of OLPC

The team of academics and technology entrepreneurs behind the OLPC initiative came to the area of educational technology with considerable experience of similar ventures. The driving force behind the initiative from its start has been Nicholas Negroponte—a high-profile technologist and academic who was one of the founding members of Massachusetts Institute of Technology's (MIT's) prestigious "MediaLab" department. Along with MIT colleagues (and subsequent OLPC figureheads) such as Seymour Papert, Negroponte had been involved in an early computing project sponsored by the French government in 1982 ("Le Centre Mondial pour l'Informatique et Ressource Humaine"), which provided Apple II computers to Senegalese schools. Although relatively unsuccessful, the idea that children in developing regions of the world could benefit from the provision of computing resources was replicated in further projects during the 1990s and 2000s—in particular the involvement of MIT and Negroponte in the provision of internet-connected laptops to small groups of children in rural Cambodia, and the larger-scale distribution of laptops to seventh-grade students throughout the US state of Maine.

These early practical projects—and much of the intellectual work that occurred at MediaLab-sponsored conferences such as the "2B1" conference in 1997—were considered to provide an adequate "proof of concept" for this notion of one-to-one educational computing, prompting Negroponte's establishment of the nonprofit organization "One Laptop per Child Association Inc." After the official announcement of the organization and its intentions in January 2005 at the World Economic Forum in Davos, Negroponte presented a working prototype of the "Children's Machine 1" at the subsequent "World Summit on the Information Society" in Tunis. The choice of this high-profile audience for the launch of a still-to-be-finalized device resulted in considerable support being given to OLPC from across the international community, not least from the UN secretary Kofi Annan. Negroponte was celebrated in the *New York Times* as "the Johnny Appleseed of the digital era" (Markoff, 2005) and—despite appearing to break the prototype during

the official launch—Kofi Annan himself welcomed the program as opening up a "new front" in the education of "the world's children."

In terms of actual production of the machines, the small-scale OLPC team worked hard during 2005 to gain formal support from other technology and media organizations—securing backing from the likes of Google, Nortel, News Corporation as well as hardware manufacturers such as AMD (Advanced Micro Devices), RedHat, and Quanta. After a further announcement at the 2006 World Economic Forum, the UN Development Program offered its formal endorsement and promised to act as a distribution agent for countries unable to purchase the minimum requirement. The actual production of the newly titled "XO" laptop then began in November 2007.

At this stage, the "business plan" for the OLPC program was a defiantly simple one. National governments that wished to participate were expected to each commit to the minimum bulk order of one million laptops. In turn, these governments would distribute the machines through their national educational networks to children and young people. In all cases, the distribution and implementation of the machines was to be conducted according to OLPC's five core principles, that is, "the kids keep the laptops, focus on early education, no-one gets left out, connection to the internet, and free to grow and adapt." Although a top-down model of state-directed distribution belied these bottom-up, open, and individually centered sentiments, the OLPC leadership viewed it as a necessary means of generating the volumes of investment needed to develop the technology. As such, only China, Brazil, Egypt, Thailand, and South Africa were considered initially to be worthwhile participants in the initiative. At this point, the OLPC program had clearly marked itself as a large-scale and politically astute social technology project—aiming to forcibly disrupt unequal patterns of access to digital technology in some of the world's largest but most deprived countries.

Initial Progress and Change

In practice, the progression of the initiative throughout the latter half of the 2000s was not as straightforward as these initial intentions would suggest. Above all, the relatively rapid introduction of the XO into the global IT marketplace of the 2000s provoked considerable criticism and resistance from other IT organizations—especially the XO's commercial competitors. This included Bill Gates's much-reported initial dismissal of the device in 2005. As Gates reasoned in a speech to a Microsoft Government Leaders' Forum, "if you are going to go have people share the computer... get a decent computer where you can actually read the text and you're not sitting there cranking the thing while you're trying to type." The XO's promise of low-cost

internet connected computing therefore attracted a diversity of opposition within and outside the technology community—from the figureheads of worldwide technology corporations to individual developers and designers.

Perhaps the most significant challenge to OLPC to this time was the decision of Intel—then the world's leading producer of microchips—to produce its own low-cost, low-specification netbook computer for educational markets in developing countries. Titled the "Classmate" PC, this laptop was designed to retail to schools and students in low-income countries for between US$199 and US$299. Over a short period of time, Negroponte was forced to move from a position of defense (initially labeling Intel's intentions as "predatory" and "hurting the mission") to a position of consolidation—announcing a formal partnership between OLPC and Intel in 2007. However, this partnership was nullified after six months, with Negroponte demanding that production of the Classmate be discontinued before the two organizations could work together any further.

