Information Technology for Developing Countries: One Laptop Per Child
by Wayne Moses Burke

"Information technology ... is a powerful force that can and must be harnessed to our global mission of peace and development. This is a matter of both ethics and economics; over the long term, the new economy can only be productive and sustainable if it spreads worldwide and responds to the needs and demands of all people. I urge everyone in a position to make a difference to add his or her energies to this effort."[1] -Kofi Annan

One Laptop Per Child's (OLPC) self-stated goal is "to provide children around the world with new opportunities to explore, experiment, and express themselves."[2] They aim to accomplish this by producing a feature-rich laptop that is inexpensive enough to be purchased en masse by governments and handed out to children, not unlike textbooks are today.

The project "is based on 'constructionist' theories of learning pioneered by Seymour Papert and later Alan Kay, as well as the principles expressed in Nicholas Negroponte's book 'Being Digital'."[3] These theories hold that people learn more quickly and fully when they are allowed to apply their own creative and intuitive logic to a situation. Computers provide a forum for creativity and problem solving that is structured and logical. Allowing the laptop to be owned by the child creates a familiarity that does not come with only using it at school. "One does not think of community pencils—kids have their own. They are tools to think with, sufficiently inexpensive to be used for work and play, drawing, writing, and mathematics. A computer can be the same, but far more powerful."[4]

Experimentation with constructionist theories has shown that they are applicable independent of a child's background. For example, when computers were first introduced into an elementary school in Dakar, Senegal, "The children from this rural, poor, and underdeveloped West African nation dove into these computers with the same ease and abandon as any child from middle-class, suburban America."[5]
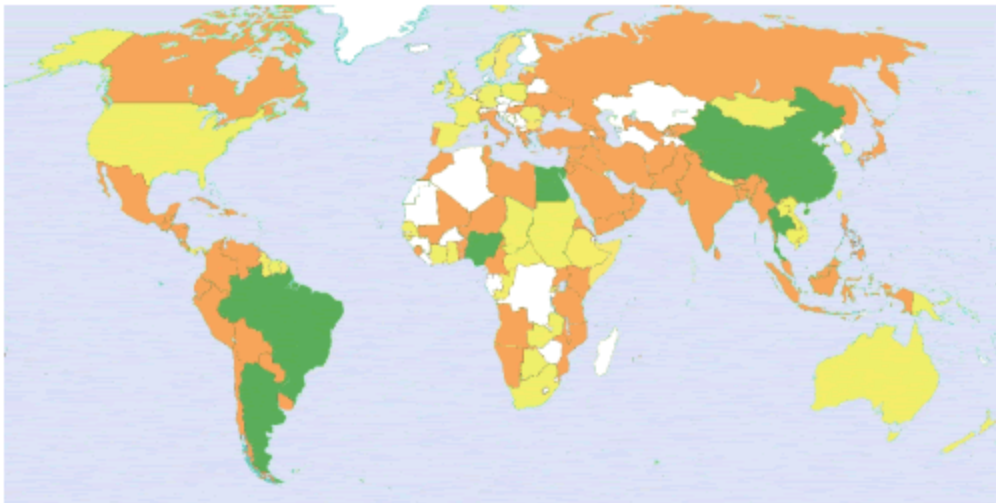
Illustration 1: OLPC Prototypes

source: http://www.laptop.org/download.en_US.html

OLPC is an outgrowth of MIT's Media Lab and is based in Delaware. Its first public announcement came on November 16, 2005 when OLPC Chairman Nicholas Negroponte unveiled a prototype with UN Secretary-General Kofi Annan at the World Summit on Information Society in Tunis. Kofi Annan referred to it as an "expression of global solidarity."[6] Not long after that, Negroponte signed a Memorandum of Understanding with the United Nations Development Project (UNDP) Administrator Kemal Dervis. Under the agreement, UNDP will utilize its connections and resources in the developing world to help manage delivery of the laptops and the learning resources necessary to make effective use of them.[7]

At this point, Brazil and Thailand are prepared to place orders as soon as a working prototype is available. In addition, China, India, Argentina, Egypt, and Nigeria are expected to follow suit.[8] OLPC is striving to have the initial run distributed to a broad geographic and cultural dispersion in order to prove the program's universal applicability.

Their first run is due at the end of this year or the beginning of 2007. This project is evolving rapidly and interested readers should consult the OLPC website directly at http://laptop.org or the site dedicated to news on the project at http://olpcnews.com.

