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Cover photos by Stephen Sagarin and Jeffrey Kane

Editorial:
Educational Technology, or the Power and Impotence of Ideas

There is no doubt that new information technologies are becoming an ever more prominent part of the American educational landscape. There is doubt, however, about what these technologies can contribute to the growth of children and whole human beings. How do electronically mediated activities affect a child's capacity not only to process information but also to experience ideas — ideas as a form of inner movement? Are these activities a source of communion with the creative in nature; do they strengthen and nourish the body and soul? If we as human beings are more than information processors, if ideas are more than intellectuals' grist, if thinking is more than intelligence applied to practical need; then do new information technologies encourage full human development, or might they distort it?

The irony in addressing such questions is that the very intellectual dispositions that enable us to create new technologies also severely limit our capacity to live active inner lives. These dispositions also limit our capacity to recognize how education, with or without technological advancements, breeds more cynicism than enthusiasm for life, more disappointed self-interest than selfless compassion, more personal weakness that masquerades as bravado than strength that shows itself as moral commitment. This is not to suggest that education should shape personality, but rather that the experiences and challenges we provide through education necessarily shape human character — the way one takes one's stand as a human being in the world.

The intellectual dispositions that gave rise to modern technology have their roots, in part, in the work of Francis Bacon in the late 16th and early 17th centuries. Bacon suggested a model of understanding in which knowledge was power. He proposed an experimental foundation for inquiry — a foundation upon which modern science evolved — intended to attain mastery over nature. Today, at the close of the 20th century, this conception of science has enabled us to achieve an almost unimaginable mastery over nature, from the splitting of atoms to the splicing of genes. Yet, furthermore, we are at the dawn of the age of information in which we have learned to exercise control, not only over nature, but also over information.

Some modern information technologies can perform over 10 million operations per second, and others can distribute data around the world at the speed of light. Millions of binary electronic switches shift in nanoseconds, and volumes of information course in electron streams past physical barriers that once limited analysis and communication. However, as such knowledge is power, information technologies have created new and intellectual energies as promising and dangerous as the physical energies unleashed with nuclear fission.

The immense potential and destructive capacity of our information technologies result from a narrowing of our cultural perspective: Where we once searched for understanding, we now seek power; where questions were asked in terms of meaning, purpose, and responsibility, our answers have come to us in terms of utility and efficiency. Baconian science sharpened our capacity for inquiry, but limited the questions to be addressed. Modern information technologies have further honed this capacity to a laser's edge, but threaten to cast the larger meaning of and context for human existence into darkness.

This is not to argue that technology itself is responsible for a decline in Western culture, or for the creation of a generation of automatons seated before personal computer keyboards and monitors. Rather, it is to say that information technologies capitalize on the clarity but exacerbate the Western cultural tendency to limit thinking to questions of power rather than purpose, of means rather than meaning, of efficiency rather than epiphany.

Our modern information technologies do not lend themselves to the exploration of ideas that evolve in complex and often ambiguous human contexts. They rarely allow the time for an individual to consider the struggles for identity or for moral direction that are often riddled with the ambiguities of experience. They do not convey the power and scope, stories and

metaphors, that for generations have passed from human being to human being with the foundations for judgments that enable us to take on our daily tasks with perspective and direction. Perhaps the most dangerous aspect of information technologies is that they provide such calculating power that they can limit our capacity to recognize that such issues exist; such issues fall through even the most tightly woven binary nets.

The irony here is that for all the power to analyze and transmit data, there is an unconscious assumption that ideas have no real power — that ideas, like the elements of nature, are grist for mechanization. Few see ideas as providing motivation or as a form of enlightenment, joy, inner experience, communion with others, or perhaps, even the Divine. It *seems* there is little difference between an idea that exists in someone's mind and data that exist in the electronic memory of a computer. The relationship between thinking and being human is almost lost altogether. Broader and deeper questions of identity, purpose, responsibility, and freedom seem like so much impractical abstraction rather than burning issues that rise from the center of our being.

Educational technologists may argue that advances in educational hardware and software can provide unprecedented aesthetic experiences, and that mechanistic depictions of computers are, like so many phantoms, fictions born of fear. Yet, few recognize that even the concept of aesthetic experience has become limited. The graphic arts and music technology programs focus purely on the generative rather than the receptive aspects of aesthetic experience. Their intention is to provide vehicles for expression and for the manipulation of color and sound in that context. Their purpose is neither to create a silence into which may enter the creative forces that work through nature, nor to create a pathway for aesthetic perception and inner activity. The programs facilitate expression, but do not deepen experience.

These are not properties of technology that can be remedied through technological advancement; they are embedded in the thinking, in the presuppositions and intellectual dispositions that form the technological bedrock. The biases of the mode of thinking that undergird technology constitute ideas that are themselves invisible to those deeply engaged in technology. It is understandable, in this context, that propo-

nents of the development of educational technology in particular, absurdly, can boast that information technologies are culturally neutral — "objective" conveyors of information — and that they will create a revolution which will transform schools, learning, and human knowledge itself.

As noted computer scientist Joseph Weizenbaum explains, educational technologists bear Mephistophelian gifts. "They provide us with a lure which tempts us in," he states, "and we may lose our souls." The irony here is that our inner vision is already dim. We may be so thoroughly beguiled by the power we have acquired that we may fail to notice how much of our humanity has been lost and is endangered.

In a similar vein, we have become so enamored with the ideas undergirding modern technology and the powers demonstrated by it that we have failed to critically evaluate its actual effectiveness in education. Why have we so readily accepted the idea of a

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technologically based revolution in education — a revolution that can radically transform virtually every facet of the educational process? Is there a body of cohesive and substantive research that does not suffer from sterility and detachment — that would give us reason to pronounce a revolution has rightly begun? Is it possible that we have dulled our powers of critical assessment? Is it possible that our faith in technology has created an educational marketplace without fundamental accountability — a marketplace where billions of dollars are to be made on the promise of technology?

The purpose of this issue of *Holistic Education Review* is to begin exploring our faith in and the promise of educational technology. The authors in this issue offer insights into the economic, political, cultural, and physiological aspects of a technological revolution of education. Where are we headed? Why? Who is leading the way? What are the costs?

— Jeffrey Kane, Editor

The Regime of
Technology in Education

Douglas D. Noble

The impulse to introduce technologies into education reflects not so much the use of technology in the service of education as the ongoing usurpation of education in the service of technological enterprise.

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Public schooling is once again ripe for colonization by the powerful forces behind technological development in this country. Corporate marketeers and technocrat politicians, joined by an eager stable of high-tech researchers and sycophantic educators, are now more determined than ever to refine the means and to redefine the ends of public schooling according to their visions of a technology-driven economy. And their seductive technological excursions in the classroom once again reflect not so much the use of technology in the service of education as the usurpation of education in the service of technological enterprise.

In recent years, countless reformers have decried the regime of U.S. public schooling, with its exasperating historical, cultural, bureaucratic, and pedagogical barriers to technological innovation. Yet little critical attention has been paid to the cultural character and the political economy of another regime, made up of those institutional forces fueling the ongoing impulse to change the public schools through technology. What is this regime of technology in education? What is its history? Who are the key players driving and shaping the use of computers and telecommunications in schools? And what are their visions for education? The story, of course, is a complex one, reflecting a confluence of many agendas and many visions. Some are alarmingly hard-edged, seemingly antihuman, while others appear seductively progressive and humane, when contrasted with the current conditions of public schooling. Despite these deceptive differences, the intersection of interests is sufficient for us to begin to identify this loose amalgam as a regime, a regime of technology in education. In this article, rather than focus on classrooms and schools, I will attempt to situate this regime of technology within the larger historical and institutional contexts responsible for the persistent impulse to align education with technology.

I must note at the outset that the place of technology in education is as ambiguous as the place of

sexuality in private life: Each is marginal and incidental, yet also somehow pervasive and definitive. When I talk to my teacher friends in public schools, or when I offer to conduct workshops on issues related to educational technology for teachers and teacher educators, I'm reminded again and again how relatively insignificant for them are issues of technology, amidst the range of pressing concerns in urban education. One meets, of course, the occasional enthusiast among teachers, someone whose desk overflows with the latest software packages, or who is involved in a truly innovative project in school computer use — by one account, as rare as whale sightings.[1] Occasional surveys, too, find that most teachers nationwide celebrate the importance of computers in schools, while other surveys find that most teachers still have never used one. By and large, however, despite the several billions spent in the last decade on school computers, most educators I know are focused elsewhere — on diminishing state resources, fragmented and deteriorating health- and child-support services, massive racial and class inequities, ongoing family disintegration, rampant drug abuse and violence.

