

# Class Wars

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The computerization of the American classroom is well under way, with broad support from the political and educational establishments. Proponents say the machines will empower students as never before, giving them ready access to a galaxy of information and new avenues to share their own ideas with teachers and with experts outside school. Yet skeptics argue that many of technology's promised benefits for schools are as yet unsupported by evidence gathered in the field and rely mainly on the hype attendant on computers in general and the Internet in particular.

The Wall Street Journal posed the issue to a pair of experts: Seymour Papert of the Massachusetts Institute of Technology Media Lab, creator of Logo, a computer language for children, and author of "Mindstorms: Children, Computers and Powerful Ideas," and Theodore Roszak of California State University, Hayward, the author of "The Cult of Information: A Neo-Luddite Treatise on High Tech, Artificial Intelligence and the True Art of Thinking."

## Seeds of Radical Change

**Prof. Papert:** When I heard that Theodore Roszak was to be my partner in this debate, of course I went back to check on what I remembered his having written about me in "The Cult of Information." What I found was pleasing not only because it confirmed my impression that we might have the right mix of mutual respect and real difference to carry on a fruitful debate, but also because he opened what I think is the key issue for us to be discussing here by characterizing my views as an exception "in the midst of the confusion" surrounding the educational role of computers. What I hope for most from these debates is to clear away some of the confusions that dominate and distort contemporary discussion of technology in education. I don't really expect to reach consensus on policies to be followed. I do hope we can identify and sort out some of the multiple meanings of the questions to be answered.

Most discussion of computers and school proceeds as if the question being discussed is clear enough: Do computers improve schools -- yes or no?" But what does it mean to improve schools? For some, the discussion is about such questions as whether computers will teach children so well that they will score dramatically better in tests on the fifth-grade math curriculum. Even this simple question does not have a simple answer, since computers can be used in so many different ways that statistical studies on "THE effect" of "THE computer" are quite meaningless. But even more serious differences in how to take the question are brought out by a personal view which I throw onto the table as a proposition to be debated -- not in order to determine its truth (which is obviously impossible) but because talking about it raises so many critical issues:

In 20 years from now, the idea of teaching the fifth-grade math curriculum will seem as quaintly old-fashioned as using stage coaches to get across the continent. To be more precise: the idea of segregating learners by age into "grades," the concomitant ideas of fragmenting knowledge into "subjects" and "curriculum" and indeed virtually all the ideas associated with the institution of School are all by-products of the limitations of pre-computational forms of knowledge technology.

In short, School as we know it is moribund. And ought to be, for reasons that were already clearly formulated by Dewey just about a hundred years ago. But while Dewey was not able to have more than a marginal influence on the practice of School, today two factors are already producing shifts towards the experiential learning he advocated.

One is the presence of a technological infrastructure that vastly expands the range of experientially meaningful projects with technical and scientific content as well as unprecedentedly rich possibilities of intellectual collaboration between children.

The other I call Kid Power. We are just beginning to see in schools the effects of the presence of computers in a significant fraction of homes. In most cases these children have had rather poor learning experiences with their computers. But some have been able to acquire a taste for richer learning than they are offered in the classroom and are demanding (explicitly or not) something better. Moreover, some of these bring to class the skills that the teacher might not have had the opportunity to acquire -- not only technical skills, but skills of the methods of researching and even of evaluating knowledge that goes far beyond what can be found in the pre-digested school texts. Thus children themselves become change agents who embody the idea of replacing an inefficient situation of one active teacher and a roomful of passive followers with a roomful of co-learners and co-teachers.

There is no guarantee that having the technological infrastructure and even the power of an army of children will necessarily produce radical change. Nor is there a guarantee that if radical change comes about it will be for the good. But what is sure is that we are in a new ball park of what is conceivable. And educators whose minds are closed to considering what is merely possible, even if not certain and certainly unproven, are in my view disqualified as educators.

## **What the Computers Don't Teach**

Prof. Roszak: Prof. Papert's work on Logo deserves to hold a permanent place in pedagogical philosophy as one of the first, and still one of the most comprehensive efforts, not simply to rethink the role of computers in schools, but the entire project of education. When he asks "what does it mean to improve schools?" he goes to the heart of the question of educational reform. He and I would both agree that simply packing the schools with computers could have little value if one has no answer to that question. It could actually do harm by wasting money needed elsewhere. It is little short of superstitious to think that putting a computer on every desk guarantees quality in the schools. A few years back,

Charles Pillar did a survey for Macworld that showed clearly that there was no way to tell how good any school was by counting computers.

So, the sincerity and genius of Professor Papert's achievement is beyond question. I gather from recent writing I've seen that Logo has had little success in breaking through the bureaucratic bastions of our public schools; but that was almost inevitable. The schools of the nation have always had more to do with sociology than pedagogy. They are an institution with so many conflicting roles to meet in each community that there is no chance any single commanding vision will ever gain control of the curriculum -- which may be as good as it is bad a fact of life. But Logo cannot be blamed for that; nor would I be quick to blame teachers for being too obstructive, as Professor Papert does in a recent book. He and I probably agree on a long list of criticism about what's wrong with schools. I see the products of standard public education in front of me in my university classes. A deplorable number of these young people seem to have learned nothing at all. They cannot even read with understanding. But I still have lots of sympathy for the teachers who sent them here. Teachers get battered from so many directions that they need more friendly advice than hard knocks. Still, there is not a teacher in the world who would not profit from reading Prof. Papert's work, simply to get back to the philosophical fundamentals of the teacher's calling.

