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Access

Even the most generous estimates of the number of people around the world connected to the internet put the figure at no more than 300 million. Obviously, we (since I'm writing this connected to the internet and you are reading it on-line) are a tiny portion of the world's entire population, which recently surpassed six billion. This fact is used as evidence by some that all the talk about the impact of the internet is just so much hype about how a lucky few (five percent) have a fancy new toy to play with.

I like to counter that view by pointing out three things: 1) how relatively little time it has taken for this innovation to reach that number of users, (2) how many people are adding themselves every day, and (3) how fast technology is evolving, such that it is not unreasonable to expect access to become less of an issue (and a different problem) in the not-too-distant future.

The internet came into technical existence about 30 years ago, but its worldwide impact (yes, among the lucky few who already had access to computers and connectivity) really started being felt with the creation and fast diffusion of the World Wide Web from the early 1990s. My personal history starts in 1992, when I became acquainted with a project of the Chilean Ministry of Education, "Enlaces," to link all the schools in that country through a computer network. At the time I was working for Apple Computer, and despite our best efforts to convince the Chileans to use Apple's proprietary networking technology, they decided to use TCP/IP, already established as the internet communications protocol. The wisdom of that decision is only one of many that distinguishes this project.

This happened before the Web started its explosive growth, and by 1993 I was able to give a talk to science teachers from Puerto Rico with an already too long list of bookmarks for interesting and useful web sites. The "only" problem, of course, was that many of them still did not have computers, and quite a few of their schools did not even have telephone lines available, so that even when they had computers they could not connect to the internet. Nonetheless, their eyes were opened to a wealth of resources impossible to imagine even a few months before, and they went back determined to get what they needed in order to have this new resource available to themselves and their students.

From a simplistic perspective, access to the internet is a simple problem: it's too expensive. Most everybody connected to the internet right now is using computer equipment worth hundreds or thousands of dollars, and paying monthly fees to an internet access provider. The initial investment in equipment represents an insurmountable barrier to many, although there are very encouraging signs that alternatives to computers costing much less will be coming to market in the near future. These "information appliances" may be specialized (e.g., do only e-mail, or web browsing) and thus avoid much of the complexities and costs inherent in computers. (See, for example, the "i-opener" appliance offered by Netpliance for US\$99 at <http://www.netpliance.com>)

In learning environments, even when the equipment is available the challenges have just started. The analogy can be drawn to automobiles, which like computers are expensive to acquire, and like computers require some "training" to learn to use. (The joke is that -fortunately!- cars don't require system software upgrades or "patches" every few months.) A teacher presented with a computer for her use may already know how to turn it on and do simple things with it, but chances are she received little or no instruction on how to take advantage of the computer (and much less, telecommunications capabilities) when studying to be a teacher. If she has opportunities to attend "computer classes," more often than not those classes are one-time experiences that assume teachers will be able to transform their practice from such limited exposure. This so-called "spray-and-pray" method has very limited success. Teachers are implicitly being told that they should do the same things in the classroom but using computers, rather than receive the explicit message that the school is interested in significantly transforming the teaching and learning experience by taking advantage of the potential that new pedagogies and new technologies make possible.

Recent news accounts suggest that most or all schools in the United States will soon have access to the internet. What most teachers will tell anyone who will listen is that "getting the internet" is not the real problem: it's knowing how to really maximize its benefits for teachers, learners, and administrators. Beyond simply knowing how to turn on the computer and use basic productivity applications, teachers need to know how to transform their practice in order to derive maximum benefits for themselves and their students. Sadly, very few receive such opportunities. Being sent for a one-day "training" or "computer class" is rarely enough to help teachers understand how computers and telecommunications can support better pedagogy and improve learning. To see an example of how this can be accomplished successfully, visit the Online Internet Institute's web site at <http://www.oii.org>

Critics of the use of technology in education like to argue that there is no evidence that computers and/or the internet actually improve students learning, and thus seriously argue for decreased investments in technology or—the most radical— no technology in schools at all. I think these arguments are misplaced. It's easy to find examples of schools, districts, states, or even entire countries that have made very costly mistakes in their attempts to introduce technology, but by now it is also possible to find great examples where things were done -or are

being done- much better (check out the Chile example referenced before).

The worst and most expensive mistakes can be blamed on the fact that current computer technology is terribly complicated and expensive to acquire, learn, and maintain. That is why the trend for low-cost, simple to use (by virtue of being dedicated, not multi-function), and easy to maintain (or replace) devices is so encouraging. As we get closer to an era where individuals and institutions will be able to afford powerful but capable devices, and have access to relevant content in the context of innovative learning environments, it becomes possible to imagine a future where teachers, learners, administrators, parents, and the community at large can be engaged in the education process in much more meaningful and rewarding ways. The devices that will be used in the future are unlikely to resemble the computers that we use today.

The limitations imposed by today's computing and connectivity paradigms are evident. Computers are costly, expensive to acquire and maintain. They are also cumbersome and impractical, suffering from poor industrial design and lacking truly intelligent (and thus helpful) user interfaces. They force users to adapt to the machines, rather than letting the user concentrate on the task at hand. (Think how many steps one has to take before actually being able to write using a computer.) Portable computers have limited battery life, and because they are seen as replacing the desktop, little or no advantage beyond portability is afforded to the user.

Innovative learning environments almost naturally call for innovative hardware and software. If students will be taking courses on-line, better and easier ways to connect to networks must be developed (e.g., had fun lately configuring your modem?) The software interfaces to everything from word processing programs to collaborative on-line environments need dramatic improvements. Tools need to adapt to the characteristics of their users, rather than make users fit themselves to inflexible tools.

And, of course, these devices have to be more affordable than today's computers, as well as more rugged (especially those to be used by children and adults who travel). They must be easy to connect to local networks and to the internet, ideally without having to plug wires into fragile connectors that break easily (i.e., the future belongs to wireless!) Ideally, they will also be "intelligent" enough to support multiple forms of input (tired of typing yet?), such that even people with disabilities can use technology without having the additional burden of fitting clunky "adaptive" devices on top of already clunky hardware.

The transformative power of technology becomes evident when society makes conscious decisions about widespread implementation of desirable technologies, which in turn shape the way people live. The telephone and the automobile are only two examples that have, in fact, shaped everything from the way our cities look to the way business is conducted. The internet has already started a transformation of a comparable magnitude, and the challenge ahead is how to make it possible for everyone, not just those with computers, to join in and benefit from active participation. The longer we allow large groups of people around the world to remain on the margins, the tougher it will be for them to be full participants and beneficiaries. Beyond issues of equity in the here and now, the problems to be faced in the future if the gaps grow even larger are truly scary. (The protests in Seattle during the meeting of the World Trade Organization can be interpreted as a preamble to further "discussion" between those who are currently benefiting from globalization and those who are being dislocated.) Ensuring access for as many people as possible, and as quickly as possible, is the best strategy for the world moving forward.

The i-opener from Netpliance.

The eMate from Apple Computer, designed for students but withdrawn from the market after less than a year. Good design for everyday school use but a somewhat cumbersome interface.

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Learning in a New World - Part IV

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