Illustration 2: Map of Interested Countries

Green those countries we plan to pilot
Orange those countries who have expressed interest at the Ministry of Educationlevel or higher
Yellow those countries who are currently seeking government support

source: http://www.laptop.org/map.en_US.html

In order to design and produce this technologically sophisticated laptop at a minimal price, while making it reliable, durable, theft-resistant, and low power consumption, OLPC is working with some of the biggest names in the computing industry. Initial funding for the project was provided by Advanced Micro Devices (AMD), Brightstar, Google, News Corporation, Nortel, and Red Hat, each providing $2 million.[9]

AMD, Intel's biggest competitor, is supplying the chips for the laptops and Red Hat is creating a version of its Linux distribution designed specifically for the OLPC hardware. Similarly, Taiwanese firm Quanta Computers was chosen as the manufacturer for the project. It is the largest manufacturer of laptops in the world, counting among its clients Dell, HP, and IBM, and offered to devote significant research facilities towards the project.[10]

The laptop is not a stripped down version of a modern laptop. It is comparable with laptops sold in the developed world in most regards, with a few exceptions and a few unique improvements. Its processor and RAM are relatively at the lower end of the scale for modern laptops (366MHz and 128Mb, respectively), but this is made up for by the customization of the operating system so as to maximize utilization of the processing capacity. It has wireless networking with the ability to recognize when other OLPC laptops are in the area and automatically establish a network. It has USB ports, built-in speakers and microphone, as well as jacks for external speakers and a microphone. It is targeted to weigh less than 2.2 pounds, on a par with the lightest laptops available on the market today.[11]

The one aspect of the design that could be considered sub-par in comparison is simultaneously unique in its implementation. Instead of a standard hard drive, the OLPC laptop will have 512Mb of flash memory, like that used in a USB drive. This is significantly less than what is available in modern laptops, but increases the durability of the system because there are no moving parts.

The display and touchpad are both particularly novel implementations of what have become standard elements on modern laptops. The display will operate in two different modes, one a back lit color mode, similar to a normal laptop or LCD computer screen, and the second a black and white, low-power "E-book" mode. This second mode will not have a back light of its own, but instead will be a reflective display wherein ambient light or sunlight will actually improve the ability to see what it is on the screen, creating an experience that is more like reading from paper.

The touchpad of the device will support pointing, scrolling, and possibly graphical input, eg for drawing or writing. It will be extra wide to allow the children to learn writing skills directly on their laptops. While the design has not yet been finalized, the chassis will be rugged and have a very child-oriented look and feel. This is to discourage theft by creating a stigma against it's usage by adults.

The OLPC project differs from past attempts to introduce computers to developing countries in several remarkable ways: it focuses on education over functionality and is rooted in personal ownership of the unit; it relies on government for purchasing, not communities; and it uses only open source software. Previous attempts[12] have relied on a village pooling its resources in order to purchase a single computer. This machine would then be useful to all of the villagers, each in turn. While this may seem sound in theory, in practice it does not work because it expects members of a village to understand the utility of owning a computer and spend a significant sum of money on it, prior to having first hand experience of it for themselves. There is a disincentive within the system inhibiting its success. In addition, this communal system keeps the computer from becoming personal to the majority of its users, much as a public space is owned by all, and therefore owned by none.

OLPC has designed their system to emphasize personal ownership and comfort with the machines as necessary elements of effective learning. First of all, they rely on governments to provide the OLPC laptops directly to the children so as to avoid communal ownership. Secondly, they insist on open source software, i.e. full access to the code of all programs that are included on the machine. This allows the children to see examples of programming and become familiar with how software works on the back end. This is where the impact of constructionist theories is most obvious in the plan. The available source code encourages experimentation and greater understanding of computers by allowing the children to explore using their own creative and intuitive logic. This lays the foundation for a computer literate society that can utilize the technology to solve local problems, without outside help or interference.

Critics of the OLPC project misunderstand this educational aspect. The criticism comes in three main forms: 'bad solution to internet connectivity,' 'people want real computers,' and 'they don't need computers, they need food.' The first actually originates with Bill Gates. He contends that laptops are a bad idea and that the answer is smart cell phones. He points out that Africa is booming with the cell phone market, and that this is the easy way to provide internet access to developing countries.[13] The difficulty with this argument is that OLPC's goal is not about providing internet access, it is "to provide children around the world with new opportunities to explore, experiment, and express themselves."[14] While cell phones continue to evolve, they simply do not provide the educational opportunities that laptops do. They have small screens, limited keyboards, and fixed functionality. In addition, any phone that has the capabilities of the OLPC laptop would most likely cost more than the laptop does.