Now I say all this even though I profoundly disagree with most of what Professor Papert would like to do with Logo. I may have been among the first to use the analogy between Logo and Latin in his vision; others have used it since. Educators of the past -- especially those involved in elite schooling -- subscribed to an item of folklore to the effect that Latin had the special transcendental capacity to form good habits of thinking -- on any subject. It was the elixir of intellect. It took centuries to overturn this hang-up. Few teachers any longer believe there is any such thing as an all-purpose skill or subject matter that can automatically make a better cerebral cortex. I surely don't believe Logo does that. Logo teaches Logo; it teaches computer programming; it teaches procedural thinking. It teaches how to think like a computer -- if that is what you are out to do. I could not conceive of anything I have less interest in doing as a humanistic educator. I would prefer to have children think like any number of other choices: scientist, artist, scholar ...

Images and ideals govern everything. Here is my image of teaching school. I have a gang of kids in front of me. One is Emily Dickinson. One is Renoir. One is Martha Graham. One is John Muir. One is Isaac Newton. One is Michael Jordan. One is Jasha Heifitz. One is St. Francis. (What a class!)

What do I do? Do I teach them all Logo? What a disaster! Do I teach them all Latin? Another disaster. How about Shakespeare -- or the 100 Great Books? Again, a disaster. Where do I begin? Ideally, I begin where Socrates began in the Agora, where Tolstoy began in his famous educational experiments at Yasnaya Polyana, where A.S. Neill began at Summerhill. I begin by assuming I as the teacher have something to learn before I teach. I must ask each student. "Who are you? What is your peculiar gift? What is your calling in life?" Only you, my student, can teach me that. After I learn that, I can begin to help you become what you

were destined to be. Perhaps this is what Professor Papert would call "kid power." I would certainly regard it as empowerment.

If that destiny is to be a computer hacker, then I would direct the kid to Logo, an excellent programming language for children. And as the kid's teacher I would defend that kid's calling for all I am worth. That is what it means to be the student's midwife.

But I surely would not waste Martha Graham's time by putting her in front of a computer. Prof. Papert would. He believes Logo can teach dancing -- or at least choreography. It can't. Dance is in the muscles, it is in the body, it requires music, it requires free access to open space. I frankly would not care if it took Martha Graham a long time to become written-word literate, let alone computer literate. Her art is her life. Her art is her. That is where her education begins. Maybe it ends there too.

Now just go down the list. Does young Jon Muir need a computer in his life? Would we ask this boy with his passion for wilderness to sit in a classroom stroking a keyboard, staring at simulations of nature on a video terminal, doing turtle graphics? Does St. Francis need a computer, or does he need to preach to the birds -- and again not simulated birds on the video? Maybe Newton needs a computer ... but I doubt even that. He got much of his inspiration from scripture and alchemy. Heifitz needs a violin, not a computer. Renoir needs canvas and brushes. Etc., etc.

Are there no limits to such permissiveness? Yes there are. If the kid wants to tear the wings off flies, I would be concerned that the child was in need of special therapeutic attention. So too if the kid wanted to play nothing but gory video games -- as I see in the video arcades, where I see the boys (always boys), with fixed stares, ripping bodies apart and running up scores. I would worry about that. But otherwise the limits are broad. The kid is a flower that needs to grow, not wax waiting to be stamped.

You see my point. When we speak of making kids "agents of change," the first change they need to make is to create their own right space in the class, in the institution, in the society, in the world. The teacher's job is to defend the kid while he/she achieves that destiny, maybe even to the point of sabotaging the system by letting the kid play hooky and use time for what she/he loves. And the result of this flowering of human possibilities is that we change the world by making it more various. We also perhaps gain inventions, insights, works of art, new computer programs, great visions of God and nature. All this waits in the soul of the child. Every child. In the presence of that sacred trust, Logo can wait, Shakespeare can wait, algebra can wait, the ABCs can wait.

My main critique of Logo in "The Cult of Information" focused on its use as a way of teaching art. I felt that was a telling point. With all due respect, Prof. Papert's notion of art in the Logo curriculum is little short of a caricature. It subordinates art to computer programming. It says thinking like a hacker is what matters for an artist. Which is like the old idea that learning Latin declensions trains the mind for everything. So generations of artists, dancers, nature mystics, athletes, inventors, scientists were required to master the ablative absolute -- while they could have been enriching our culture.

Speaking as a historian, I find that the entire discussion of Logo and of computers generally is historically illiterate. It seems to assume that education -- and maybe childhood -- began with the invention of the computer. So the discussion seems like a frenzied effort to answer the question: How shall we get computers in on this business of education? Maybe that becomes the question if one is working on grants from the computer industry or computer labs who have to come across with ways to sell computers. But how were kids taught before the computer existed?

