Free Laptops:
Creating, Producing, and Sharing a Revolution

Jonah Bossewitch
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Prof. Todd Gitlin
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Buried deep within the system developer's corner of the One Laptop Per Child's public wiki site is a terse section at the bottom of a page with instructions for applying to their developer program. In September 2006 I sent an email to the project on behalf of my employer, Columbia's Center for New Media Teaching and Learning, detailing our plans for the machine – what we hoped to learn from the hardware, and how we intended to participate and contribute back to the project. I never received a reply, but a week later a mysterious Federal Express box arrived at my office, originating from a distribution center somewhere in Florida.

Inside the package was an unmarked brown cardboard box containing a bare printed-circuit test board in a static-proof baggie, a pair of stubby wifi antennae, and a power supply brick. The package did not include a welcome letter, documentation or glossy orientation materials. The only piece of paper included was a diagram showing where to affix little plastic feet to the circuit board. The OLPC website had tried to prepare me for what to expect, but the unmediated and unguided quality of the experience was still striking and memorable.

The OLPC chairman Nicholas Negroponte often emphasizes "It's an education project, not a laptop project." The process of applying to the developer program provided me with a glimpse of the kind of education that Negroponte and his team have in mind and the kinds of learning activities that the OLPC laptop is designed to support.

My experience with the developer program was like a hazing ritual – one which indoctrinates participants with a "do it yourself" attitude realized at every layer of interaction with this project. From the scavenger hunt for clues necessary to request a board to figuring out from the community-generated documentation how to bring up the environment once it arrived, the project implicitly reinforced a strong ethos of individual responsibility tempered by civic collaboration and cemented with community bonds. This balance has been cultivated and honed over the years within free software communities and is closely aligned with the pedagogical perspectives of the OLPC founders. The OLPC experience is not about help desks or support centers, it is about empowerment, creativity, productivity, sharing.

Pedagogical Roots

The OLPC founders, many of whom continue to hold professorial appointments at the MIT Media Lab, are longtime proponents of the constructionist learning theory. Seymour Papert, an advisor to the OLPC and a student of Jean Piaget developed this theory of learning in the late 1950s. Constructionism, a direct descendant of Jean Piaget's constructivism, promotes learning by making and doing, especially through the conscious construction of public entities actualized in particular contexts. Individuals are encouraged to construct meaning for themselves through the progressive internalization of action, as opposed to passively receiving and memorizing information fed to them off a silver spoon.

The laptop project is designed to facilitate learning in a constructionist style (i.e. learning how to learn) and the entire project is systematically structured in ways which reflect this approach.

Papert was recently a guest on a webchat hosted by the US Department of State where the topic was "How the OLPC Could Change Education". In one of his replies he said "I believe that school is an unnatural way for learning. I believe that natural learning is what happens before school and after school. But there are many things that can't be learned in the environment of the home. School became necessary because some things are not imbedded in the culture of our daily lives so children cannot learn them."

The OLPC is an educational project, but not in the sense which most educators and politicians ordinarily imagine. Negroponte is invoking a more venerable sense of education, knowledge of oneself, of justice, and of the Good, rather than just enough reading, writing, and arithmetic so that no child is left behind. Furthermore, one of the project's premises is that "learning and high-quality education for all is essential to provide a fair, equitable, economically and socially viable society." Papert's remarks suggest an ambition to reintroduce educational opportunities back into the fabric and culture of daily life. From this perspective, the OLPC can be seen as a cultural initiative, or more accurately, a structure for introducing cultural changes to the inert and stilted 20th century educational system.

Unlike teacher preparation programs and school system infrastructure projects the OLPC effort is not necessarily about enhancing any existing curricular context. Rather it is intended to provoke an entirely different style of learning – one which respects the individual and the importance of their personal relationships. Their idea of study more closely resembles play than modern homework exercises. Crucially, this learning is situated within a social setting, and the laptop as a communications device is meant to enable people to work together, help each other, and share their understanding and knowledge.

To this end the OLPC laptop incorporates an innovative networking capability which does not exist on any other consumer platform. OLPC laptops will automatically form a wireless mesh network with other OLPC laptops in the vicinity, whether or not there is an Internet connection available. Even when the lid is closed and the main processor sleeps, the wireless equipment continues to operate, routing packets all through the night.

The user interfaces and the underlying metaphors of the past few decades of desktop computing (folders and files) have been reworked to reflect these shifts in educational ideology. On the OLPC "applications" are called "activities", the "filesystem" is called a "journal" (a record of things *done*, not things *saved*), and the "desktop" is called a "neighborhood", providing easy access to views of the learner, their friends, and other users nearby. "Presence", an indication of other learners simultaneously connected to the mesh, is a low-level service provided by

the OLPC operating system that is always available for any activity to engage. This is possible since the mesh is a permanent fixture. Collaboration is implicit in this environment, and invitations can easily be extended to friends to join activities underway.