In fact, because of these more pressing, often seemingly insurmountable, priorities, I was at first reluctant to write still another article on educational technology. Attention paid to technology seemed a luxurious distraction from, if not an abandonment of, the real concerns and deeper purposes of public education. Yet this is precisely the point to be made here.

Computer technology represents for many powerful interests the solution to, if not an escape from, the social, political, cultural, and economic dilemmas ravaging public education. Indeed, for key corporate and political interests, ongoing research and development in computer technology offers the potential (and potential profit) of dramatically "reinvented" means of educational delivery. For these interests, such technological research and development signals, as well, a redefinition of the very meaning and purpose of education, now seen as part of the technical infrastructure, the human capital supply system, for advanced technological society.

So while technology remains in many respects still quite marginal to public education despite decades of haphazard implementation and massive public expenditure, it nevertheless occupies center stage for key political and corporate architects of education policy in the 1990s, many of whom have reached the point of exasperation with the continuing intransigence of public schooling. We are entering a phase of education policy in which technology will be called upon increasingly to "break the mold," to end the "gridlock," of public schooling, and to ensure an efficient delivery system of "human resources" with the generic, technical, "problem-solving" skills required within technological systems of the new global economy. Technology has become the centerpiece of the redesign and reinvention of public education by outside forces, serving both as the impetus for this redesign and, increasingly, as its lever.

Of course, public education is in need of reshaping, and prominent progressive educators have been active over the past decade in programs and coalitions intended to disengage public schooling from the structural legacies that inhibit more humane approaches and purposes. Ted Sizer, Henry Levin, James Comer, Deborah Meier, and others have all been involved, in one form or another, with this educational "restructuring," which, at its best, enhances autonomy, flexibility, collaboration, equity, and holistic approaches to children's learning. This is also a moment of efflorescence for progressive impulses in education — whole language, authentic assessment, site-based management, and antiracist curricula. In some cases, technology is employed to further these agendas, and an appreciation of the changing technological landscape of the workplace and the economy often serves as a backdrop for such efforts, especially for economists such as Levin, who has contributed substantially to our understanding of these changes. Despite this backdrop, however, the pivotal concerns of these educators are equity and empowerment — the education of all children, not so much to function in some future technological scenario (within which, almost by definition, most have already been written off) as to understand and to engage the present circumstances of their individual and collective lives, and to help forge a humane technological landscape for the future.

Seductively aligned with these efforts, in rhetoric if not also in practice, is an array of corporate promoters and technologists whose agendas, ultimately, have less to do with issues of equity or even of education, broadly conceived, than with furthering technological development (and potential profit), through research and development in the public arena, through the merchandising of hardware and software, and through the reshaping of educational systems both to facilitate their technological colonization and to ensure the training of a reliable cadre of

adaptable "problem solvers" and technicians. These agendas come with an abundance of resources — both financial and political — that dwarf those available to progressive educators unwilling to adorn their efforts with technological or vocational trappings. Consequently, many adopt these trappings, hoping all the while to maintain the scope and integrity of their visions, just as, early in this century, John Dewey and other progressives hoped vainly to forge a humane response to industrialism by turning the powerful vocational impulse of a National Association of Manufacturers coalition to their own progessive ends.

Once again we are at a crossroads in American education, with child-centered advocates of humane alternatives to a broken school system joining forces with the "educational engineers," inheritors of a century-long enterprise whose legacy includes vocationalism, standardized testing, a cult of administrative efficiency, behaviorist and now cognitivist learning theory, and an arsenal of technologies from programmed instruction to teaching machines.

Here I introduce the principal forces behind the alignment of technology and education, so that we might perhaps become more appropriately suspicious of strangers in three-piece suits bearing gifts, and more vigilant in our partnerships to restructure education for the 21st century. Technology in education is not simply a matter of multimedia presentations and computers in schools; for over 30 years its promoters have been telling us that it is about a fundamental redefinition of the means and ends of education. In the current educational environment, in which corporate partnerships abound, in which the line between public and private blurs steadily, in which talk of redesign and reinvention of public schooling is common fare, in which a resurrected vocationalism for a technological age ("tech prep") is rampant, in which public schooling is in desperate straits, the time is ripe for a technology-driven escapade in educational engineering the scope of which we have not seen before. What follows is a scorecard of some of the key players.

The military legacy

First, some history. Although it is not widely understood, military research in what is called "human engineering" — training, human factors in weapons design, personnel classification and selection — has been the prime incubator, catalyst, and sponsor of educational technology throughout this century, from the intelligence tests of World War I, to programmed instruction and teaching machines in the 1960s, to the sophisticated computer-based multimedia and tutoring systems of today. Decades of military training research have also provided the impetus behind the development of criterion-referenced testing, mastery learning, and the refined use of behavioral objectives in instruction. Military agencies have been the source of three-fourths of all funding for educational technology research over the past three decades, and within government agencies, the military spends seven dollars for every civilian dollar spent on educational technology research. Each year the military spends as much on educational technology research as the Department (formerly Office) of Education has spent in a quarter-century.[2]

Since the late 1950s military research has been the pivotal player in advancing the state-of-the-art of computer-based education, and its influence continues today, at the cutting edge of new developments in the field. As I have traced in my book, *The Classroom Arsenal*, computer-based education grew out of military research and development in the late 1950s at the juncture of two fields: training science and what is now called computer science. Within training science the field arose from a military fascination with what was labeled "automated teaching," involving programmed instruction, teaching machines, and other training devices and simulators. With rapid turnover of personnel and rapid technological obsolescence, the automation of ongoing technical training has long been a military priority. Computer-based training began as an attempt to embed "on-line" training into weapon systems and command-and-control systems themselves, which could then train their "human components" as the need arose, automatically. Human beings were considered the "personnel subsystem" of an increasingly sophisticated military technological infrastructure, which was and continues to be of primary concern within the military.

This trend toward dissolving training functions within systems operations, eliminating the distinction between training and job performance, remains central today. Training technology is increasingly seen as merely one among many "engineering" functions serving high performance systems, providing the automated technical training of a steadily diminishing number of required human components. The ultimate military technological fantasy calls for total automation of military high performance technol-

ogy, eliminating any need for training, for instructors, or for people generally — the fulfillment of the longstanding ideal of the totally automated battlefield, "war without men."

Indeed, within nascent computer science in the 1950s, the field of computer-based education grew out of research on troublesome "human factors" problems arising within military computer-based command-and-control and weapon systems. These problems generated interest in how best to improve or to supplant human capacities for processing information within large computer-based systems characterized by superhuman performance speeds and overwhelming information loads. Military research in this area gave birth to the twin fields of information-processing cognitive psychology and artificial intelligence, now merged under the rubric "cognitive science," still largely military funded. Through computer simulation of human intelligence, the military has striven to develop an array of "smart" weapon systems, from intelligent bombs and aircraft, to tanks that might fix themselves and "perceive" terrain, to totally automated battlefield management systems. Short of this, artificial intelligence and cognitive science research in the military has also been directed toward the development of a codified map of "human cognitive performance for defense use" and an arsenal of "intelligent tutoring systems" for embedded training. The birth of computer-based training and cognitive science occurred simultaneously within the same military projects in air defense in the late 1950s, and the field of computers in education remains wedded to computer-based research on human cognition, intelligence, and learning today, still funded substantially by the military. Many of the principal players in computer-based education research and development, as well as many of the most prominent educational researchers in cognitive science and learning research, originally cut their teeth in military research and continue to find much support for their work from military agencies. These individuals include such leading figures in computer education research as National Academy of Education member John Seeley Brown, of Xerox and its Institute for Research on Learning; Seymour Papert of the MIT Artificial Intelligence Lab and Media Lab, and developer of LOGO (originally

funded by the Office of Naval Research); and Roger Schank, founder of the Institute for Learning Sciences at Northwestern, lavishly funded by military agencies, as well as by such high-tech corporations as IBM, Ameritech, and Arthur Andersen.