After this disjuncture, the Classmate program continued with laptops being produced and sold to governments around the world in conjunction with the Taiwanese manufacturer Asus. Part of the attraction to government purchasers of the Classmate products was their inclusion of Microsoft Windows and Office software, in comparison to the OLPC initiative's preference for bespoke open-source systems. Indeed, Microsoft's introduction at this time of a US$3 "Student Innovation" package of software to be sold in developing countries marked another direct challenge to the OLPC program. Many commentators were then only partially surprised by Negroponte's subsequent decision in 2007 to offer a version of the XO laptop with the dual option of open-source software and Microsoft Windows and Office software. This decision prompted widespread dismay from many of the OLPC's supporters—including the resignation for a time of the organization's "President for Software and Content," Walter Bender. Nevertheless, it highlighted a clear willingness to compromise the OLPC philosophy and the ideals of those involved in the face of commercial market-based concerns.

Throughout this period, actual sales of the XO continued to fall short of the initiative's projected numbers—with many of the early deals that appeared to have been secured with national governments failing to be completed. Most notably, contracts with Libya for 1.2 million XO computers and for 1 million units each with Nigeria and Thailand, all fell through. In an effort to counter this trend, further changes to the OLPC business model were then introduced—in particular the introduction of the "Give 1, Get 1" (GIGI) scheme during the Christmas season of 2007. Here, North American consumers were allowed to purchase an XO computer for US$399, with this

cost covering the donation of an additional laptop to specified programs in low-income countries. As a further inducement, customers were able to have the donated computer considered as a tax-deductible charitable contribution. This subsidizing of XO donations by the North American market saw nearly 84,000 donations being made. Tellingly, a second GIGI scheme the following Christmas through the online retailer Amazon saw only 12,500 laptops being sold. Nevertheless, this renewed momentum saw XO laptops distributed to countries such as Haiti, Afghanistan, Mongolia, Ethiopia, and Vanuatu. This geographical spread of the XO continued with the sale of thousands of laptops to the New York City Department of Education, as well as the education departments of Chester County in Pennsylvania, and Birmingham Alabama. At this point, the OLPC initiative was certainly increasing its global reach, although without necessarily achieving the levels of saturation that had been promised initially.

Recent Developments

The OLPC initiative has latterly found itself continuing to be one of the most substantial—and certainly most visible—global educational technology projects of recent times. The program has continued to attract considerable amounts of support and publicity into the 2010s. The donation of XO computers were part of aid efforts in the aftermath of the 2010 Haiti earthquake, as well as being deployed into other high-profile humanitarian zones such as Iraq, Gaza, and Afghanistan. In commercial terms, the concept of the XO is considered to have hastened the emergence of the low-cost "net book" market in Western countries. Conversely, politicians have continued to laud the initiative as an example of innovative international development—to the point of calls "for the OLPC program to be designated by the UN as a new Millennium Development Goal" (Tabb, 2008, p. 337).

In this respect, the OLPC could be judged to have been one of the most successful educational technology programs of recent times. The initiative has been implemented in a number of South American countries, with governments in sub-Saharan Africa also participating. This has seen the introduction of over one million machines into Peru and Uruguay, with smaller amounts in the countries such as Ghana, Argentina, Columbia, Mexico, and Rwanda. Coupled with the machines that have been introduced through loss-leading pilot programs and the GIGI donations, this means that OLPC computers can be found in over 20 countries from Nicaragua to Nepal. The initiative has certainly prompted changes in the patterns of educational technology use in some of these countries. In Uruguay, for example, XO laptops are at the heart of the "Conectividad Educativa de Informática Básica para el Apredizaje en Lánea" (CEIBAL) initiative—reckoned to be the first national program to achieve a one-to-one ratio of primary school students to computers.

That said, these levels of adoption have failed to match the initial expectations and proclamations of Negroponte and his team. As Yujuico and Gelb (2011, p. 50) concluded, "If the criterion for success was admiration for an innovative concept, the OLPC project would be an unqualified triumph... however, if the criterion was achieving its sales goals, the project would have to be judged a failure, despite some recent glimmers of progress." For many commentators within the technology community, one key failing of the initiative has been the stabilization of the actual price-per-laptop at a level approaching US$200. Coupled with the added "financial burden" of maintenance, technical support, and other aspects of program maintenance, the OLPC devices clearly cost far above the mooted price of US$100 (Streicher-Porte et al., 2009). Yet despite these issues of price and penetration, OLPC remains a beacon project for many educational and technological commentators—seen to offer clear proof that digital technology can be an integral element of a transformative agenda in the field of international development. As de Bastion and Rolf (2008, p. 31) conclude with regard to the continued rollout of the XO machines in sub-Saharan Africa,

> As an integral part of a robust overall strategy, it is indeed correct to give children in Ethiopia a laptop... It may seem ironic to distribute emergency aid and computers at the same time, but it is one way of breaking the endless cycle of dependency. The true madness would be to underestimate the lasting value of the learning which ICT4D can additionally deliver.