As Eben Moglen, Columbia University Law Professor and founder of the Software Freedom Law Center explains, "It keeps the mesh. The village is the mesh, when the kids have green or purple or orange boxes. And all you need is a downspout somewhere and the village is on the net. And, when the village is on the net, everyone is a producer of something -- services, knowledge, culture, art... YouTube TV?"

Ambassadors of Freedom

Technology projects like the OLPC are often misunderstood by focusing exclusively on their underlying technological platform. A better representation comes from considering the larger ecology in which the platform is embedded. As Paul Everitt, founder of ZEA Partners and executive director of the Plone Foundation phrases it "The software is an artifact of the community." A fuller elaboration of a technology project's ecology takes into account the platform, the community, and the processes that bind them together. This ecological model of technological projects incorporates the dynamic lifecycle of the project over time, and provides insight into how a project might behave under complex, unanticipated circumstances.

In the case of the OLPC, the platform is the laptop itself, comprised of the hardware and the software which runs on it. The platform presents specific affordances to the users, many in the form of innovations and decisions that the OLPC community decided to incorporate into it. The community includes (1) the various individuals and organizations, companies and universities participating in the development of the platform (2) the governments and educators who are negotiating with OLPC to bring the laptop to their countries and soon, (3) the students and teachers in the partnering countries who will use these devices. These diverse communities of participants are connected to each other through formal and informal structures and processes ranging from legal entities and contracts to technically mediated mailing lists and collaborative cyberspaces.

The OLPC project did not attempt to single-handedly create the rules and processes which constitute this ecological model. Instead, they built upon the edifice of the free software movement, using many of the tools and practices found within those projects to infuse their project with the flavor of the culture they were hoping to spread.

The alliance between OLPC and the culture of Free and Open Source Software (FOSS) was completely natural since the guiding principles and ideals behind FOSS development can be understood as constructionist in personality and practice. FOSS projects have repeatedly demonstrated a commitment to

creativity and sharing and a strong tradition of learning by doing. The very nature of engagement within these projects is constructionist in character, with individual and institutional learning occurring through iterative creating, publishing, and sharing.

FOSS ecologies have been a breeding ground for experimenting with various models of structure and governance which promote constructionist learning within the community. Since writing software is an act of creative expression, it is predictable that the artifacts created by a software community capture the values of that community through the inclusion (and omission) of features and metaphors in the software they create.

"Eating your own dogfood" is a popular saying in the technology sector that is used to describe a project that consumes its own product. FOSS projects regularly consume other FOSS products, creating a feedback loop that reinforces the processes and values understood by those communities. The software that manages code repositories and bug-tracking systems incorporates styles of collaboration, decision making, and conflict resolution which percolate throughout the community as a whole. Cultural practices around mailing lists and group chats bring together the people with ideas and the people who can act on them. Wikis and self-organized conferences encourage autonomously motivated action and peer-production, not usually in response to authority or hierarchy. FOSS projects are organized for community and access to knowledge, not market-driven production and selling. Their tools embody and reflect these priorities. You could say that they eat their own dogfood on process, and that they are what they eat.

The New York Times initially reported that due to cost OLPC opted for a variant of the freely licensed GNU/Linux operating system rather than Microsoft Windows. Later the Times issued a correction from Negroponte saying that the groups failed to reach an agreement over licensing terms, not price. The correction is fundamental to understanding the goals of the project, as public access to knowledge is non-negotiable, and software is an important form of knowledge. OLPC has recently announced that their keyboard will include a "view source" button, adorned with the icon of a gear, which will allow learners to instantly view the underlying layer powering the activity in which they are engaged in. An operating system whose source code is locked behind proprietary gates, even if it is provided free of charge, contradicts the project's constructionist educational philosophy and is entirely inconsistent with their worldview.

Majestic Moments

Moglen has claimed that the OLPC project represents "a great moment in human technological history." He sees the project as a means to consolidate the strategic gains of the free software/free culture movements. In his view the project demonstrates the ability of these movements to "reorient power in the larger traditional economy" as well as the ability to "change the infrastructure of social

life. That OLPC is every textbook on earth. That OLPC is a free MIT education. That OLPC is a hand-powered, thick-mesh, router."

In some respects Moglen has already been proven correct. The innovative non-toxic, low-power, dual-mode (black/white and full color) display would not have gone into production if it were not for the OLPC. The industry manufacturers had been targeting high-resolution, high-contrast displays with little concern for energy consumption or child safety. However, the prospect of orders to the tune of tens of millions of units, quickly reoriented their strategic direction.