The work of a virtual who's who of cognitive science and educational research has been shaped in whole or part by military contracts, including the work of such luminaries of the National Academy of Education as Robert Gagne and Robert Glaser, who continue to work on military projects on human performance, and Lauren Resnick, director of the Learning Research and Development Center at the University of Pittsburgh and a pivotal figure in current efforts to reform education through national standards. (By no surprise, Resnick's 1987 presidential address to the American

*T*hough rarely noted, the overriding emphasis on student performance in recent educational reform is in part a direct reflection of this wider military/industrial emphasis on job performance skills and measures.

Education Research Association was co-sponsored by the Office of Naval Research). Other educational researchers engaged in current reform efforts who have also, often simultaneously, been engaged in military-funded research on human performance and cognition or "learning science" include Allan Collins, Richard Shavelson, Richard C. Anderson, Richard Snow, and M. C. Wittrock.

These hybrid activities of key educational researchers have substantially colored the complexion of research in education, from an earlier focus on behavioral objectives and criterion-referenced testing, to more recent emphases on "problem-solving" skills, "learning strategies," and "performance" measures. To cite just a few recent examples, the largest coordinated effort in the area of "authentic" performance assessment, now the rage in education, has not taken place in the schools; rather, it has been the multimillion dollar Joint-Service Job Performance/Enlistment Standards Project, conducted over the past decade by the Department of Defense, with educational researchers Glaser, Shavelson, and others on board.[3] Many educational researchers now

codifying "workforce skills" for high school students also have career histories winding through military laboratories and funding agencies.[4] And the codification of "computer literacy" skills for schools was entrusted by the Department of Education to the Human Resources Research Organization, originally the principal human factors laboratory of the U.S. Army. Though rarely noted, the overriding emphasis on student performance in recent educational reform is in part a direct reflection of this wider military/industrial emphasis on job performance skills and measures.

Among the institutions playing seminal roles within the military history of computer-based education research since the late 1950s have been the RAND Corporation, progenitor of Air Force R&D and architect of "systems design" experiments for education since the 1960s; the high-tech research firm of Bolt, Beranek and Newman (BBN), a major military contractor; and IBM. Each of these conducted pioneering research on computer-based training within the context of military "man-machine" and human performance research for air defense systems. They continue as pivotal players in recent excursions on the cutting edge of educational technology and education reform.

For example, consider the New American Schools Development Corporation (NASDC), the corporate-funded centerpiece of President Bush's America 2000 education agenda, which was created to fund "design teams" to "reinvent" education through "break-the-mold" schools. Consultants from RAND orchestrated the selection process for NASDC, whose board includes the heads of such military contractors and high-tech firms as Boeing, Martin Marietta, Kodak, Honeywell, AT&T, and BellSouth.[5] No wonder Secretary of Education Lamar Alexander referred to the design teams as "the defense contractors of the education industry."[6] Little wonder, too, that the editors of the journal *Educational Technology* declared "technology ... the big winner" in the final selection of eleven design teams, which include such partners as IBM, Xerox, and AT&T.[7] The most technology-intensive design teams include one directed by BBN, and one headed by the National Center on Education and the Economy (NCEE). A key partner in both of these is Apple Computer Corporation — no surprise since John Sculley, CEO of Apple, is chair of NCEE, and Allan Collins of BBN is a principal scientist for Apple's school computer research initiative, Apple Classrooms of Tomorrow (ACOT).

It seems strange, in a discussion on educational technology and school reform, to be paying so much attention to military research and technology. But the accumulated military legacy, still very much alive, must be taken into account for a deeper understanding of technology in education. This legacy includes the use of computers in schools for "command and control" of instruction, from "integrated learning systems," to the continuous monitoring of student performance, to nationwide databases and information networks linking schools, employers, and government agencies. The military legacy also includes a massive research enterprise on human cognitive performance and learning within technological systems, engendering cognitivist incursions in schooling as well as the ongoing codification of job performance skills for the 21st century.

Perhaps the most seductive efforts in educational computing involve the military legacy of artificial intelligence (AI) researchers such as Seymour Papert, Allan Collins, John Seeley Brown, and Roger Schank, all prominent in recent education reform. Their progressive agenda celebrates higher order "thinking" of children as constructors of their own learning. At bottom, though, they seem to harbor an ideal vision of children as clones of themselves: as designers of new realities and automated wizardry, either building robotic Legos or creating new on-screen species of fantastic animals. This constructivist agenda explicitly designed to nurture "children as AI scientists"[8] appears progressive, especially in contrast to the typical mind-numbing school experience. However, the celebration of such mindgames as a paradigm for education is actually a seductive distortion of progressive education, encouraging the hubris of militarized child fantasy in the place of a more substantive struggle for meaning and character and understanding.

Another legacy of military researchers in educational technology and cognition is this: Again and again, from the 1960s to the present, they have used the public schools as a refuge. In some cases, as in the development of the military-funded PLATO system at the University of Illinois, interest in computer-based education projects first arose out of researchers' need to find alternative sources of funding for technology development when military money dried up. Lavish federal funding for education in the mid-1960s attracted many such excursions into schools, as federal education labs and centers provided researchers a bridge from military to civil-

ian research. We are at such a time again, with post-Cold War demilitarization resulting in accelerating the "transfer" of military research, technology, and personnel into public education.[9]

Finally, public schools, with their "captive" student population, have served as laboratory sites for ongoing research on technology, learning, and human performance. As a pioneer in military training research observed over 30 years ago, "The final difficulty that … must be faced in the attempt to integrate the science of learning and the technology of education is that of gaining access to children of school age for … experimental investigations."[10] Most recently, Apple's Classrooms of Tomorrow and similar corporate high-tech excursions in the classroom are billing themselves as "research and development" efforts, as distinct from sales or marketing ventures.[11] This approach defuses suspicions of underlying commercial motives. It also continues a 30-year tradition among educational technologists of forestalling critics by perpetually prolonging the "research phase" of their efforts. Such corporate research in schools — on learning, cognitive performance, technological development, instructional design — has now acquired the veneer of legitimacy and philanthropy. Yet we must begin to ask whether this research truly serves the interests of children and schools, or whether it serves, instead, corporate interests in human performance, product development, and public relations, while providing yet another refuge for a cadre of technologists and cognitive researchers.

Recent corporate agendas

Corporate America is the latest patron for researchers pushing advanced technologies into the schools. Corporate interest in brokering school reform and in penetrating substantial school markets now coincides as never before with the agendas of researchers of technological innovation. Several major electronics and communications corporations attempted unsuccessfully to exploit education markets in the 1960s with teaching machines and other gadgetry, and computer companies have flooded the schools with their wares since the mid-1980s, with marginal impact. But in this new decade, with its urgent attention to school reform, its massive cutbacks in state funding, and its general approbation of American business despite the recession, the welcome mat is out for widespread corporate intervention in education. The moment is especially ripe for renewed attempts by major corporate interests to transform the schools through advanced technology.

This corporate offensive takes a number of forms. First, of course, major computer and telecommunications companies have continued flooding the public schools with hardware and software, lending technological expertise along with their products, providing publicity and support for computer-related projects, sponsoring all sorts of teacher and student awards, and spinning tantalizing visions of the future for their partners in education.

One need only walk into a suburban school or scan the advertisements by IBM, Apple, and other computer vendors splashed over the pages of teacher magazines to appreciate the ubiquity of the high-tech presence in the business of education.

But there are two less obvious, though more significant, inroads of high-tech corporations into public schooling. For one, the CEOs of major high-technology companies have become influential brokers in state and federal education policy, shaping the direction of school reform to their interests. For another, major high-tech corporations are busy underwriting new public school experiments and new private, for-profit, education schemes aimed at the technology-intensive "reinvention," or abandonment, of public schooling. A closer look at each of these is in order.

First, leaders of major high-tech companies have assumed influential positions in education policy. To note just a few, David Kearns, former CEO of Xerox and catalyst for its Institute for Research on Learning, has served as Deputy Secretary of Education under President Bush. John Akers, former CEO of IBM, has been a member of Bush's Education Policy Advisory Committee and chair of the Business Roundtable's Education Task Force. The CEOs of such major multinational high-technology companies as AT&T, Kodak, Boeing, BellSouth, Honeywell, and Martin Marietta are key board members of Bush's New American Schools Development Corporation, a powerful new force shaping educational research. And John Sculley, CEO of Apple Computer, serves as chairman of the National Center on Education and the Economy, perhaps the single most influential organization shaping education policy for the new Clinton Administration.[12] This high-tech corporate presence on the federal level of education policy is echoed on state and local levels, through affiliates of the Business Roundtable and the U.S. Chamber of Commerce, and through the influence of these companies in their home states and regions.