Unpacking the Values of the OLPC Program

As this brief overview of its progress suggests, OLPC is certainly not a straightforward technology production and distribution program. Indeed, seen in terms of a theoretical focus on the "social shaping" of technology, the OLPC initiative is better understood as being driven at all stages of its development by a complex set of interests, values, and guiding agendas. As such, the idea of putting an XO laptop in the hands of every child in the world clearly has been—and continues to be—informed by a set of accompanying ideological interests and agendas. In this respect, OLPC is no different to all of the other examples of educational technology considered by other contributors to this book.

The notion of educational technology as an ideologically driven process is not lost on those involved in the OLPC initiative. As Nicholas Negroponte has himself reasoned, "We're not building an empire, we're building a movement" (Negroponte cited in Hamm & Smith, 2008). Thus, as Ananny and Winters (2007, p. 107) continue,

> We suggest that this and other projects be critiqued not only in terms of their technological feasibility, economic rationales or models of education but, more fundamentally, in terms of the ideologies they intend their users to enact. [Even] the OLPC's interface guidelines... serve—intentionally or otherwise—as powerful signals to policy makers, cultural critics and local communities of the particular ideologies intended to be enacted by the XO's users.

In this manner, we now need to move beyond our initial descriptions of the OLPC as a set of artifacts (e.g., the XO devices and their software designs) and as a set of practices (e.g., the design decisions of OLPC, its partnering organizations and community of open-source developers). Instead, we now need to consider the OLPC initiative as embodying a set of values, and approach the XO laptops as "sites in which designers, users, policy-makers and evangelists of all stripes perform ideology—explicitly or otherwise" (Ananny & Winters, 2007, p. 117). From this perspective, a number of different ideological assumptions can be identified as having underpinned the OLPC implementation to date.

First is the assumption that the XO laptops offer a means of achieving significant social, economic, cultural, and political change in developing regions and countries. Indeed, much of the popular appeal of the OLPC project stems from the grandiose "noble dream" (Rowell, 2007) that informs many of the initiative's actions and activities. Behind the impressive proclamations relating to "the idea that universal laptop computer use will revolutionize the world for the better" (Luyt, 2008, n.p.), lies an aggressive modernization agenda, similar to many of the educational projects in the field of "ICT4D" (Information Communication Technology for development). Indeed, much of the impetus behind the OLPC initiative stems from a belief that enhanced access to technology can lead to a range of educational, environmental, and societal-related improvements. As Nicolas Negroponte has asserted,

> The more people that are capable of rational, critical thinking, the better the world will be. The more they have access to knowledge about the rest of the world, the better the world will be. This is probably the only hope—I don't want to place too much on OLPC—but if I really have to look at sort of, how to eliminate poverty and create peace and work on the environment, I think—I can't think of a better way to do it. (Negroponte, cited in Dotsub, 2007)

As this bold statement implies, many of these societal benefits are seen as achievable through the stimulation and support of technology-enhanced learning directly and indirectly. In this manner, OLPC is built deliberately around a context-free "liberation-from" model of social change. As Kullman and Lee (2012, p. 47) observe, "For the developers of OLPC, capability and liberation are achievable through increasing the ability of individual children to safely ignore and transcend their immediate circumstances." Such is this conviction that there has been increasingly frenzied rhetoric of securing the distribution of OLPC devices to children regardless of their circumstance, with Negroponte even making the proposal at the Social Innovation Summit in New York for a mass air-drop of tablet computers into remote villages from helicopters (Bajak, 2012)

Alongside this unshakable faith in the primacy of individual agentic action, it is also important to note that the XO laptop has been built around a very specific set of assumptions about education and learning. From its start, OLPC has been positioned deliberately around a set of social-constructivist learning principles common to most MIT MediaLab projects. Here the initial involvement of the prominent MIT professor Seymour Papert in OLPC is an important factor in understanding the values underpinning the program. Papert's well-known refinement of social-constructivist learning theory into the notion of "constructionism" during the 1970s and 1980s provides a clear underpinning principle for the technological and pedagogical design of the XO laptops. Through constructionism Papert proposed that learning best takes place when individuals are engaged in socially rich informal learning environments where they can create computational objects and systems that act as concrete representations of their cognitive development. As such, constructivist principles have been explicitly "built-in" to most aspects of the XO design—from the Sugar interface to the anthropomorphic network antennae. Indeed, the early label of the Children's Machine 1 for the XO laptop deliberately referred back to Papert's 1996 book on constructionism and computers entitled "The Children's Machine."