And indeed before the public schools existed? In fact, there were well-developed kinds of education. Some -- like that of Socrates, Rousseau, William Godwin, Pestalozzi, Maria Montessori -- were as brilliant as they were simple and inexpensive. In contrast, the kind of principled uniformity that Logo would impose is, I believe, deadly to the life of the mind, even when it is brilliantly defended -- as indeed it is by Professor Papert, with whom it is a pleasure to have a significant disagreement.

### **Blame Schools, Not Technology**

**Prof. Papert:** "Would I waste Martha Graham's time by putting her in front of a computer?"

The question has been so evocative for me that I propose to name it after its author in the hope that this will help it enter the permanent repertoire of intellectual exercises for people grappling with the difficult issues of exploring the possible shapes of the learning environment of the future. But "The Roszak Question" is valuable not because it proves any particular point of view but precisely because it is so fecund in provoking a range of responses. Three of the many that jumped into my mind might serve as suggestions for readers to generate their own.

My first response was to remind myself that "the computer" is not a fixed thing but a rapidly evolving concept. The phrase "in front of a computer" is tied to a particular and very early embodiment as the familiar hybrid of typewriter and television set. Perhaps the computer that might be of greatest service to a Martha Graham is not something she would "sit in front of" but something she would carry or wear. The modern form of Logo -- the programming experience that I and my research colleagues at the MIT Media Lab have developed for children -- uses computers the size of a cigarette pack which can be incorporated in Lego models to give them behavior or carried in a pocket to record and reconstruct their movements during a game of tennis ... or a dance. (Beats Laban notation and greatly supplements the camcorder!) Other researchers at the Media Lab are developing even less intrusive "wearable" computers that could ultimately be woven into the fabric of a dancer's clothing. Moral of the story: Thinking about the educational value of computation requires the same leap of imagination beyond its early forms as was needed to see the tiny hop of the Wright Brothers Flyer as the start of a revolution in transportation and indeed of the world economy.

My second response was to remind myself that although in a sense Dance is, as Prof. Roszak tells us, "in the muscles" and requires "access to open space" -- it is also in a culture and it is not ridiculous to conjecture that in an increasingly globally connected world

becoming Martha Graham might be facilitated by access to cyberspace where dancers and choreographers can transcend the limitations of physical space in sharing their work and ideas. Moral: When Keynes was criticized by his snooty Cantabrian colleagues for marrying a dancer he noted that having one's brain connected to muscles in the feet might not be as different as they imagined from having it connected to muscles in the throat. Dancers and economists are also people.

My third response was the most poignant. Images popped into my head of groups of young people who have been helped by what I have come to call "immersion learning of technological fluency" to recover a lost sense of themselves as competent learners. They are the flotsam and jetsam of our failing education system. On day one of a workshop, we see blank and sullen faces. Who could believe that among them might be a Martha Graham or an Isaac Newton? But wait: by the second or third day, a few of them are beginning to feel the exhilaration that comes from pursuing, for the first time in their lives, an intellectually rich project, which might be programming their own video game, creating a computer animation or building a robot using the "programmable brick" computers I mentioned in the first response. They are learning to program the computer, they are learning to find material on the Internet and above all they are learning to manage a complex technical project.

After several weeks, quite a few are producing work of a quality that astonishes everyone -- and not least themselves -- who knew them as school failures and dropouts. An experience that makes essential use of the learnability of technological fluency has created a context in which we can help them -- using Prof. Roszak's apt definition of the primary goal of a good teacher -- become what they are destined to be. But I would characterize what they are destined to be not as a dancer or a writer or a scientist but as a human being who knows that these choices are there. When these kids come into our workshop they have no real idea that such careers exist, or if they do they are convinced that they could never learn what it takes. When they leave, even though the experiences have always been cut too short for lack of material support, an encouraging number go back to work or study in pursuit of a variety of careers that mostly have no more connection with computers than everything does in the modern world. Moral: The much quoted African proverb is really a shorthand for: "You can give a hungry man a fish or you can teach him how to make a fishing rod so that he can apply the lesson to knowing that he can make a bow and arrow or a boat, or learn to be a bard and sing for his supper."

But do we need a computer to conduct such workshops? Prof. Roszak suggests that all we need is a good teacher to help students explore and develop their interests and talents. However, he also suggests that we look at history and charges that I -- or at least my colleagues -- are historically illiterate in our way of talking as if education started with the advent of the computer. I think the boot is on the other foot. If we do look at history, we see that the image of the ideal teacher (which I fully share with him) has been proposed over and over again and has failed to take root in our schools. One might well say that historical illiteracy lies in persisting in repeating the actions that have failed in the past. My version of a historically literate approach is to develop a theory of why the actions failed and look for what might be different in the future. Prof. Roszak is wrong to suggest that I "am quick to

blame teachers" for the failure of school reforms. Quite the contrary: I have proposed and written extensively about a theory of sociological dynamics in which visionary teachers are pitted against the forces of self-preservation of the established system (which I call School, with a capital S to distinguish it from individual schools.) My analysis of the history of computers in schools tells a story in which visionary teachers see it as an instrument of revolutionary change that will liberate them from the anti-learning practices of the one-size-fits-all curriculum favored by a bureaucratic, test-fearing system. But School, like all institutions, resists change and has striven, with considerable success, to force the computer into its own mold and so turn what threatened to be a revolutionary instrument into a bulwark of reaction.