Among the principal features of the education agenda of these corporate leaders is an emphasis on performance standards and national examinations, on a resurrected vocationalism and school-to-work transitions, on intensified mathematics and science instruction, on organizational restructuring for accountability, and on enhanced productivity — through longer school days and years, and through the use of advanced technologies. Their model for education reform is the restructured, "high performance," technology-intensive corporation, epitomized by Xerox (and, despite the hype, characteristic of still less than 10% of American companies[13]). According to their vision, successful schools will model this high performance structure and will produce students with the "high skills" required to enter the high performance workplace of the 21st century. For anyone familiar with recent state and federal education policy legislation, the principal agendas of these corporate leaders and their business organizations have provided the code words for the latest top-down education reform initiatives across the country.

A second front in the corporate high-tech offensive

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*W*hen one reads between the lines, restructured schools, as envisioned by high-tech corporate leaders, have less to do with the improvement of education than with the easy assimilation of technology into education.

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on public education involves the underwriting of new public and private "designs" for the "reinvention" of schooling for the 21st century. Some such experimentation is taking place within the public schools, as is the case with the much-celebrated "design teams" sponsored by the New American Schools Development Corporation (and also heavily funded by such corporations as Xerox, IBM, AT&T, and Apple). Other examples abound. Ameritech Corporation, one of the Baby Bells, has recently announced a $750,000 awards competition encouraging schools in the Midwest to find creative, innovative ways to use electronic communication to improve education. IBM recently completed its sponsorship of a $25 million competition in university–school partnerships for technology instruction in teacher education. Other corporations, among them

Honeywell and BellSouth (another Baby Bell), have established their own technology-rich experimental schools in their home regions. And Apple Computer has been a partner of the computer-saturated "Saturn School" in St. Paul, Minnesota, made famous by President Bush's visit upon the announcement of his America 2000 education plan.

Major computer and telecommunications corporations have most recently begun to underwrite the development of for-profit schools, as in the substantial investment by Time Warner and Philips Electronics in Chris Whittle's Edison Project, the celebrated proposal to set up a private school system heavily dependent on advanced technology for cost-effectiveness.[14] Education Alternatives, Inc. (EAIN) is another celebrated for-profit initiative, currently contracted for the management and instruction of schools in Dade County, Florida, and in Baltimore. EAIN's president, the former superintendent of schools in St. Paul, was a key promoter of the "Saturn School." The ideas behind EAIN were extracted from research conducted by Control Data Corporation, until recently the proprietor of the military-developed PLATO system, whose total systems control philosophy informs EAIN's approach. In alliance with Computer Curriculum Corporation (or CCC, itself an early pioneer in instructional systems technology), EAIN emphasizes continuous, computer-controlled monitoring of student and teacher performance. Meanwhile, IBM provides EAIN with its latest hardware and software in exchange for EAIN's agreement to provide feedback for IBM product development.[15] The Edison Project and EAIN are two of the more visible efforts by high-tech firms to privatize cost-effective, for-profit schooling through technological innovation; interestingly, their largest partners, respectively Time Warner and Paramount Communications (which owns CCC), are giant communications conglomerates whose multimedia visions for education are, by all indications, another harbinger of things to come.

How might we make sense of this burgeoning presence of high-technology corporations in the schools, in educational R&D, and in education policy? Some answers come readily to mind: School markets for computers and telecommunications remain as strong as ever. There are substantial profits to be made if cost-effective "learning growth" can be

guaranteed through technological gadgetry (as CCC guarantees). Also, high-technology corporations claim an ongoing need for a cadre of sophisticated, technically trained individuals in their workforce. Corporate intervention in failing schools affords an excellent opportunity for high profile community contribution. Corporate leaders are eager to extend to the schools their experience with advanced technology and with organizational "restructuring." Corporate leaders view schools as the last major labor-intensive industry ripe for colonization and modernization. Public schools, finally, represent for them an expensive public monopoly overcome by bureaucratic inefficiency and abysmal productivity. For all of these reasons and more, high-technology corporations have become an integral partner in the regime of technology in education.

By far the two rationales most often repeated by the leaders of high-technology corporations have to do with improving educational productivity through organizational "restructuring" and technological innovation, and securing a supply of technologically sophisticated "human capital" for the "high performance" workplace. In each of these objectives there is great irony, when one considers the recent history of the high-technology firms most visibly promoting them.

We need only ask what these corporations are doing with their own technology, how they are restructuring, how they are increasing productivity and enhancing their human capital. The answers, in the case of IBM, AT&T, Kodak, Ameritech, BellSouth, Time Warner, Philips Electronics, Apple, Xerox, and most other high-tech firms, is that "restructuring" means massive "retrenchment," or "downsizing" — made possible, in part, by global telecommunications and technological innovation. Under intense competition, IBM has desperately reduced its workforce by over 25% since 1986, by 40,000 in 1992 alone — despite its highly touted no layoff policy — resulting in what has been called a "psychological reign of terror" throughout the company.[16] Philips Electronics has laid off 45,000 workers since 1990; Kodak has cut 20,000 workers, a third of its local workforce, in the last decade; AT&T and the Baby Bells have been undergoing equally massive downsizing; and Apple and Xerox have recently undergone sizable though less severe cuts in management ranks. By most accounts, these massive cutbacks are permanent and as yet incomplete, with resulting devastation in employee morale.[17] This is what high-tech corporate "restructuring" has really been about, along with the dismemberment of monolithic bureaucracies into independent units threatened with extinction if they fail to produce. What irony, then, and what a chilling prospect, to read the words of James Dezell, president of IBM's new independent education division EduQuest: "Just as IBM is being restructured, the American educational system is in the midst of an awesome restructuring."[18]

In fact, when one reads between the lines, restructured schools, as envisioned by high-tech corporate leaders, have less to do with the improvement of education than with the easy assimilation of technology into education. Denis Doyle, co-author with ex-Xerox CEO Kearns of the book, *Winning the Brain Race*, writes: "The introduction of technology will totally transform schools. Or perhaps more to the point, schools must be totally transformed to use technology wisely and well."[19] And Allan Collins of Bolt, Beranek and Newman, a principal researcher for the Apple Classrooms of Tomorrow program, talks about his work in schools as an attempt "to construct a systematic science of how to design educational environments so that new technologies can be introduced successfully."[20] Is this the development of technology in the service of education or the usurpation of education in the service of technological expansionism by high-tech firms desperate for new markets?

Despite the persistent celebration of teachers and teaching in the advertisements of IBM, Apple, and other computer vendors, the use of technology for educational productivity raises the specter of automated instructional delivery on a grand scale, reminiscent of military training agendas discussed earlier. In the recent words of Doyle:

> We do not yet have the technologies at our disposal to create human capital as readily as we create physical capital. But at some point we will, [and] it will break the mold and eliminate the gridlock of labor-intensive schooling.... Schools are actively afraid of, even hostile to, technology because in their bones educators know that technology will replace people. It always has and always will. About this matter educators' hunches and fears are justified.[21]

This agenda of automating education through the use of sophisticated technology is central to the work in "intelligent tutoring systems" of AI guru Roger Schank, whose Institute for Learning Sciences is lavishly bankrolled by Arthur Andersen, Ameritech, IBM, as well as by the Department of Defense. Schank "would replace teachers with computers [since] most teachers ... are intellectually and temperamentally ill-equipped to deal with schoolchildren." According to

one account, "even though Schank would like to see teachers dethroned, he doesn't want them banished from the classroom. Instead, their roles would be considerably diminished so that they'd serve as teaching assistants to computers."[22]

The arrogance and undisguised contempt for educators in these remarks complements perfectly the aggressiveness and "controlled impatience" characteristic of many corporate leaders engaged in school reform.[23] The championing of technology as an alternative to labor-intensive schooling also explains the sudden interest in for-profit schools: "Suddenly, for-profit schools are the subject of intense interest," explains Doyle, "because, first, in the area of technology, there is real promise of a breakthrough [and] ... whoever unlocks the secrets of educational technology, whoever devises major productivity increases, stands on the threshold of enormous wealth."[24]