Allied to these beliefs in learner centeredness is a guiding value throughout OLPC of networked individualism and a belief in the self-determining power of the individual. Indeed, the constructionist ethos is built around an individualized notion of learning—with the individual learner

responsible for coordinating and directing his or her own educational experiences. This philosophy is reflected, for example, in the positioning of the OLPC initiative around "a particular model of children as agents of change and networks as the mechanisms of change" (Ananny & Winters, 2007, p. 107). Politically, then, the OLPC initiative moves beyond supporting the increased engagement of individuals with learning, to wider issues of supporting individuals in taking complete control of the process of education. Thus, as Michael Klebl observes, the OLPC initiative does not seek to support change through the enhancement of education systems or education institutions—"instead of traditional methods for improving an educational system like building schools, spreading textbooks, reforming the curriculum or educating teachers, self-determination of the children themselves is at the midst of this educational reform, leveraged by a technical device" (Klebl, 2008, p. 280). As such, it is unsurprising that the initiative has been increasingly presented as an "educator-free" model of learning—as Negroponte was recently quoted as arguing,

> There are about 100 million kids without schools, without access to literate adults, and I would like to explore a way to get tablets to them in a manner that does not need "educators" to go to the village. (Negroponte, cited in Bajak, 2012, n.p)

Of course, a belief in individualized self-empowerment has long run throughout the field of educational technology, reflecting an implicit (and sometimes unconscious) "romantic individualism" among many technologists that positions individual technology users as "inherently expressive and self-transforming" (Luyt, 2008). Yet there is also a clear anti-institutional element to the OLPC philosophy that is less common to other educational technology projects and programs. Despite relying on national school systems to facilitate the distribution of XO laptops to children and young people, there is a distinct antischool sentiment to the OLPC project. As Laurie Rowell (2007, n.p) reported at the time of production of the first incarnation of the XO laptop,

> Walter Bender has been clear in saying that education could benefit from a paradigm that allows more critical evaluation from people at all levels, and he's frank in suggesting that the traditional school hierarchy is a barrier to quality improvement. In his words, the education community, because of the way school and (perhaps more significantly) school systems are structured typically top down, tends to suppress the spread of best practice as it is developed bottom-up in the classroom.

While concerned with wider social issues such as the deinstitutionalization of education, a further set of philosophies that have underpinned the OLPC initiative since its inception are more explicitly technologically driven—what Andrew Brown (2009, p. 1152) has labeled "the fetishizing of technology, and the pursuit of access as a social project in and of itself." These values were perhaps best expressed by one of the early slogans adopted by the community of programmers responsible for the initial development of the XO. Thus it was stated succinctly, "Not every child in the world has a laptop. This is a bug. We're fixing it" (cited in Klebl, 2008, p. 280). As this melding of programming logic and social welfare suggests, the OLPC initiative has gained considerable momentum from its positioning as a collective effort on behalf of the technology community to develop technically sophisticated and exciting machines. This is noticeably the case in the high-profile alignment of the XO devices with open-source principles. Of course, the notion that the XO hardware and software is "open" to user reconfiguration and improvement chimes with the constructionist and constructivist learning theories outlined previously. Yet the open-source label has also been valuable in giving the XO a technologically "cool" cache that some critics argue has gone some way to obscuring—or even overcoming—any criticism of the devices' clear technical limitations. As Brown (2009, p. 1168) concludes, "Though it is claimed that this is an education not a technology project, the development of the laptop, rather than the principles of its use, have been to the fore."

Of course, this "core" philosophy of following open-source principles belies the OLPC program's almost ruthless commercial and political pragmatism when it has come to achieving its aims. As described above, the history of the OLPC initiative has been characterized by an ability to broker deals and partnerships with previously conflicting interests and organizations. This can be seen in successive arrangements with commercially hostile organizations such as Intel and Microsoft, as well as the maintenance of partnerships with supranational and intergovernmental organizations such as the World Bank and the United Nations, alongside corporate partners such as Google, Amazon, Citigroup, and eBay. At the time of writing, plans to partner with the Walmart supermarket chain were being mooted by the OLPC management team. As such, a clear philosophy of political adaptability and pragmatism runs throughout many of the OLPC team's actions. As Nicolas Negroponte reasoned when defending the decision to offer a dual open-source/Microsoft product, "It's like Greenpeace cutting a deal with Exxon. You're sleeping with the enemy, but you do it" (cited in Hamm & Smith, 2008).