I suggested in my opening remarks some forces that are beginning to turn the tide. But in the meantime, the actual use of computers in education is dominated by the School deformation. The destiny of the computer is to provide the technological infrastructure needed to replace a vision of teaching in which the teacher is a technician of the curriculum by a vision in which computers open opportunities to "learn by doing" and to "direct their own learning" to an extent that was unimaginable by Dewey or Piaget or Socrates or Neill. But most of what we actually see in practice -- and hear in the discourse about technology in education -- is not only dull but profoundly anti-educational. It is easy for critics to fault the way School uses computers. But the real question to address is whether the fault lies with School or with the computer. In my view, most of the criticisms directed against computers are really criticisms of School, whose practices are reflected in its ways of using computers.

I end with an example of this tendency to project the faults of school onto the practice of computers that is especially painful to me. After praising some virtues of Logo, Prof. Roszak recalls that the main critique of it made in his "The Cult of Information" is the caricatural notion of art in what he calls "the Logo curriculum." I could not agree more. I did not make such a monstrosity as a Logo curriculum. I certainly did not tie it to art education. Quite the contrary: My intention was to develop something that would break away from curriculum driven teaching and from School's caricatural versions of all the disciplines (math as much as art). The teaching text that evokes Prof. Roszak's critique illustrates what happened when School "neutralized" Logo as part of its "neutralization" of the computer. It is a caricature of Logo (and especially of me) as much as a caricature of art education.

So what shall we do about it? I make a proposal to Professor Roszak: After we have succeeded in clarifying our differences let's turn them to advantage by launching a joint action to shame the computer billionaires into providing the kind of support that would allow artists and writers and cultural historians and critics who deplore the current low level of artistic values that permeates (with a few wonderful exceptions) the whole field of educational computing to come into the computer culture and improve it. For we have to recognize that for good or for bad computers are going to be in the lives of children. Instead of complaining that it is "for the bad" let's do our best to make it "for the good." And that, my dear Professor, means come in and join us. We need people like you.

## The Business Corruption of Education

**Prof. Roszak:** I assume neither of us expect to see our child-centered vision of education prevail in our troubled public schools at any time in the near future. But if I understand correctly, you have some hope that, in the right hands, ("visionary teachers," as you call them), the computer can be used somewhat like an electronic Trojan Horse to infiltrate enlivening intellectual experience into classrooms where there are now so many "blank and sullen faces." I am all for that. Your aim is commendable, and your optimism heartening. In fact, what you seek to do is not so distant from what Tolstoy was after in his famous libertarian educational experiments. His example, which was obviously pre-computer, has meant much to me, so I will offer you a bit more on his work.

Here is what Tolstoy did to reach the peasant children for whom he built a school on his estate: He swept aside everything that might discourage or inhibit their intellectual growth. No lesson plans, no grading, no classroom protocol, no assignments. He stripped the school down to nothing but young imagination. His technique, as a writer, was to coax the kids into creating stories based on their lives. Now, in Tolstoy's time, schools spent a great deal of time teaching penmanship: endless boring hours of forming letters, with the pen held just so. And then there was grammar and spelling to worry about. Instead of lumbering his pupils with all this, Tolstoy took their stories down from dictation with a stubby pencil, praising the kids at every step, and encouraging them to tell more. The kids quickly took up the task collectively, elaborating one another's tales. Then he presented them with the finished work -- their work. He actually believed that the children were better authors than he was!

I gather you would like to see the computer used somewhat this way -- as a means of skirting all the encumbering rules, breaking through apathy, and stimulating imagination. And you may be right in believing the computer has the best chance of doing that. After all, if you approached schools with a program for taking dictation with a stubby pencil, you know how far you would get. But if you come equipped with state-of-the-art computers, the schools light up and rush to make a place. The computer radiates glamour and prestige; it seems to promise high tech skills and employment. Of course, the "School deformation" may still defeat your grand design, but at least you have some chance to produce healthy change.

So a computer-based curriculum may open up locked doors. But I remain unconvinced that the computer is the only way, or best way to achieve the enlivening of schools we both value. Because unless it is used in exactly the right spirit, it can produce the sort of stultifying result that teaching machines of the past and many forms of computerized instruction produce today. Have you, for example, seen the so-called ecology programs that seek to simulate on the screen what would be better done by a real flower in a pot on the window sill?

I suspect that putting your resources in more teaching talent, smaller classes, and personal attention might be a better choice. In fact, I would bet some of the good results you have achieved with Logo stem from the personal attention. Kids that have been demoralized,



who lack self-esteem and have no interest in learning might be stimulated and empowered by anything that treated them as special and began with what they wanted to learn.

But look -- while you and I have some interesting and rather high level disagreements about pedagogical technique, I sadly sense that most of what we are discussing is beside the point. Has the action not moved elsewhere? I wonder if all you may have labored to achieve with Logo has not been outflanked by a barbarian army that will further corrupt the schools -- and corrupt them with the very instrument you are championing: the computer.