Of course, in the business of manufacturing and servicing computers and telecommunications, as in almost every other sector of corporate America, productivity improvement — increased output per worker hour — has been achieved not by taking full advantage of workforce capabilities through technology, but rather through the permanent displacement or disenfranchisement of millions of often highly educated, highly skilled U.S. workers, as advanced technology facilitates automation and global production. Such technology also escalates the pace and multiplies the tasks for those workers remaining on the job, while enabling the meticulous, online monitoring of their job performance, within a workplace "panopticon."[25]

Such is the real meaning of productivity in education, as engineered by corporate leaders frantically rescuing their corporations by streamlining their workforce. This agenda is captured by the words of Norman Augustine, CEO of defense conglomerate Martin Marietta and board member of the New American Schools Development Corporation: "We must accelerate the process of streamlining our society [just as we are] streamlining our economy."[26] Such sentiment is merely the latest echo of a legacy perhaps best captured by the words of military computing legend J. C. R. Licklider, the inspirational leader behind Bolt, Beranek and Newman: "We are going to retool our industry, and ... we must, at the same time, retool ourselves."[27]

This helps to explain the otherwise bewildering corporate insistence that schools produce students with "high skills" for the "high performance" workplace, even as corporations are busy lopping off millions of

present and future high skill jobs in the name of productivity and competition (while also tapping cheaper skilled labor overseas). This recent corporate celebration of "human capital" reflects a number of corporate concerns about retooling its workforce. For one, corporate leaders have been greatly influenced by (increasingly controversial) studies predicting both a shortage of skilled workers and a burgeoning level of skill required by the high-tech workplace; this dubious double prophecy has generated a torrent of human capital rhetoric in the past few decades, catapulting corporate leaders into school reform.[28]

Corporate human capital concerns also reflect the changing nature of work done by the dwindling cadre of workers on the shop floor or in the office. This work must be "multiskilled," requiring more tasks from fewer people; the work is increasingly "abstract" as technicians and troubleshooters retreat from hands-on production to vigilance in computerized control rooms (always presumed to require higher, "thinking" skills); site-based teamwork and shop floor decision making are intensified (approaches not without controversy[29]); worker responsibility and loyalty, tending massive capital investment in technology, are at a premium; and, finally, "learning" has become "the new form of labor,"[30] as accelerating production pace and product cycles, continuous technological upgrading, and constantly shifting job tasks force remaining workers continually, defensively, to "retool" themselves, just as those less fortunate scramble to "retrain" for the next array of evanescent job prospects (all this in the name of "lifelong learning").

Above all, high-tech corporate interest in education reform expects a school system that will utilize sophisticated performance measures and standards to sort students and to provide a reliable supply of such adaptable, flexible, loyal, mindful, expendable, "trainable" workers for the 21st century. This, at bottom, underlies the corporate drive to retool education and retool human capital. "We in the personal computer industry," notes Apple CEO John Sculley, also chair of the National Center on Education and the Economy, "are really in the behavior-changing industry. We have the challenge to create the tools that fundamentally are going to change the way people learn, the way they think, the way they communicate, the way they work."[31] Such is the scope and hubris of the regime of technology in education, a legacy of military fantasy conjoined with the unbridled self-interest of corporate power.

In conclusion, technology in schools must not be thought about piecemeal, as simply a computer here, some fiber optic cable there. Rather, it represents a powerful regime, enjoined by a confluence of forces alien to education, buttressed by the accumulated momentum (if not success) of almost half a century of research and development, and encouraged by the longstanding complicity of increasingly influential sectors of the educational community. There is every indication that the time is ripe for a revitalization of the various agendas this regime represents, signaling the further colonization of schooling in the service of technological enterprise. For those progressive educators interested in the well-being of whole children rather than in the modernization of instructional delivery systems for a chimerical high performance economy, there is ample reason for concern.

Notes

1. Quoted in "Computer 'Revolution' on Hold," ASCD Update (November, 1990), Association for Supervision and Curriculum Development. For a recent account of computer use in schools, see the articles in the September 1992 issue of *MacWorld*, with the cover title "America's Shame."

2. Unless otherwise noted, the principal reference for this section is my book, *The Classroom Arsenal: Military Research, Information Technology and Public Education* (Falmer Press, 1991).

3. See Alexandra K. Wigdor and Bert F. Green, Jr., *Performance Assessment for the Workplace*, Vol. 1 (Washington: National Academy Press, 1991).

4. For example, see the recent work at the University of Southern California on the measurement of workforce readiness competencies codirected by veteran military researcher Harold J. O'Neil, Jr.

5. For a detailed account of the business activities and education agendas of corporate board members of the New American School Development Corporation, see my paper, "New American Schools and the New World Order," presented at the Annual Meeting of the American Educational Research Association, April, 1992.

6. Quoted in Troy Segal, "Saving Our Schools," *Business Week* (September 24, 1992), p. 72.

7. Charles Blaschke, "Review of the NASDC Awards," *Educational Technology* (August 1992), p. 4.

8. See, for example, Idit Harel (of the MIT Media Lab), "Expanding the LOGO Environment," American Educational Research Association, Artificial Intelligence and Education Special Interest Group Newsletter (June 1990).

9. Millicent Lawton's article, "E. D., Pentagon Set 'Career Academies,' " in *Education Week* (November 4, 1992), p. 35, describes President Bush's "defense adjustment assistance initiative," calling for increased use of Defense Department resources for education, job training, and other objectives.

10. A. W. Melton, "The Science of Learning and the Technology of Educational Methods," *Harvard Education Review*, Vol. 29, No. 2 (1959), pp. 97–105.

11. See Jane L. David, "Partnerships for Change," ACOT Report No. 12 (1992), Apple Computer, Inc.

12. For an account of the influence of the National Center on Education and the Economy, see my article "Let Them Eat Skills" in *Rethinking Schools* (October 1992), pp. 18–19.

13. This was the unexpected finding of a nationwide survey conducted by the Commission on Workforce Skills, sponsored by the National Center on Education and the Economy, in their influential 1990 report, *America's Choice: High Skills or Low Wages!*

14. For a critical account of Whittle's Edison Project, see Jonathan Kozol, "Whittle and the Privateers," *The Nation* (September 21, 1992), pp. 272–278.

15. For an account of EAIN, see Elizabeth Conlin, "Educating the Market," *Inc.* (July 1991), pp. 62–67.

16. See Note 5 above.

17. For a recent summary of these circumstances in the business press, see Ronald Henkoff, "Where Will the Jobs Come From?" *Fortune* (October 19, 1992), pp. 58–64.

18. Quoted in a recent EduQuest brochure.

19. Denis Doyle, "The Challenge, the Opportunity," *Phi Delta Kappan* (March 1992), p. 519.

20. Allan Collins, "Toward a Design Science of Education," Bolt, Beranek and Newman, Technical Report No. 1 (January 25, 1990).

21. Doyle, "The Challenge," p. 515.

22. See John Blades's article on Schank and the Institute for Learning Sciences, "Thinking Ahead," *Chicago Tribune* (March 24, 1991), Sec. 5, pp. 9, 10.

23. P. Michael Timpane and Laurie Miller McNeill, *Business Impact on Education and Child Development Reform* (New York: Committee on Economic Development, 1991), p. 34.

24. Doyle, "The Challenge," p. 515.

25. For discussions about these most prevalent uses of technology in service and industry, see Shoshana Zuboff, *In the Age of the Smart Machine* (New York: Basic Books, 1988); and Barbara Garson, *The Electronic Sweatshop* (New York: Simon & Schuster, 1988).

26. See Note 5 above.

27. Noble, *Classroom Arsenal*, p. xiii.

28. For a good summary of the studies and their critics, see Jonathan Weisman, "Some Economists Challenge View that Schools Hurt Competitiveness," *Education Week* (November 13, 1991), pp. 1, 14–15. For the latest compendium celebrating human capital, see David W. Hornbeck and Lester Salamon, eds. *Human Capital and America's Future* (Baltimore: Johns Hopkins University Press, 1991).

29. See, for instance, Mike Parker and Jane Slaughter, *Choosing Sides: Unions and the Team Concept* (Boston: South End Press, 1988).

30. Zuboff, *Age of the Smart Machine*. For a more complete critique of high-tech skills, see my chapter "High-tech Skills" in Steven London et al., *The Re-education of the American Working Class* (New York: Greenwood Press, 1989).