OLPC: Toward a Critical Perspective

The scale of these ambitions—and the aggressive and often self-important manner in which they have been pursued over the past ten years—has understandably begun to attract a burgeoning critical commentary. Yet it is telling that popular discussion of OLPC has, for the most part, taken place in an empirical vacuum. Despite some hagiographic "evaluation" and "assessment" studies, there has been little tangible evidence of sustained effectiveness and outcomes. The few independent studies that have been conducted of XO implementation have raised doubts of any substantial changes taking place in situ. As the authors of one evaluation of the OLPC implementation in South America concluded,

> Our interviews and observations in Paraguay suggest that XO use there is stratified, with a minority of youth making use of the XOs in creative and cognitively challenging ways, and a majority using them only for simpler forms of games and entertainment. We also found that the children who are already most privileged socially and economically tend to make use of the XOs most creatively. Thus, independent XO use by children might exacerbate divides rather than overcome them. (Warschauer & Ames, 2010, p. 44)

This lack of empirical "evidence" stems, in part, from the OLPC program's dismissive stance against the need for evaluations and pilot studies to be conducted. As Nicholas Negroponte reasoned in a 2009 speech entitled "Lessons Learned and Future Challenges,"

> I'd like you to imagine that I told you "I have a technology that is going to change the quality of life." And then I tell you, "Really the right thing to do is to set up a pilot project to test my technology. And then the second thing to do is, once the pilot has been running for some period of time, is to go and measure very carefully the benefits of that technology." And then I am to tell you what we are going to do is very scientifically evaluate this technology, with control groups—giving it to some, giving it to others. This all is very reasonable until I tell you the technology is electricity, and you say, "Wait, you don't have to do that." But you don't have to do that with laptops and learning either. The fact that somebody in the room would say the impact is unclear is to me amazing—unbelievably amazing.

It could be argued that Negroponte's bullishness reflects an imperviousness to criticism that leaders of large-scale global projects undoubtedly require to succeed. Indeed, a strong conviction and sense of righteousness pervades much of the commentary that surrounds OLPC. Yet as even its most ardent supporters acknowledge, the enormity of the project has left the OLPC program falling short of its much-publicized ambitions. For example, while the initial stated target of the Australian OLPC program was the provision of 400,000 laptops to children in remote regions, the actual delivery achieved since January 2008 has been closer to 5,000 machines. Through instances such as this, OLPC has begun to attract growing criticism in contrast to the initial wave of positive support and enthusiasm. Indeed, the XO laptop itself was reported by the *New York Times* to now be regarded by some sectors of the NGO community as "the emblem of the failure of technology to achieve change for the better" (Strom, 2010, n.p.). The suggestion can be made, therefore, that the OLPC initiative has been thwarted by a set of mitigating issues that face any large-scale educational technology program. These issues are therefore worth considering in more detail if we are to extend the example of OLPC to other examples of educational technology around the world.

First is the contention that the XO devices and the wider ambitions of the OLPC program are simply inappropriate for the contexts in which they are being implemented. In particular it is argued that the XO machines have been "designed in a lab-centric rather than need-oriented paradigm," therefore failing to fit with the realities of the developing countries and poor regions where they are being implemented (Pal et al., 2009, p. 61). It certainly could be argued that the OLPC initiative is founded upon exaggerated expectations of the vitality of laptop computing outside of the developed world. As John Naughton (2005, p. 6) has argued, distribution of XO devices to communities in sub-Saharan Africa raises significant questions of appropriateness, not least "whether the folks who wrote it have any understanding of what it's like to live in a society where the average income is less than $2 a day and the notion of children's rights is as theoretical as time travel."

Taking these concerns further, it has been reasoned that machines worth upward of US$200 are of considerable value in most of the countries where they are being delivered. From a practical perspective, this has prompted a reticence among some children, young people, and teachers to use the devices in fear of damaging or breaking them. As Warschauer and Ames (2010) found, some communities of XO users have also encountered difficulties in meeting the costs of running the machines and then ensuring the provision and maintenance of basic infrastructure. Another salient issue along these lines is that many children are simply unreliable

"owners" of laptop computers. As Warschauaer, Cotton, and Ames (2011, p. 71) observed,

> When children own their own laptops and are responsible for maintaining them, over time many of them break down and go unrepaired. Moreover, the poorest children and families are most likely to be unable to repair their laptops. This results in a situation, confirmed by our classroom observations, in which large numbers of students do not have working laptops.

Indeed, in many different contexts the XO machines have proved difficult to repair and to find replacement parts. In practice, some of the key components of the XO-1 laptop (such as the rubber membrane keyboards) have been found to quickly wear out and render the machines useless. Studies of the OLPC projects in New York City and Alabama found that large numbers of laptops were broken or otherwise unusable within the first 20 months of implementation. Similarly, in Uruguay it was reported that more than half of the XO machines that were out of commission were determined to be unusable due to breakage. As Warschauer and Ames (2010, p. 41) continue, "Earlier, Papert claimed that 'an eight-year-old is capable of doing 90 per cent of tech support and a 12-year-old 100 per cent.' This may well be true in theory, but in practice large numbers of XOs go unrepaired."