I find myself especially worried about what the computerization of classrooms will produce since the advent of the World Wide Web. After all, the classrooms of the nation are currently being wired primarily to connect the kids with the Web. Indeed, the Web is being touted as the panacea for our schools. The Web has made computers more glitzy than ever -- like the bait that one uses to catch unwitting fish. And the kids are getting hooked.

True, some Web sites are perfectly intelligent, conscientious efforts created by universities, government agencies, publishers, or organizations like the Smithsonian Institution or the Library of Congress.

Others -- the overwhelming majority -- feature celebrity gossip, sports, comics, jokes, personal eccentricity, shopping or pornography. With twenty or thirty machines running material like this in every classroom, one can imagine teachers having some difficulty keeping everybody's attention off the Jenny McCarthy and Disneyland sites and focused on the assignment at hand. Moreover, the Web is a holy mess to use, based as it is on no sensible intellectual structure. If anything, it has proven the absurdity of the key word search.

In any case, almost all the search engines are commercially sponsored (some actually rent out key words!) and feature advertising, much of it enticingly presented with lots of colors and blinking lights and cartoony images. Sometimes there is a prize for choosing this or that link, or maybe an Elvis Presley sighting is promised. Or there might be a big, bright link that says Don't Click Here! If you do, you get a Dr. Pepper advertisement or some such. Like television Channel One, this is simply assimilating the school to the media marketplace.

I talked with a librarian recently who was approached by a student who had to do a paper on sharks. She found him a couple of excellent books and articles. He insisted on using the Web; his teacher had insisted that he use the Web! After a long search, what he came up with were scores of hits for teams named "Sharks," software firms called "Sharknet" and such, products called "Shark --," ads for hunting and fishing equipment, some scattered private sites that kept track of shark attacks, beach front spas and hotels that featured shark on the menu, bookstores and video stores selling books and feature films about sharks ... but no basic, reliable information about sharks -- except for the article in the Encyclopedia Britannica. Some sites required downloading video and sound plug-ins that overwhelmed the computer. The "refinement" system offered to improve the search was as

inane as anything in a Jorge Borges story: "include fish," "exclude turtles," "include fish: catching," "exclude fish: eating." And this was Alta Vista, the best of the engines!

The hackers who have tried to introduce some sane order into this chaos have reinvented the wheel -- and it has come out square.

John Gage of Sun Microsystems, the promoter of Netday, calls the Web "a world of information." I would call it a swamp of trivia, a slough of distraction. I am already teaching students in college who think "research" means rambling randomly around the Web and printing out everything they find. I see them floundering in a technology they do not understand and cannot manage. What they are up against is the product of minds that have no essential interest in learning, nor even in culture. They are technicians showing off their skill and entrepreneurs showing off their merchandise. For people like this, writers, artists, and thinkers are mere "content-providers" that one works in afterwards.

What a commentary on the Information Age! Rembrandt, Dante, Sophocles ... content-providers!

But what else would one expect? The Web is the brainchild of an entrepreneurial world view. It favors high-tech effects and attention-grabbing tricks. The businesses behind it are seeking desperately to transform the medium into the new television, the new movies. Their objective is to get millions to look at their site so that they can make a ton of money. This is no secret; the main, ongoing story about the Web is how much profit its backers are taking in. What passes through a medium like that is bound to be shaped by commercial values, not by any significant regard for quality, truth, or taste. Used as a teaching device, the Web is an expensive way to distract attention and clutter the mind. I would not see it eliminated from our society for that reason, but neither would I choose it as an educational resource. Over the generations, teachers have evolved skills to encourage a respect for quality, truth, and good taste. I'm not sure I understand why we should, at the behest of entrepreneurial elements, now decide to retire those skills in favor of Yahoooligans!

I endorse your values, Seymour. But the machine they are attached to may be a Trojan Horse that works against us, not for us.

## **Digital Technology's Dangers, Benefits**

**Prof. Papert:** Once more, Prof. Roszak puts his finger on a key question that is missed by most commentators, critics and advocates alike. I recast it slightly. Can the educational techniques developed over past generations cope with the dangers as well as the opportunities created by digital technologies? I firmly believe that the answer is a loud "no." But I do not see the choice before us as either excluding computers and the Web from the lives of children or retiring our values in favor of the Yahoooligans. What is needed (as much by parents as by teachers) is new approaches to learning, new skills for guiding the development of young minds.

The enemy to combat in this task is not the Yahoooligans, but the idea of placing many computers in otherwise unchanged schools. Taking advantage of the new opportunities as well as circumventing the dangers requires far-reaching changes in the content and educational methods that have been built into the very idea of school. Professor Roszak's stories make my point at least as well as his. When students confuse random surfing with doing research, you can blame the Web for giving them the opportunity to surf or you can blame School for not giving them a better understanding of research. I prefer the latter, though with the proviso that I am not blaming teachers but rather a system that places more value (Mr. President, please take note) on ensuring that children pack their brains with fixed knowledge determined in advance by designers of tests than on learning the research skills that would lead them to acquire the knowledge they will need when they need it in the rapidly changing world of the future. In a similar vein, I note that students who have really acquired "a respect for quality, truth, and good taste" have no trouble distinguishing between what is of value and what is trash on the Web and elsewhere. Every student who cannot do this is a sign that despite the experience of many generations, School is failing in this most important responsibility.