31. Tom Inglesby, "An Interview with John Sculley," *Manufacturing Systems* (January 1989), pp. 32–35.

Visual Technology:
Vacuous or Visionary?

Jane M. Healy

Educators must consider the effect of visual technologies on the development of a child's reflective thinking and problem-solving abilities and take action to direct the technology towards positive educational goals.

Visual technology holds the potential to supplement, expand, and even radically alter the evolutionary future of the human brain. Its current presence in the cultural and intellectual lives of children, however, holds immediate peril as well as distant promise. Educators who care about the fundamental imperatives of childhood must give particular consideration to the uses of television, video games, and computers, not only in educational settings but also in the wider environments that irrevocably shape growing minds. Thus far we have been only too willing to avoid the issue, thus abdicating our influence to that of the popular culture.

In this article I would like to call attention to certain aspects of the video experience that have the potential to impinge significantly on youngsters' development of reflective thinking and problem-solving abilities. I will propose that the media makers are well on the way to substituting their product for education in the allegiance of many of our children. I will also attempt to sketch some means by which we can counteract the negative effects of visual media and direct it toward positive educational goals. Technology and its self-appointed arbiters have edged us, unwitting, onto the cusp of major change; if we do not take specific action to guide media use, then producers, marketers — and even the manipulated tastes of the children themselves — may well push us over the brink into intellectual and spiritual vacuity.

Time and space invaders in children's lives

Television. Much lip service has been given to decrying the amount of time children spend with the most pervasive of the video technologies, television. Indeed, the amount of time spent with the "plug-in drug" has increased dramatically since the 1960s, so that American youngsters now, on average, spend more hours in front of the set than at any other activity except sleeping. Even many preschoolers begin watching several hours a day of varied programming at about age two. Many educators lament the fact that extended hours in front of the set have

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drastically curtailed active playtime, reading, games, and social interaction with family and friends. Teachers both in this country and abroad insist they see significant changes in the "Sesame Street" generation: shorter attention span, inability to develop and sustain strategies for problem solving, faltering oral and written expression, difficulty managing interpersonal relationships, and a need for a "quick fix" of visual novelty every few seconds. Yet few educational institutions have taken a proactive stand to inform and influence the wider community toward other alternatives.

In my travels I frequently meet earnest parents who worry that their children are becoming semi-verbal "couch potatoes" and would like to redirect their family time away from the tube. Many, however, have insufficient motivation to endure the hassles involved in separating their kids from viewing — or even to remove the personal sets that the children watch alone in their rooms. They need help! Tragically, many of today's parents, themselves TV babies, lack alternative models or resources for use of family time. Children from lower socioeconomic backgrounds, who watch the most television of all, are the ones most likely to suffer from a lack of adult mediation of the medium, but the problem is now endemic even among middle-class households. In my view, we as educators have been remiss in generally failing to suggest specific guidelines for media use and for not coaching parents in alternative uses of family time.

We have also failed to demand persuasive ammunition in the form of definitive research on the effects of television viewing — and other video technologies, as well — on children's cognitive development. A considerable body of research has been generated on the negative effects of media violence, but information about television and general aspects of the learning process is scant and mainly drawn from studies financed by program producers. In the process of researching *Endangered Minds*, I was shocked to discover that nothing is known about the interaction between visual media and the growing brain, despite the fact that young synapses are extremely malleable to structural and functional change from any repeated stimulus, with these changes varying according to the stage of development of the viewer. Clearly, we need some objective data on which to base recommendations for important decisions such as amount of viewing time at various ages, the potential of various types of content to enhance or retard cognitive development, and effects of program formats on attention, learning, and the brain itself, to name but a few.

*S*tudies suggest that television may help young children expand vocabulary up to a point, but most aspects of language, like the synapses that make it possible, are gained only from interactive engagement: Children need to talk as well as to listen.

Video games.
> If I didn't make him eat, sleep and go to school, he would be at that thing 24 hours a day!
> — Mother of an 11-year-old boy

As a seemingly more "active" way to let children entertain and possibly educate themselves, video games have been accepted, even welcomed, as a significant alternative to TV viewing. Yet important questions remain unanswered. Why do video games exert such a hypnotic force? What will happen to kids who spend every available moment seeking ever greater conquests in a fantasy microworld? Will this preoccupation build imagination and nonverbal abilities — or will it limit them by keeping the child from normal play and human interaction? Will children learn new strategies of problem solving — or will they lose the ability to initiate ideas unless prompted by a machine? Are there ways to make educational content equally engaging, or should we expect children to forsake the excitement and instant reinforcement learned from the Mario Brothers and adapt to traditional classrooms where teachers talk at them 90% of the time?

Here is another medium with the proven ability to exert dramatic and seductive effects on our children's developmental time, yet about which we know very little. A few schools have taken the definitive step of banning hand-held video games ("Gameboys") from the school premises, yet many teachers report that playground and lunchroom conversations still center on game scenarios and the material acquisition of new games. The potential emotional and social hazards of

this predominantly violent and gender-stereotyped video game culture have been detailed elsewhere (Provenzo, 1991); we will speculate shortly about some other educational effects.

Computers for young children: Artificial or real intelligence? While dining not long ago with a neuroscientist who probes the workings of the brain, I enjoyed hearing about the intellectual exploits of his three-year-old daughter, clearly the apple of her Daddy's eye. I enjoyed his stories, that is, until we got to dinosaurs.

"She can recognize all the names when she sees them on the computer screen: Tyrannosaurus Rex, Brontosaurus, whatever — and she matches them right up to the pictures!" he said happily. "The program we got her even teaches about what each one ate, and whether they could fly, and all kinds of stuff. It's amazing!"

"And how long did it take her to learn all this?" I inquired.

"Oh, she loves her computer. She spends a lot of time at it. When my wife and I are busy we would much rather see her there than watching TV. At least we know she's doing something educational."

"Does your little girl ever just play — by herself, with other little kids?"

"Oh, sure," he thought for a moment. "But she really loves that computer! Isn't it wonderful how much they can learn at this age?"

"What do you think that computer is doing to her brain?" I asked.

He paused. "You know," he said slowly, "I never thought about it. I really haven't a clue."

Many adults with far less scientific sophistication than this man also don't have a clue as to what early use of computers can do to children's development. They believe that if a child looks as if she's mastering something that adults view as complicated, the kid must be getting really smart.

Yet many authorities question how much, if any, of children's time should be spent sitting at a computer terminal. What will this predominately rote-level learning contribute to her development — and at what cost? Clearly, short-changing real-life social and fantasy play is a big mistake. Moreover, children may be simply "playing the game" rather than absorbing the strategies or concepts desired. I have watched middle-schoolers using some highly regarded educational software, such as "Oregon Trail" or "Carmen Sandiego." Without teacher guid-

ance they focused mainly on trial and error to get to the finish as quickly as possible. They learned what worked and didn't work in that particular game, but little about reflective problem solving or the general concepts involved.

Addressing the problem — and the potential. Even if we hide our eyes and count to ten thousand, these technologies are not going to run off and hide. Whether we like it or not, they are exerting a dramatic influence on students in all walks of life. In order to approach the question of how to make the most of these technologies — without jeopardizing the critical principles of development and of holistic education — let us explore briefly the major issues they raise for intellectual development.

Visual technology and the developing mind

Verbal versus pictorial. Language creates possible worlds. A seriously underestimated effect of extensive visual media use is its potential to interfere with development of language skills. While no one would question that visual representations are a critical part of the human experience, language has at least an equal role in organizing both brain structure and experience. As language, brain, and the human intellect have shinnied together up the evolutionary pole, language has become braided tightly together with our human intellectual habits: a director of problem solving, a vehicle for abstract thought, and a mediator of both inter- and intrapersonal awareness. Many of the teacher complaints about poor problem solving, faltering reading comprehension, and warped social relationships that emanate from America's classrooms today may be accounted for by students' degraded language skills.

"Language is our most powerful tool for organizing experience and, indeed, for constituting our social realities," states Jerome Bruner (1986, p. 8). In fact, he suggests that the type of symbol systems we teach children to construct their global frames of reference, or "possible worlds."