A set of concerns is also emerging with regard to the "goodness-of-fit" between the OLPC program and the school contexts within which the laptops are being deployed. One case study of XO laptops in Indian schools, for example, reported challenges ranging from infrastructural issues relating to reliable power supplies and keeping laptops charged, to the lack of structured support for teachers. It also highlighted the shaping of the laptop use around the existing micropolitics of school time, school ownership of resources, preferences for teacher surveillance, and paired (rather than individual) working patterns (Padmanabhan & Wise, 2012). As another investigation of laptop use in Peru found, students already familiar with video games were largely disinterested in the "foreign experiences" of the XO laptops, while many teachers perceived the devices to conflict with their preexisting arrangements. As such, these researchers concluded, the OLPC devices did not appear to fit with students' or teachers' contexts—"this particular sociotechnical system evidently arrived without any strategy for embedding itself in the daily practices of a different set of agents" (Villanueva-Mansilla & Olivera, 2012, p. 185).

These practical technical limitations are compounded by a set of wider moral issues—not least the appropriateness of directing funding and resources

toward what is essentially a global educational technology experiment. As Andrew Brown (2009, p. 1152) concludes, "With even small amounts of money able to make a distinct difference to life chances in desperately poor parts of the world, through, for instance the provision of fresh water and vital medication, this effort is misplaced." These criticisms are especially acute with regard to the "goodness-of-fit" between the OLPC program and the nature of education systems in developing nations. For instance, as Larry Cuban observed, many of the guiding philosophies behind OLPC could be considered to be "naïve and innocent about the reality of formal schooling" (cited in Markoff, 2006). The educational and pedagogical merits of the OLPC philosophy have therefore been challenged from a number of perspectives—not least the lack of testing and research into the educational assumptions that underpin the initiative. For instance, the philosophy of not encouraging the sharing of resources within communities has been criticized in terms of restricting any benefits of the program to a minority of children and young people (James, 2011). More broadly, as John Naughton (2005, p. 6) queried at the launch of the program,

> It is an article of faith that giving kids computers is a way of aiding their learning... [The OLPC initiative] is thus rather grandly contemptuous of mundane questions such as whether there is any evidence that giving kids computers is educationally better than giving them books, hiring more teachers or building more schools—or even paying families to send their kids to school. For Papert—and his MIT colleagues—technology seems to be the answer, no matter what the question.

Clear divisions can therefore be traced between the OLPC program and the educational systems that they seek to initially work within but ultimately intend to then work around. In particular, it could be argued that the OLPC initiative suffers from a conceptual tension in viewing individual children as the principal sites of change while also using the principal mechanism of change as the networked structures of national school systems (Ananny & Winters, 2007). Indeed, the deliberately provocative strategy of giving laptops to individual children and young people has prompted considerable unease among those with vested interests in the continuation of formal educational institutions. As the general secretary of the Peruvian "Unified Union of Education Workers" was reported to argue, "These laptops are not part of a comprehensive educational, pedagogical project, and their usefulness is debatable" (Luis Munoz Alvarado cited in Hamm & Smith, 2008).

Of course, the story of OLPC "is not simply about the failure of good intentions via inadequate design" (Philip, Irani & Dourish, 2012, p. 4)—this

is as much a story of the politics of global education reform as it is about the development and implementation of the OLPC digital devices. First and foremost, the ambition of OLPC to import (and many would argue impose) a homogenous set of "other" principles and values into a diverse range of countries and contexts around the world has raised concerns over the program's cultural insensitivity and neocolonialist approach. As Andrea Chan (2012) argues, OLPC typifies the "universalist" underpinnings of contemporary digital technology that allows a vision for digital connection generated by cosmopolitan techno-elite, to speak for and represent the "global" rest. For some critics, then, the OLPC program is an extension of earlier colonialist interventions into the regions of South America and sub-Saharan Africa. As technologist Guido van Possum has argued, "I have thought for a while that sending laptops to developing countries is simply the twenty-first century equivalent of sending Bibles to the colonies" (cited in Brabazon, 2010). In particular, the "one-size-fits-all" model of OLPC in terms of technology, pedagogy, and business has been widely criticized. As Allen (2012, p. 207) concludes, OLPC "is entrenched in Western values and ideals and thus influences developing countries and the Indigenous communities within those developing communities in a culturally negative way." While extreme, these criticisms are reflected in practical aspects of XO use in local contexts—in particular the OLPC model of open-source development of diverse "local" content. As Linda Smith Tabb (2008, p. 347) observes,

> Since most of the translators for the project are volunteers, it seems improbable that all of the various languages will be able to be used for the XO laptops. This is a concern even in countries such as Haiti—where Kreyol Aiysyen co-exists with French—and the Andes of Peru—where Quechua co-exists with Spanish—where linguistic recolonisation is at risk if laptops do not enable use of either language. In these cases, the Green Machine does not so much threaten Americanization, but cultural absorption by polities of larger scale in closer proximity.

