

Fascinating too he's not sure he believes his own model.

So we have a guy who loves computers, books, and learning. His ideal library of the future is the community library we have now. A problem is electronic storage not the media, but the reading equipment. Tried to buy a record player instead of a CD player lately? Other problems are with the ability to scan books and other printed media you can, but its not 100% accurate. By the way does anyone know of a scanning program that can read super and subscripts? Material might have to be replicated in a more modern format every twenty to thirty years-very expensive.

Electronic library searches are very effective if you want to find a specific book, especially if you can do it electronically from home or office. Electronic searches for connections between different topics are much less effective than card searches. Another problem is the myriad search systems used and changes made during 'updates.' ..."Even though I constantly use computers, I still have to figure out how to look up a book. I forget the commands between library visits. Every library has a different on-line system: my own library has three, all mutually incompatible. Their terminals have sticky keys. At the very moment I need the command menu, its scrolled off the top of the screen." Electronic books are definitely not the way to read a novel, but it's convenient to have reference material on-line.

We are shifting resources from books and librarians to on-line access to the computerized catalog of the Library of Congress. Of course you'd have to go to Washington to read the books. Perhaps its reassuring to know the book you want is there? Actual material from the Library of Congress is now becoming available.

He like many of us is finding it increasingly difficult to download information due to heavier use of available bandwidth. So increase the bandwidth (the amount of information you can push through) to take care of the increased traffic-sure just like adding highways cures traffic problems. Of course the electronic highway is much more amenable for a technology breakthrough, I'm already hearing of many possible solutions for adding increased capacity and speeding up existing infrastructure. On the other hand companies like Apple are coming out with software which will allow us to cut and paste color 3-d clips and send the resulting color 3-d movies over the WWW. So we're gong to need a lot of bandwidth. It should be an interesting unending race.

Book Review2- by Brian Pankuch

"Being Digital," by Nicholas Negroponte, 1995, Alfred A. Knopf, Inc. ISBN 0-679-43919-6, 247 PP, \$23.00.

Nicholas Negroponte is a Professor of Media Technology at MIT, and Director of the Media Lab. He is enthusiastic about what increases in bandwidth will do. Bandwidth is the ability to send information down a given channel, whether copper wire, optical fiber, or as electromagnetic radiation. Fiber is especially impressive since we are already close to sending a trillion bits per second. Capable of carrying a million channels of television at the same time or all the Wall Street Journals ever printed in a second. That's a lot of information.

The book for the most part is a string of essays and articles done before and not particularly well connected. If you like his column in *Wired* magazine, you'll probably enjoy his book.

As one might expect he has been involved in many interesting projects. Asked to help ready our commandos for different hotspots, he set up a system for storing tapes of potential hotspots on videodisks which could give our antiterrorist commandos the computer equivalent of a drive down streets and corridors they might soon be fighting in.

He is inclined to go where the action is. People who are interested in applied research are reading the Wall Street Journal instead of scholarly journals. The action is in entrepreneurial companies so you're more likely to find cutting-edge information in the Wall Street Journal.

With the increasing inexpensive power available to use in computers Negroponte is strongly in favor of using it to improve our interface with computers and other electronics, and appliances. "...At home I used to have a very intelligent VCR with near perfect voice recogni-

tion and knowledge of me. I could ask it to record programs by name and, in some cases, even assume it would do so automatically, without my asking. Then, all of a sudden, my son went to college. I have not recorded a TV program in more than six years. Not because I can't. It is because the value is too low for the effort. It is needlessly hard.."

I could give the example of digital watches. When they first came out setting the correct time was awkward frequently requiring a pointed tool and each was different. Now the usual watch stem has the usual function.

Computers and systems in general will know you, learn about your needs, and understand both verbal and nonverbal languages. An example is the video tape of Apple's hypothetical Knowledge Navigator and its lifelike machine persona with the ability to be a prized, friendly, extremely attentive, well trained personal assistant. Speaking for myself I could use one right now. Apple's current version of Newton the hand held message pad is much improved over the first model. It is helpful but has a long, long way to go to be this intelligent assistant.

"The best metaphor I can conceive of for human-computer interface is that of a well-trained English butler. The 'agent' answers the phone, recognizes the callers, disturbs you when appropriate, and may even tell a white lie on your behalf. The same agent is well trained in timing, versed in finding the opportune moments, and respectful of idiosyncrasies. People who know the butler enjoy considerable advantage over a total stranger. That is just fine.... If you have somebody who knows you well and shares much of your information, that person can act on your behalf very effectively. If your secretary falls ill, it would make no difference if the temporary agency could send you Albert Einstein. This issue is not about intelligence. It is shared knowledge and the practice of using it in your best interests."

If you've experienced some frustration with keeping up with the tremendous amount of information we have available.

"...Imagine a future in which your interface agent can read every newswire and newspaper and catch every TV and radio broadcast on the planet, and then construct a personalized summary. This kind of newspaper is printed in an edition of one."

Virtual reality has the interesting potential of making realistic simulations useful, allowing the user to practice rare and dangerous events without for instance wrecking a real airplane landing in fog in San Francisco. Clever breakthroughs will allow use of holograms without necessitating hardware that gives resolution of 10,000 times that of your TV. Holograms combined with

devices that sense where you are looking will provide some very realistic simulations. Simulations where you are the molecule and "experience" what it is like to undergo a reaction, modeling of expensive or dangerous reactions and systems would be very interesting.

We are of course most interested in applying computers to learning. Rather than using computers just to shove facts into minds he suggests that one might learn about frogs not by dissecting but by building a simulation of a frog. Students could be asked to design a frog to simulate the muscles, etc. They are probably using computers more than the average professor, and writing and reading more with email than they are in science courses. I've been working on simulations myself and it is a great learning and presentation tool, but programs like Director take quite awhile to use effectively. This could be a very interesting project for upperclassman or students who have developed more computer expertise.

Back in 1981 a conversation with Sheik Yamani led to an experiment with two dozen Apple computers and Logo introduced to rural, poor Senegalese children. These children showed no difference in adoption or enthusiasm than American middle-class children, they loved it.

Negroponete foresees the probability of having machines and appliances communicate with each other and us. Your computer or VCR will be able to instruct you on how to do a set of operations to accomplish your goal. Microsoft is already including Wizards to help graph, etc. Apple has the Apple Guide for its Macs and quite a bit of built-in help for its Newton.

The way we do science and medicine has changed dramatically over the last century. In a typical classroom there is little difference in how we are teaching now versus one hundred years ago. Pursuit of intellectual achievement will cater to a wider range of cognitive styles, learning patterns, and ways of expressing ourselves. Work and play will become less distinct using the same tool-computers-for both. Negroponete is very optimistic about this amount of power being in the hands of the young, despite much additional competition and challenges from all over the world.

This book is an interesting read. More material specific to learning would have been helpful, but sharing the vision of someone helping to shape the future and using the latest innovations is sure to spark some ideas of your own.

Brian Pankuch