Unfortunately, the one-way nature of most media talk makes it a poor language teacher. (See Healy, 1990, for a complete discussion of this and related issues.) Studies suggest that television may help young children expand vocabulary up to a point, but most aspects of language, like the synapses that make it possible, are gained only from interactive engagement: Children need to talk as well as to listen. They need to play with words and reason with them. They need to practice talking about problems

to learn to plan and organize their behavior. They need to respond to new words and stories to build a broad personal base of *semantic* meaning. They need personal adult guides to provide good examples of grammar — not primarily so they will sound "intelligent," but because word order, or *syntax*, is the means by which they will learn to analyze ideas and reason about abstract relationships. They need to hear and speak the tiny units of language — such as *-ed, -ing, -ment* — that convey fine-grained differences between what happened yesterday and what will happen tomorrow, between actions and things, between the shades of meaning that give clarity to mental operations.

Neurodevelopmental research suggests that these skills may have a critical "window" of development during the years before adolescence; if not gained then, they may be impossible to acquire fully later. Children who have never absorbed the sounds of literate language will remain ignorant of the major themes of our culture which have been conveyed in print. Reading, and the reflection that accompanies it, will neither excite nor inform their lives.

As far as the growing brain is concerned, which language or dialect is learned does not appear to be as critical as how well it is mastered. A growing body of evidence suggests that the critical issue for children is to develop proficiency in at least one language; this basis, then, will support acquisition of further verbal skills.

The omnipresence of media has severely reduced time for reading, game playing, and good conversation in homes today. Unforgivably, there is also little conversational experience in many schools. Thus, traditional sources of language exposure have ceded much of their neural real estate to television, video games, and the peer culture. At some time in the not-too-distant future, computers may be able to imbue growing brains with the sound of literate syntax, with the melody of great sentences and the challenge of verbal analysis; since we have not yet reached that point, someone must do the job if we are to avoid severe erosion of our cultural landscape.

Another potential casualty of too much visual media is "inner speech," or the inner voice of reflection. This is the brain's ability to communicate with and guide itself through a covert dialogue. This pos-

sibility alone may account for some of the "epidemic" of attention deficit disorder and poor problem solving in our schools.

According to Lev Vygotsky (1986), inner speech develops in a social context first as the child learns to use language first to think out loud and then to reason inside her own mind. Eventually, it becomes an instinctive tool to form thinking, to control impulsive behavior, and also to transfer thoughts to paper in writing. Students whose brains have been bombarded with too much noise and overprogramming (literally and figuratively!) might well have difficulty with problem solving, abstract reasoning, and writing coherently because they have insufficiently developed mechanisms of inner speech. It stands to reason that learning to listen to an inner voice is difficult, if not impossible, if one never experiences quiet. Of course, schools that keep young children from talking much of the time — even to themselves — do not help the situation. Interestingly enough, programs to teach impulsive

> *Even disregarding the unsuitable content of much commercial television and video games, making children into "watchers" or program manipulators as opposed to "originators" is an alarming perversion of childhood's developmental tasks.*

or antisocial children to "talk through" problems have had positive results both in decreasing attention problems and ameliorating peer disputes.

Inner speech originates in the earliest interactions of the infant and a living, responding caregiver. Children gradually absorb the methods that caregivers use to regulate them and then begin to use the same methods on themselves. Impulsive physical punishment, careless unconcern — or a preponderance of raucous media activity — may cause the child to try to manage his world in the same manner. He may adopt a smilarly impulsive or diffident mental style — jumping at problems, striking out at them and then withdrawing, or else simply avoiding them. On the other hand, if real-life models show children they are interested in challenges, talk through problems, and demonstrate more thoughtful strategies, the

child receives a very different set of messages about the way the world — both physical and mental — should be approached. Given the preponderance of television screens as baby-sitters in many homes, teachers interested in the holistic development of the child have a newly significant responsibility in this regard. Not only must they provide models in their own classrooms, but they must also advocate for more constructive uses of video in shaping children's attitudes and behavior.

Although it may appear that young children are listening to television or to computer games, research suggests that when visual and auditory experience is linked, the brain tends to process the visual at the expense of the auditory. Unless schools make a point of getting children actively involved in interesting and interactive listening experiences, we should not be surprised if our youngsters "tune out" verbal input; unfortunately they may also fail to listen either to an author's voice or to attend to their own thoughts.

Episodic versus sustained experience. At the first and only conference ever held on the potential effects of television on the growing brain (Conference on Television and the Preparation of the Mind for Learning, sponsored by the U.S. Department of Health and Human Services, October 2, 1992), it was pointed out by one prominent researcher, Dr. Jennings Bryant, that any camera shot over ten seconds long is defined as "slow-paced" on "Sesame Street." He also described a preliminary study of four- and six-year-olds in which he found that such rapid-fire formats appear to reduce "vigilance," the brain's ability to remain focused on a problem perceived as difficult or boring.

In the early days of television, it didn't take advertisers long to learn that sudden close-ups, pans, and zooms get attention fast because they violate the brain's reflex need to maintain a predictable "personal space" — a certain distance between oneself and others. Secondly, they found that "salient" features such as bright colors, quick movements, or sudden noises would also draw viewers' attention, since brains are programmed to be extremely sensitive to sudden changes in a perceptual field which might signal danger.

Most children's programs feature movement, noise, flashing colors, and second-by-second scene changes to capitalize on these involuntary responses. We might well question the long-term effects of thus separating the natural responses of brain and body. Although the viewer's attention is alerted, there is no

need or outlet for physical action. Whether or not this artificial stimulation of attention mechanisms has any long-term consequences has not been investigated, although psychologists have speculated that children without natural physical outlets for the pent-up response might develop overactivity, frustration, or irritability.

Other concerns have been voiced about the episodic nature of both television and video games. While children seem to pick up numerous items of information, teachers report students have difficulty linking them together into meaningful concepts or patterns. The ability to sustain a train of thought to analyze a problem may become another casualty of fragmented programming formats, as may sequential thought and concepts of cause and effect.

One danger of developmentally inappropriate computer software is that it, too, will fragment learning into meaningless "factlets." Certainly, filling our children with data will never make them the equal of computer databanks, but it may deprive them of practice with the "big-picture" integrative skills they will need to manage a computer-driven society.

Clearly, one prescription for all educators must be to give children sustained experiences, with time to link ideas and develop internally meaningful relationships with ideas and concepts. Unfortunately, the plethora of low-level "teach and test" objectives so prevalent in our schools force teachers into exactly the opposite direction. Here is certainly one area where holistic educators can show the way.

Vicarious versus real experience. Visual media substitute pictorial, symbolic information for real "hands-on" experience. With the exception of a few computer programs, these representations are also two-dimensional. Yet a shortage of experiences with real materials, objects, animals, and people presents a threat to the full mental development of children.

Adolescents' learning is also still grounded in real-life trial-and-error rather than exclusively through abstract-symbolic routes. Skills of planning and organization, "motivation," and feelings of personal efficacy are just a few of the outgrowths of personal involvement in learning at any age.

Even disregarding the unsuitable content of much commercial television and video games, making children into "watchers" or program manipulators as opposed to "originators" is an alarming perversion of childhood's developmental tasks. Likewise, many types of computer programs sold for young children deprive them of the opportunity to coordinate brain

and body (e.g., press a key and color the apple). Many programs that use paired associate learning (e.g., matching names, letters, or numerals with pictures; learning the multiplication facts) may be useful for getting data into older brains, but may well shortchange the young child's development of widespread neural connections. Even when the programs call on more complex skills (e.g., categorizing attributes of dinosaurs), feeding the brain with too much vicarious experience (e.g., words and pictures on a computer monitor) instead of real ones (e.g., investigating the behaviors of actual kittens, goldfish, ants, salamanders, or whatever) or with touchable, manipulable objects (e.g., dolls, stuffed animals, making dinosaur models out of clay) could place artificial constraints on its natural developmental needs. The young brain's main job is to learn the principles by which the real world operates and to organize and integrate sensory information with body movement, touch, and feel. Thus it grows from inside out (Healy, 1989).

The child's need to initiate and feel in charge of her own brain's learning is another reason for hands-on experiences. Programming a youngster to expect to receive information without independent mental exploration and organization may be a grave error — which won't become apparent until she can't organize herself around a homework assignment or a job that requires initiative. More commonplace activities, such as figuring out how to nail two boards together, organizing a game, or creating a dollhouse out of a shoebox may actually form a better basis for real-world intelligence. It is interesting to reflect on the fact that the one area where "AI" (artificial computer intelligence) consistently fails is in the type of thinking specifically predicated on simple experiences with the physical world.