Echoing the concerns of Hall (in ch. 9 of this book), strong criticisms can also be made of the largely obscured issues of exploitation and domination that underpin the OLPC model. In particular, the aggressive posturing over the reduction of the price of the device to the level of US$100 and the popular promotion of the programmers, marketers, and users of the XO as "heroic actors" obscures a number of issues of exploitation that lie beneath the popular promotion of the heroic actors of the project. Most notable among this exploitation is the reliance of the project on "the standing reserves of feminized Asian labor that manufactures the XO laptop" (Philip et al., 2012, p. 11).

One final criticism is a misplaced confidence in the ability of a global technology project such as the OLPC to be free from political influence and interference while still dealing with national governments and multinational corporations. From the perspective of the OLPC leadership, the decision to focus the program on state educational systems was largely strategic and self-serving. Indeed, it has been acknowledged that focusing the OLPC program in terms of education and learning has been a convenient means of "translating" the XO laptop "into ways that fit with the mission" of the governments and state bureaucracies that the OLPC team needed to work with in order to achieve maximum coverage (see Luyt 2008). Indeed, Negroponte (2007) has been explicit in the role of notion of the "educational" $100 laptop as a "Trojan Horse" tactic to get the technology into the hands of children and young people.

Yet in taking this pathway, OLPC has shown a considerable lack of political realism in its dealings with national governments and multinational corporations. As has been suggested throughout this chapter, from its inception onward the OLPC initiative has been mired in the politics of international relations and of international commerce. Since its launch, the OLPC leadership has failed to find political ways of countering the continued reluctance of governments willing to commit to the required mass orders of machines. As one commentator observed four years after the high-profile launch of the initiative, "after years of deal-making and political machinations, it is still only making relatively slow progress" (Johnson, 2009, p. 5). This political intransigence was illustrated with the deployment of XO machines to Iraq in the aftermath of the second Gulf war. Although much heralded at the time as an instance of OLPC bringing technology and education to otherwise deprived contexts, in reality Iraqi use of the XO laptops was minimal. As Warschauer and Ames (2010, p. 36) note, "The U.S. government bought 8080 XOs for donation to Iraq, but they never reached children's hands; half were auctioned off to a businessman in Basra for $10.88 each and half are unaccounted for."

Of course, political intransigence and compromise is part and parcel of international relations. Yet as far as the OLPC team seems concerned, these barriers have been mostly unexpected. As Negroponte conceded in 2007, "I have to some degree underestimated the difference between shaking the hand of a head of state and having a check written, and, yes, it has been a disappointment." As Linda Smith Tabb (2008, p. 339) reasoned in response,

> What is most striking about his statement, besides the obvious arrogance it takes to assume that a deal with a head of state could be so easily facilitated, is the disregard for the speed of a liberal democratic process, which is usually very slow. The main type of leader who might be able to

make good, and fast, would be one not interested in a completely democratic process of decision making and consensus building. So, in Latin America, the traditional home of the caudillo, decisions seem to be made at a much swifter pace than in the rest of the world. The campaign at this juncture could have been renamed "Una Computadora por Niño."

These are certainly harsh criticisms. Yet the ease with which the OLPC program brokered deals with world leaders such as former president Tabaré Vázquez of Uruguay, former president Gaddafi of Libya, and former president Olusegun Obasanjo of Nigeria certainly suggests a political expediency (and possible lack of concern for ethical and moral consistency) when pursuing the aim of getting the XO laptops into the hands of schoolchildren.

The political complexity of the OLPC program's dealings with national governments is illustrated by the ongoing failure of the initiative to be adopted in India. Despite placing a great deal of emphasis on the need to establish the program in the country (Negroponte was once quoted as saying, "India is the largest market for us, and I had to be there"), there have been numerous public denouncements from the Indian government to the advances of the OLPC team. Government officials argued in 2006, for example, that "India must not allow itself to be used for experimentation with children in this area" (Mukul, 2006). Sudeep Banerjee, head of the Indian Ministry of Human Resources Development, branded the idea "pedagogically suspect," and suggested that "classrooms and teachers were more urgently needed than fancy tools." As another official from the Human Resource Development Ministry concluded, "It would be impossible to justify an expenditure of this scale on a debatable scheme when public funds continue to be in inadequate supply for well-established needs" (Mukul, 2006).

Such reactions are not attributable solely to a skepticism among Indian politicians about the social and educational merits of the XO laptops, but also reflect a general wariness of grand technological solutions from external Western organizations. Notably, OLPC undoubtedly suffered from Negroponte's prominent involvement in a previous project to establish a satellite "MIT Media Lab Asia" in India, which ceased despite significant amounts of initial funding from the Indian government. Also significant has been the Indian government's desire to convey its political ambitions to be seen as an emerging superpower capable of supporting its own technology projects. As the Human Resource Development minister stated at the launch of a proposed Indian-built US$35 tablet computer, "The solutions for tomorrow will emerge from India" (Kapil Sibal, cited in BBC News 2010).[1] Against this local political context, the assumed global appeal of the OLPC program has understandably failed to take hold.

