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In Depth: Technology

➤ From the November 23, 2001 print edition

Expert Opinion

Next from the Net: Learning takes on new dimensions

Phil Cruver

The Next Generation Internet is coming of age. It will force a revolution in how we work, play and learn.

It is also triggering a resurrection in communication -- taking us back to our roots before the advent of text and numbers. This Internet will accommodate broadband multimedia technologies that when coupled with the impressive bandwidth of the brain will accelerate the slow evolution in learning. Full-motion video, high-fidelity audio, and technologies that digitally convey additional human senses could soon usurp conventional written words and numbers for more rapid and egalitarian learning in the new economy.

Next Generation Internet was the name given a government-sponsored initiative to help develop a faster, more powerful version of the Internet. Similar efforts are being undertaken by a consortium of universities and high-tech companies in a project called Internet2.

It can be argued the crux of the "digital divide" dilemma is predicated on not only having access to technology but also on how we learn. Our nation's learning culture is divided: One-third are readers, while nearly two-thirds get most of their information from television. This has produced a social schism in literacy and learning through the unintended arrogance of the reading elite -- people with more advanced reading and writing skills -- combined with a greater need to use those skills.

Could broadband technologies force a shift towards visual thinking whereby communications and learning will be based upon images -- the most efficient way to transmit large amounts of data?

We live in a visual world where we think and dream in pictures and symbolic images. When we read, we transform the words into mental pictures. Several millennia ago, visual imagery began taking a backseat to more efficiently produced words and numbers. Sentences and paragraphs usurped forms and images. With the advent of Gutenberg's printing press a little more than 500 years ago, words and numbers began to rule by allowing the average person to communicate in this new mass medium.

Now these same sentences and paragraphs are being replaced by the return of images, in the form of digitally transmitted real-time data and modern broadband technologies.

James Crowe, CEO and founder of Level 3 Communications, spins the potential of broadband this way: "We are visual creatures. Ninety-nine percent of the information we collect comes through our eyes. The last hundred years was spent in communications building a network that is about your ears. That's the phone network. Today it is possible, at a reasonable price, to extend your ears pretty much around the world. This network that we are building -- and that others are building -- is about extending your eyes. Your eyes have a bandwidth, if you would, hundreds of thousands of times that of your ears."

The bandwidth of your auditory nerve is about 1.5 megabits per second on each side (the equivalent of a high-speed T-1 line). We register a full-color image, the equivalent of a megabyte of data, in a fraction of a second. The apparent resolution in your brain is higher than what the eye's rod-and-cone structure would indicate -- which means there's some mighty sophisticated software interpolation going on -- and it's in the gigabits per second.

The more of our senses involved, the more completely and enjoyably we learn and the greater our retention. Research shows individuals retain 20 percent of what they hear, 30 percent of what they see, and 50 percent of what they see and hear.

With gigabit bandwidth, complex and huge data streams of smell, touch and taste also can be transmitted over the Internet. At the Integrated Media Systems Center at the University of Southern California, scientists are researching haptics -- the sense of touch and the sensation of shape and texture an observer feels when virtually "touching" an object. Their results promise a new dimension in distance learning.

This new dimension will become a reality when the next generation of workers who are media-savvy, peer-oriented and innovative are allowed to work, play and learn on the Next Generation Internet. Since Internet2's beginning in 1996, membership was limited to universities and research institutions, but this spring students in kindergarten through 12th grade were invited to participate in its wonders.

This network is a ganglion of routers and switches on steroids connecting fiber-optic superhighways that operate at speeds up to 2.4 gigabits per second, or 45,000 times faster than a typical modem.

With gigabit bandwidth, video takes on a new dimension, supporting 3-D Tele-Immersion with visual verisimilitude and fidelity of presence. This enables users at geographically distributed sites to collaborate in real time in a shared, simulated environment as if they were in the same physical room.

The future of learning points in one direction: full-sensory multimedia. And gigabit broadband provides the ideal delivery

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medium for the masses. No other medium has its power and impact to reach, teach and communicate.

The next generation optical Internet is the future of learning and promises a more united society along racial and socioeconomic lines.

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