Dell and Intel both claim that the OLPC laptop is such a stripped down model that it will not be attractive to the people that are expected to use it. Dell makes the point that "[i]t's important

that a computer prepare students for the applications they'll be using after they get out of school."[15] While there is validity to this argument, it is too narrowly focused. While the OLPC laptop will not contain commercial software such as Microsoft Office, it will contain programs with similar functionality. The critical aspect of the project is for children in developing countries to establish the same familiarity with computing technology that is second nature to children in developed countries. Operating systems and word processors are increasingly similar to one another in look and feel and the transition from one to the next is increasingly trivial.

The chairman of Intel agrees with Dell, and critically states, "I think a more realistic title should be 'the $100 gadget'. The problem is that gadgets have not been successful."[16] This criticism displays an ignorance of the OLPC laptop's features and falsely lumps it in with past, failed attempts to bring low-cost computer solutions to the developing world.[17]

The third criticism that the OLPC project faces concerns the legitimacy of providing computers to people who are starving. The following quote is a particularly colorful example: Sure laptops are cool. But let's face facts folks. Few starving people need a computer worse than food and clothing... If they give these $100-125 PCs to the poor, 80%+ will certainly be sold for things which are more important to real life (food, clothing, shelter, and probably sex, drugs, and booze too)...*18* This criticism displays an even shallower understanding of the project than the previous two, but is important to mention because it is the most common one heard. In addition to misperceiving OLPC as a technology project, this criticism relies on several other assumptions that are based on insufficient knowledge. First is that all citizens of the developing world are starving. This is clearly not true. On the contrary, the list of countries that are first in line for implementation, e.g. Brazil and China, are among the fastest growing economies in the world. Secondly, it misses the importance of technology beyond its value as a "cool toy." It fails to acknowledge the improvements that technology has brought to the developed world and the burden that this growing technology gap imposes on the developing world. Thirdly, this criticism does not acknowledge the value of empowering individuals to use modern tools to solve their own problems. And finally, the accusation that the OLPC laptops will simply be sold displays a lack of familiarity with the design of the system and the attempts made to create a stigma against its being used by adults.

In short, the criticisms are based largely on misperceptions about the nature of the project or the nature of the problem that it intends to deal with. This leads to the question, "What will go wrong?" There are two factors that may lead to unsuccessful completion of the project. The first is technical failure of the first run of laptops. Should there be something critically wrong with the design or its manufacture, this could deflate the legitimacy of the product in the eyes of the world and thus end its opportunity for proper implementation. Given the quality of the partners involved in design and manufacture of the project, and the attention that is being paid to detail on each successive prototype, this seems unlikely but always remains a possibility.

The other potential for failure comes from the consistency of the governments who will implement this solution. The project requires a long term commitment to improve education in order to create a population that can solve its own problems. Short term implementation will not accomplish this. It could even be argued that in order to be effective, OLPC should be encouraging governments to maintain their participation, while increasing accessibility to education for their populace. It could also be argued that OLPC should become involved in increasing student attendance and working with governments to maintain those levels.

These are all enormous problems, and their causes differ from country to country. The OLPC project is an education project because it provides an educational tool. It does not attempt to

define how that tool should be used. Just making the technology available to the masses of schoolchildren will change the educational systems in the countries that implement the project. Solving the larger problems then must fall to those with expertise in the field, from UNDP to the governments to the teachers in the classroom.

The One Laptop Per Child project aims to make a great contribution to the world. It is not great because of the size or the cost or the features of the laptop that it is working so hard to produce. It is great because of the increased potential that it will bring to each child that receives a laptop. This project is not about creating opportunities, it is about making people able to understand and take advantage of the opportunities that are available to them. The results will be fascinating to witness.

Notes

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17. eg,Simputer and PCtvt, as mentioned above.

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About the author

Wayne Moses Burke is a Master's degree candidate in Global Affairs at New York University. His interest is in how international policy can improve opportunities for individuals. He is currently focused on studying development programs, the role of the United States in the international system, and the way in which governments, businesses, and nongovernmental organizations interact.