Conclusions

The case of OLPC encompasses a complex knot of issues and agendas—connecting design issues with matters of social justice on a global scale, alongside cultural assumptions about "development" and the role of technology in effecting social change (Kullman & Lee, 2012). All the criticisms of the program outlined during the latter sections of this chapter should not detract from the many positive outcomes that have certainly arisen from the OLPC initiative so far. These include the foregrounding of the issue of low-cost computing onto the global political stage, as well as the many considerable advances in the technical development of low-cost computing components that have derived from the development of the XO devices. Yet, as Warschauer and Ames (2010, p. 46) note, "There are important differences between a research-oriented development effort and a large-scale international campaign involving the production, distribution and use of millions of educational computers." It is here that the gulf between the grand ambitions of the educational technology community and the realpolitik of world economics and world politics are laid bare. Through its consideration of the OLPC initiative as more than a well-designed and well-intentioned technological device, this chapter has been able to further explore some of the key themes that have underpinned the increased digitization of education over the past three decades or so—not least issues of power, politics, and ideology.

From even this brief discussion of the program, the complexities of OLPC are obvious. What might appear at first glance to be an innovative and ambitious educational initiative has in fact been shaped by a number of mitigating factors. These include the professional backgrounds and beliefs of its founders; the educational, economic, and ecological values driving the design of technology hardware and software; and the complications of intervening in commercial markets and "selling" not-for-profit technologies to state purchasers. As such, this chapter offers a rich account of the politics of educational technology. What may appear to be an uncontroversial international development project has, in practice, proved to be a site for a number of ideological conflicts. These conflicts include the privileging of the assumed power of individual actors and market forces over the governance of national governments, as well as the deinstitutionalization of public services such as schools and schooling. Far from being a benign force for "good," the OLPC "mission" of putting low-cost, brightly colored digital devices "into the hands of children" has been driven by complex political struggles and conflicts. As such, OLPC highlights a number of salient issues that should be taken forward into general discussions of the politics of education and technology.

First and foremost, the OLPC program highlights the need to balance any focus on the design and development of technology with consideration of social, political, cultural, and economic contexts within which technology use takes place. It could be argued that many of the "unexpected" setbacks now being faced by OLPC implementation in various local contexts relate back to the overtly technicist nature of the project and the excessive faith put into the XO technology itself. Indeed, beyond the understandable criticism of the OLPC program that "the hackers took over" (Edith Ackermann, cited in Hamm & Smith, 2008), lies a willingness among many people within the educational technology community—not least Negroponte himself—to approach the social issues that are supposedly being addressed through technology programs in largely technical terms. In particular, many of the OLPC actions appear to have been informed by a prevailing view of social change as a form of programming-orientated problem—that is, as a logical series of "bugs" in a system that need to be fixed. As Michael Klebl (2008, p. 280) reasons, OLPC therefore could be said to "represent an interpretation of educational expansion solely as a technical issue to be solved like a programming mistake. An inexpensive, connected, and robust laptop personally owned by every child provides the ability to learn and progress, especially for children in developing countries."

Above all, then, OLPC stands as another reminder of the tensions between global technology solutions and local contexts of implementation. Despite the technical elegance and apparent political simplicity of the OLPC business plan, it would seem that no amount of charismatic leadership, strategic lobbying, and technological sophistication can impose globalized change and transformation onto whole societies or national education systems. Perhaps most importantly, OLPC reminds us that "there is no such thing as 'actor-free' dissemination or reception, lending or borrowing, export or import" (Tabb, 2008, p. 345). As with all the examples of educational technology discussed in this book, the grand global ambitions of OLPC are entwined with the mundane realities of the local educational settings and contexts in which they seek to be located (see also Cervantes, Warschauer, Nardi & Sambasivan, 2011). It is this thought—above all others—that needs to be taken forward as a basis of any attempt to advance the field of educational technology toward more equitable ends.

Notes

*This is a revised and updated version of "One Laptop per Child: A Critical Analysis"—Chapter 7 (pp. 127–146) in N. Selwyn (2013), *Education in a Digital World*, London, Routledge. The author would like to thank the original publishers for their permission to republish this work.

1. The Indian US$35-tablet scheme is itself an interesting case study of the complex politics of high-tech "big-gesture" programs. Eventually settling on a US$50-Android-powered tablet manufactured in China, the program has been marred by criticisms of business mismanagement and unrealized targets, with serious doubts being raised over the viability of the project (Raina, Austen & Timmins, 2012).