Prof. Roszak and I seem to agree at least in some large measure on what kind of alternative form of education would do better. We differ in the conclusions we draw from looking at how badly the technology is being used today. I have been as fierce as he in my criticism of the actual uses of computers in most schools ... as well as of the so called educational software being bought by parents. Yet he is wrong in supposing that I do not expect to see widespread shifts to "child-centered" learning "anytime soon." To explain my optimism, I have often used an analogy between several aspects of School as we know it and the fall of the Soviet command economy.

A first analogy is in the simple observation that less than 20 years ago, virtually all observers thought that the Soviet system would not change "anytime soon." Surely School is not any more firmly entrenched. A deeper analogy lies in the observation that the core fault that made the Soviet economy increasingly unviable in the modern world is very similar to what makes our Schools increasingly out of step with our society. The set of ideas, including the one-size-for-all curriculum, the system of testing, the authoritarian class all fit the pattern of a "Gosplan for learning." The freer approach to teaching and learning described by Professor Roszak as well as by me is far closer to the spirit of individualism and free enterprise that most readers of [The Wall Street Journal] would no doubt advocate as the only viable form for an economy compatible with the digital age. And in the last analysis this is why I am sure the change will come.

But why are we not seeing it happen? Two further analogies with the Soviet story elucidate this. The first of these is the "Gorbachev phenomenon." In the mid-80s, when it was already clear that the system was in deep trouble, Gorbachev still tried to tinker with Communism, to jigger the system using the same word "perestroika" or "restructuring," just as we see from those who are trying to jigger School without making fundamental change. It took time, though not much, to bring the understanding that in Russia a more radical change was required.

My final analogy relates the chaos we are now seeing in Russia to the chaotic effects Professor Roszak sees and anticipates in the wake of injecting the Web into School. A free enterprise economy requires much more than allowing everyone to go into business. It requires a system of laws and business practices and social customs. In short, a culture. Until this emerges, as surely it will, we must expect to see chaos. Similarly, free and open learning will not magically come into being as soon as the opportunity for free exploration of knowledge is offered. The growth of an appropriate culture will need time, intellectual effort and moral dedication. It would be facilitated by far greater financial resources than our government agencies seem ready to give. It would certainly gain from the participation of people like Prof. Roszak. Once more, Ted, I invite and challenge you to join in.

### **Using the Web as an Educational Tool -- or Not**

**Prof. Roszak:** Prof. Papert: I would amend your characterization of the American economy in one important way that relates to our discussion. The strength of our system lies in its remarkable internal diversity. Not that anybody planned it that way (least of all the business community), but we have evolved into a mixed economy that has been able to retain the driving energy of free enterprise by taming many of its worst features. The Social Darwinists fought tooth and nail against it, but through a century of reform that began with the Progressives, we have managed to make the public interest count for something against those whom Teddy Roosevelt called "malefactors of great wealth." The economy we now have is a spectrum that includes:

1. A private sector that is always trying to expand its powers.
2. A public sector that owns and manages much and which also includes the regulatory apparatus the private sector makes necessary.
3. A non-profit privatized sector that runs such things as churches, private schools and private museums.
4. A philanthropic sector that functions as the conscience of the private sector.
5. A volunteer sector that performs many social services.
6. And an all-too-small cooperative sector.

We might also include:

7. A family-domestic sector where unpaid parenting, disabled and elder care, and much basic education take place.
8. And an underground or moonlighting sector that operates off the books.

Finally, need I add?

9. We have a robust criminal sector that does quite nicely handling all our illegal commerce.

Rarely do these sectors operate in their pure form; all of them mix and mingle in ways that make our economy a lively spectacle. But each represents a distinctly different take on the values of life. For example, we now have a growing hybrid public-private sector that has taken over subsidized, profit-guaranteed public services like welfare and prisons. A very worrisome development.

Now, this resilient diversity allows us to choose different instruments for different functions. So when we turn to education, we need to ask which of these might do the job best. I frankly cannot think of a single good contribution to education that has been made by the private, profit-making sector in and of itself, unless we count the business it does selling supplies and contracting services for schools. But it is absurd to expect much more from the private sector. It has its own peculiar goals and values; they are not the education of the young unless as apprentices to the firm. When entrepreneurs come up with educational ideas it is something like Channel One -- a crass, commercial outlet in the classroom.

American education has always been best entrusted to some combination the public, the non-profit, the philanthropic, the domestic, and the volunteer sectors, where it is apt to be pursued for love -- not for money by people with some calling for the task and some concern for children.

So here is the problem about the current use of computers in the schools: It is a design for education wholly developed by the private sector and promoted by the same hype used to sell everything else. Just read the reports as they roll in. Everybody wants to know when the Web will start making big money. In my eyes, that makes it a bad choice.