But how can we be confident that the OLPC will result in positive changes to the social infrastructure where it is deployed? Perhaps it will merely capture and export the worst features of our society. Will children's innate curiosity motivate them to crack open the hood of the laptop and master its inner workings? Or, will it simply degenerate into the instrument which delivers spam and pornography to the third world? Will teachers embrace the platform and craft their curriculum to take maximum advantage of this device? Or, will they ask students to store the laptop in a cubby for the duration of the school day? Will this technology improve the ways children interact with each other, and the way they relate to information and knowledge? Or, will it promote consumerism, competition, obesity, and depression? If we don't understand these dynamics in our own society, how can we pretend to understand them as we unleash this technology upon rest of the world?

Ian Bicking, a python developer for the Open Planning project and an active contributor to the OLPC project, argues that believing in this project ultimately requires a leap of faith. "[The] OLPC is also a leap of faith, and *must* be so. It is not a tool to make the classrooms of developing nations look like the classrooms of industrial nations. It is not an effort to come up with the perfect curriculum or teaching philosophy that can reform education and the world. These are not reasonable goals, and may not be very positive goals. As a result, OLPC cannot have concrete and specific educational goals. It is a tool, and we do not know how it will be used; we *cannot* know how it will be used because that would necessarily exclude the laptop users from determining how they will use it."

The OLPC platform is new, but its cultural heritage is familiar. As a free software project its living ecology endorses a methodology designed to be respectful and responsive to the needs of its community. This community is accustomed to listening and responding to the desires expressed. For this to work, all of the stakeholders must be involved in the creation and production of the knowledge nourishing subsequent designs and future iterations. We can anticipate the form of these interactions but only the communities themselves, once engaged, can determine the specifics.

The road to OLPC's success is not only paved with good intentions, it has been fortified by structures and processes which have evolved to embrace and accommodate change. These practices rely on honesty and transparency to

achieve accountability and sustainability. These rules have supported communities with the capacity for agile, responsive, and self-determined growth. If OLPC can maintain the humility and self-awareness that mature free software projects have mastered, then they should succeed in spite of its critics. Of course, the criteria for success will vary across countries and cultures, over space and time, and according to the eyes of the beholders.

The Price of Freedom

While the project initially targets children, it is natural to imagine its impact quickly extending to their families and communities. Especially in the developing world, where communications infrastructure and computing power is scarce, this project may permanently alter the landscape for educational initiatives ranging from the United Nations Millennium Project to disease prevention to disaster relief efforts and beyond. In addition to its constructionist potential, the laptop could also become a primary channel (perhaps via USB thumbnail drives for villages without an Internet connection) for disseminating a wide array of educational materials and tools.

If deployment continues as planned, this device will be present in the relief camps after some yet-to-be-named disaster. Hurricane Katrina taught us how critical Information Technology can be in these situations – assisting in planning, rationing, and even connecting with loved ones. Whether applications to ameliorate these emergencies will be developed before they occur, or their absence be lamented in hindsight remains to be seen.

But perhaps the OLPC's greatest disruptive potential lies in its seemingly mundane capacity for many-to-many communications. Moglen asks:"What does it mean when children around the world are networking with one another over the issues that concern them directly without intermediation, everybody to everybody, saying 'Do you have what we need? How come you have what we need? How come we can't do what you can do? Because your father is rich? Because we are dark? Because we live down here?'"

What will happen when ubiquitous networked constructionism breeds with free culture? If the theory that Yochai Benkler advances in the *Wealth of Networks* is on target, then these devices truly do have the potential to transform markets and freedom. According to Benkler "The declining price of computation, communication, and storage have, as a practical matter, placed the material means of information and cultural production in the hands of a significant fraction of the world's population - on the order of a billion people around the globe." The OLPC may provide a major boost to this trend, significantly increasing social production, that is, production not motivated by market considerations. Benkler shows that within a networked information economy it is possible to extract substantial market value from these creations.

Which of these scenarios will come to pass? At the moment, the future is still cloudy. But one thing is appearing more and more certain by the day–like the weather, the OLPC is happening, and once it does we have all have an opportunity to seize the moment and make the best of it. The OLPC is humanity's project, and the task to fulfill or disappoint rests on all of our shoulders. The spirit of the OLPC project isn't about asking permission from a centralized authority. Partners need to wean themselves off the dependence on a hierarchical model of cooperation and embrace the true spirit of constructionist learning. If you have a good idea, run with it. Act on it and share it.

The project will continue to provoke detractors and critics, probably for decades. To their cry that "There's a hole in the laptop", the appropriate response is "So fix it, dear Liza". The laptop is coming. What will you do to help it succeed?