Take the case in point: If we can agree that the World Wide Web is the current hot topic in educational computing, then I may be able to refine my criticism. The Web concentrates and magnifies most of what I find worrisome. Is the Web worth the time, energy, and money it is now attracting? In my skeptical view, absolutely not. The Web was developed to find some way to make money off the Internet, which was essentially a delightfully free-wheeling, anarchist public utility. While there are public, non-profit, volunteer, and philanthropic elements on the Web, the medium is being elaborated for entrepreneurial purposes -- primarily selling computers and their software. The World Wide Web is unabashedly an advertising medium, though maybe not a profitable one. The main information kids will find on it is advertising. All the search engines used to find anything are rigged with advertising. Every information-bearing homepage is studded with advertising. The main reason enthusiasts want it in the schools is to deliver advertising. If you don't believe me, try suggesting that all advertising be eliminated from computers used in schools. Just try. You will be told this is a technical impossibility. It isn't.

The technical glitz and glamour of the Web are used as you might expect in a commercial arena. They function as bait to get the schools wired and to pressure them to upgrade equipment. Spending money to wire your school is a the first step toward spending a lot more money after you're wired. Because the World Wide Web is very, very slow unless it is run on ISDN, with fast equipment and the latest software, none of which is free. I would

regard all freebies from the computer industry the way I would a free sample from your friendly, neighborhood crack dealer. The money that is spent by those who take the bait could be better spent -- either on your high ideals, Prof. Papert, or simply (as I would prefer) on more good teachers, smaller classes, books, maps, videos ... and many other relatively inexpensive educational materials.

Not that I would exclude computers entirely. They have an obvious role to play in some fields of instruction. But the effort to focus education exclusively on the Web, and indeed to convince kids that everything is on the Web makes computers positively detrimental in the classroom. Far less than "everything" is there, and what is there is mostly junk or trivia. Imagine a school library where anybody could place anything on the shelves in any order and go on to cover the walls with posters and graffiti. What would the result be?

Let me use the library as a good contrast here. The greatest mistake the Web designers made was to assume that they were so new in the world that they had nothing to learn from the surrounding culture. Wrong!

The libraries of the nation are an inherited intellectual structure of great sophistication that has always operated in the public interest. These days one comes upon high praise for Yahoo! for having created a set of sub-headings for keyword searches. Talk about reinventing the wheel! Have these people never heard of the Library of Congress or Dewey cataloging systems? By comparison, Yahoo's system is like something out of a Borges novel. So too the refinements for search engines: They are like a bad joke. These bungling improvisations actually impoverish the culture by giving children the worst rather than the best.

By failing to consult with the society's prime information institution -- the library -- the Web hackers made every foolish mistake one can make. They may have been too philistine to know that one can frequently get more reliable information out of a free five minute phone call to any nearby library (one of my main research tools) than from hours of clicking on the Web, but I suspect the main reason they left libraries out of account was because libraries are an example of how public, non-profit, and philanthropical institutions deal with the life of the mind.

A case in point: I recently asked a librarian if she would consider renting out space on her on-line catalogue. She frankly could not understand me. So I explained: If someone enters the key word "automobile" or types in the subject "Henry Ford," they would get a nice bright commercial on screen from a local car dealer. If they type in "Japan," they would get a commercial for a local travel agency. The librarian was sincerely horrified. "We would never do that," she said.

That is the voice of public service. The librarian belongs to a profession whose ethics and methods date back to the great library at Alexandria. Over the centuries, librarians have found ways to balance access with preservation, intellectual freedom with quality control. They are still the best source of quick, reliable reference help in the information age. And they have developed excellent systems for keeping track of enormous and growing

amounts of material in all media. Now if the Web had started with the Library of Congress, if its search engines had been designed by the American Library Association, if the Web had been organized like a grand on-line reference service, it would be a wholly different educational resource today. Instead, it has become an electronic billboard. I frankly fear for what will become of our schools as the Web engulfs more of the school system.

My own hope is that the Web will prove to be a commercial failure and revert to something like a graphic version of the old Internet ... or perhaps be dumped into the lap of the public library system for radical reconstruction -- with a subsidy that will allow the libraries -- including school libraries -- to prosper. This powerful instrument belongs under the control of those who believe in public service and who can lend it a robust cultural foundation. I would trust the librarians and teachers of the nation to champion the enduring value of books, the importance of the ideas found in books, and the complexity of the culture raised up upon those books. I would go farther. I would even suggest there is a quality of attention, reflection, and intellectual plasticity that derives from the habit of reading -- the ability to track through from start to finish, to connect, compare, contrast -- that is essential to a significant range of public issues -- more so than anything one gains from hypertextual skimming. I agree that culture becomes stuffy and oppressive when we say that print literacy is the best or only exercise of the mind. It isn't, but its virtues should be obvious from even the most cursory examination of the world's culture. The book belongs to a rich and necessary way of thinking that should be enhanced, not degraded. It encourages a certain ethical and psychological autonomy based upon the value of taking counsel with yourself in a quiet, personal place. I think we are losing that capacity, and for no better reason than to make the computer industry and its enthusiasts rich.

Let me make a wager. If our objective is to teach children to think, let us try the following exercise. Let me have a class of average high school or college-age students equipped with a single paperback classic. Since I have recently written a novel based on Mary Shelley's *Frankenstein*, (The Memoirs of Elizabeth Frankenstein) let the book be *Frankenstein*, a seemingly appropriate technological thriller. Price: maybe \$2.00 per student. At most, let me supplement with a few videocassette rentals: price -- \$5.00 for the whole class. For the sake of the exercise, no computers allowed except for word-processing, but let me have access to a standard school library for reading assignments and reference support. I could use any room anywhere that was quiet ... or a few park benches out of doors.

Take another class and let it do anything you want that is essentially computer-based: Logo, World Wide Web, multi-media, Encarta ... Now, mind, the object here would not be to teach *Frankenstein*, but to teach thinking. I will wager that I can do as measurably good a job of teaching the elements of thought for \$2.00 per student as anybody can do with a roomful of computers. That is: using one book over a period of (say) 10 weeks, I could teach the difference between fact and interpretation, how to choose among interpretations, the meaning of myth, metaphor and symbol, how to elicit and deal with the subtext, the role of imagination in learning, the relationship of fiction to history, the structure of narrative, methods of research, how to find information and bibliography, the art of story telling, and not least -- the joy of personal discovery. Whether the kids also learned anything about Mary Shelley and *Frankenstein* would be strictly secondary.

I think you can see what I am about. What I propose is one of the oldest forms of education we have: exposition of text. It is not my favorite way of teaching, but it is soundly traditional and so makes for a strong contrast with high tech. I realize this method can be supplemented by computers. But I suspect it would lose nothing of value by doing without them.

Oh yes ... I would need a blackboard.

## **Use Technology to Make *Real* Change in Schools**

Great! I accept. His wager once more shows Prof. Roszak's flair for putting his finger on superbly insightful issues and then refusing to draw the obvious conclusions. The Roszak wager, like the Roszak question about Martha Graham, gives concrete form to the radical difference between two kinds of question: fundamental questions about what serious educators can in principle do with digital technologies and superficial questions about the medley of poor and even harmful ways in which it is most often used. Let me develop the point by restating my position and my reading of Prof. Roszak's on one aspect of the big question.

I summarize my position in four propositions. First, digital technologies can in principle permit much more than incremental, improvements in learning. Second, the question facing educators is not whether to have them or not to have them; digital technologies will inexorably come to play an ever growing role in the lives of children. Third, I have been at least as vociferous as Prof. Roszak, Neil Postman, Clifford Stoll and the other cybercritics in making it clear that what is being done today in (let me guess) 99% of school and home uses of computers falls far short of what could be done -- and often goes in exactly the wrong direction. But fourth, my reaction is not to scream bloody murder about how terrible things are but to look pragmatically for ways to close the gap between the good in principle and the bad in practice.

Consider an example. Prof. Roszak tells us: "The main information kids will find on [the Web] is advertising" ... "what is there is mostly junk or trivia." I refrain from objecting to the element of exaggeration: He has a real point even if he states it a little hysterically. A more important kind of objection is that one could say the same about other media: Surely, most of the printed stuff in the world is junk or trivia. What do we do about it? Prof. Roszak himself formulated it rather well in an earlier intervention: "Over the generations, teachers have evolved skills to encourage a respect for quality, truth, and good taste." A goal of education is to enable young people to learn to discriminate and if I had a group of "average" high school students for the ten week period suggested in the conditions of the wager I am sure that many of them would develop greater proficiency at obtaining and using knowledge than they did from their ten years of school experience. So in the end, I don't care very much if "most" of what is on the Web is junk. What matters is that young people learn to use the very considerable resources that are not junk.

Prof. Roszak's ridiculing of the search engines calls for a similar response. Of course, we need better search engines and other software. But although I work hard to promote and



develop such materials, in the meantime, I regularly use the Web to get information. Of course, this needs skills that go beyond the silly instructions he so easily ridicules. Is this really so bad? I think my wager students would acquire these skills and find them useful in many contexts of life and work besides searching the Web.

Should the wager experiment actually be carried out? I believe that it does some good (though I think more for me than for its author) even as a thought experiment. It reminds us to make a clear distinction between two contexts for discussing the educational value of digital technology. In one context we try to assess what happens if a lot of computers with Web connection and current commercial "educational" software are dumped in an otherwise unchanged school. In the other we discuss how the technology can support the work of a dedicated educator who has had the opportunity to acquire real technological fluency and who is not locked in to the Procrustean bed of School's old ways of doing things. Most of the writings of the cybercritics are relevant only to the first context. They would do less harm, and even a lot of good, if everyone had the distinction clearly in mind.

They would do good because their arguments would turn into an incitement to schools and policy makers to ask themselves -- and even most of the ardent cybertopians would gain by doing so -- whether their model of bringing computers into schools really assumes the first context. But in order to recognize that their current policies really consist of placing computers in essentially unchanged schools, they might need concrete models of more substantial change and really doing the Roszak wager experiment would make a substantial addition to the rather slim (though growing) stock of good models of using technology to make real change in schools.

So in conclusion, I challenge Prof. Roszak, or any other educator who shares his values, skills and attitudes, to do it. I also challenge corporations and individuals who care about the future of children to contribute to conducting the experiment well: On the technology side, we should have appropriate technology, and on both sides we should have the means to record, analyze and publish what happens in finely textured detail. In the end, the point will not be who "wins" -- though I would not mind having a panel of judges and a pot of prize money to which I offer an initial contribution of \$1000 -- but rather a record that would allow a less abstract discussion about learning through these very different media.