Who's making the pictures? We do not know whether exposure to visual technology will retard or advance children's abilities to reason in nonverbal, visual ways, sometimes termed the "higher dimensions of human experience." Although I haven't heard anyone suggest that TV has improved kids' spiritual natures, one noted drama teacher told me she sees children of the video generation as better able to handle a "multiplicity of images, less stuck in narrative chronology." "The camera is a dreamer,"

she pointed out, that encourages their imaginations. Other teachers say just the opposite: "They have lost the ability to visualize — all their pictures have been created for them by someone else, and their thinking is limited as a result."

Curiously enough, however, visual stimulation is probably not the main access route to nonverbal reasoning. Body movement, the ability to touch, feel, manipulate, and build sensory awareness of relationships in the physical world are its main foundations. A serious question now becomes whether children who lack spontaneous physical play and time to experiment with the world's original thought builders (e.g., sand, water, blocks, measuring spoons, tree climbing, rock sorting, examining a seashell or the leaf of a maple tree)

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will be short-circuited in experimentation with nonverbal reasoning. Children who are rarely alone may well miss out on some important explorations with the "mind's eye." Frantic lifestyles and media manipulation do not lend themselves to imagination and reflection any more than aerobics classes for toddlers encourage manipulation of life's mysteries. Inept language usage is a serious problem, but inept insights would surely be an even greater disaster.

The challenge: Expanding schools, expanding minds

Visual technologies offer extraordinary potential as brain accessories, coaches for certain types of skills, and motivators. Educators have no choice but to come to grips with their power in the worlds of our children. Otherwise, the combined legacies of video and adult expediency will continue to erode both academic and personal development.

1. *Acknowledge the power and the potential of video and computers, but accept them critically.* Visual tech-

nology is highly engaging for today's students and can have many constructive purposes in educational settings. It can immerse children in history, bring science to life, challenge thinking, and empower students who have alternative learning styles. It can provide an opportunity to create as well as to understand. It is already demonstrating its potential to supplement or even replace language as a means of modeling and communicating technical information. Yet educators must consider carefully the uses to which it is put. In a recent op-ed piece in the *New York Times*, David Gelernter of Yale's computer science department commented on his concerns about hypermedia: "impulse shopping for ideas." "Most of all," he said, "I worry that the educational establishment isn't worried. Granted, these educational approaches can all be valuable. But to the extent that they become the educational main act and not the sideshow they should be, they all fail in the same ominous way, by fostering glitz over substance. Do schools really need a brand-new way to promote shallowness?" (1992)

2. *Teach children to be critical consumers of visual media.* By excluding television and video from the classroom, educators deprive themselves of one means for teaching critical reasoning about something eminently relevant to their students' experience. I believe we must keep an open mind toward "visual literacy": experiences in which teachers guide children in analysis, interpretation, and debate about video materal; comparison of visual and textual presentations; studying the effects of different formats on opinion; the manipulative quality of advertising, and many other possibilities. This is not to say that video needs to dominate the curriculum, nor that children should spend learning time with mindless electronic time-fillers. Nevertheless, we should consider that well-structured experiences linking visual and verbal may strengthen both.

3. *Do not expect machines to substitute for human models.* Both at home and at school, children and adolescents desperately need human beings to help them mediate the experiences of a fast-paced technological society.

4. *Work actively with families to limit and mediate the media.* Parents need information, help, and ongoing support in setting rules for children's television viewing, video-game playing, and computer use. They need proactive suggestions for alternative strategies for family time. Schools that have instituted well-thought-out "TV Turn-Off Weeks" gener-

ally report enthusiastic parent response and positive effects on students. Educators must take a stand to help with this critical aspect of their students' lives. Parents of young children should also be informed about the implications of "educational" computer time replacing more developmentally appropriate activities.

5. *Schools must teach language.* Lest we lose the syntax and melody of literacy, schools must work to close the pop-culture gap in both oral and written language. Particularly in early years, children need to hear good language in stories, rhymes, and fables from our many verbal traditions. We need to emphasize skills of listening, oral expression, storytelling, and rhetoric. Make no assumptions that the home and society are doing this job; it is now in our hands.

6. *We must engage our students in active, hands-on learning experiences.* Too many children today see schools as irrelevant and uninvolving alternatives to the media culture. Many classrooms, however, are demonstrating the possibility of engaging their curiosity and imaginations in learning predicated on active inquiry. This alternative has now become an imperative.

7. *Educators must demand better information on the effects of visual media on all aspects of children's development.*

8. *We must give children the gift of time.* Frenetic media environments will fragment both our children's thinking and their spirits. Yet in many schools, children's attention and energy are also jerked around throughout the day. The growing brain needs time and space to play and to ponder, or it will lose the ability to connect — with learning, with people, or with the ultimate questions of the universe.

Technology has not yet reached the point where it can guide our children's mental development — if it ever will, or should. Nor can children, without good models, shape their own brains around the intellectual habits that can make comfortable companions either of machines or of their own minds in a rapidly changing world. Adults in a society have a responsibility to children — all children — to impart the habits of mental discipline and the special skills refined through centuries of cultural evolution. It is foolish to send forth unshaped mentalities to grapple with the new without equipping them with what has proved itself to be worthwhile of the old.

A prudent society controls its infatuation with "progress" when planning for its young. Unproven

technologies and changing modes of living may offer lively visions, but they can also be injurious to the young plastic brain. The cerebral cortex is a wondrously well-buffered mechanism that can withstand a good bit of well-intentioned bungling. Yet there is a point at which fundamental neural substrates for reasoning may be jeopardized for children whose proper physical, intellectual, or emotional nurturance is drawn from media worlds. Childhood — and the brain — have their own imperatives. In development, missed opportunities may be difficult to recapture.

While "progress" must be judiciously assessed, new developments are both needed and inevitable. Parents and teachers will need to broaden, perhaps even redefine, traditional parameters of learning, not simply because of the changing priorities of future technologies but also because of present realities. We cannot permit a continued alienation of children's worlds — and the mental habits engendered by them — from the culture of learning and thought.

With technology at their elbows, our children may readily gain command of curriculum data and go forward to new feats of knowledge. Yet human brains are not only capable of acquiring knowledge; they also hold the potential for wisdom. Wisdom has its own curriculum: play, conversation, thought, imagination, empathy, reflection. Its faculty consists of people — of models — not of machines. This is what our schools must primarily be about.
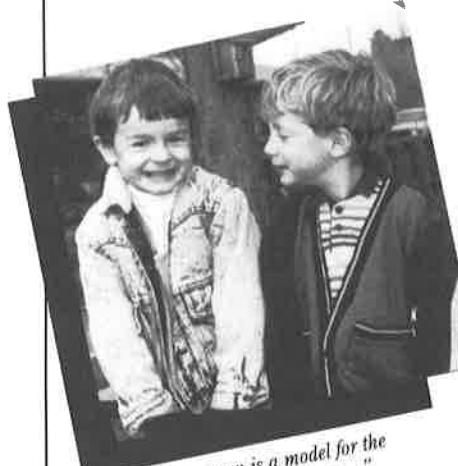
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Children, Television, and the Life of the Imagination

David Sobel

Television's capacity to evoke passivity and invite addiction can have a serious impact on the rich and fragile imaginative life of a child.

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The Sirens are calling

The slate grey sameness of November has arrived, and the fateful agreement of 6 months ago nags at my consciousness. A few weeks ago, I dutifully took the *1991 Consumer's Report Buying Guide* out of the library. The Bradlees advertising circular, the one that comes with the fat Saturday paper, now sits sandwiched inside it on my desk. The front page advertises a good deal: a 20-inch GE television for $229 and a GE VCR, with all of those options I don't understand, for only $199. A complete home entertainment center for only $428.

Consumer's Report touts these as both dependable pieces of equipment — low frequency of repair, high-fidelity visuals, on-screen programming. But it's hard for me to imagine actually walking into the store, making the decision, and carrying the boxes out to the car. I get shivers up and down my spine thinking about writing out the check. What's the big deal? We can certainly afford it. Of course, we've been boycotting GE products for the past 10 years, but we don't have to buy GE. Sears has a wall of different models, not that much more expensive. I think back to the time we wandered in there before a movie on a balmy early October evening — as a kind of inoculative preparation, to break the ice of consumer resistance. After 15 minutes of options talk and sales palaver, my wife, Wendy, and I were both jumpy and anxious to get out in the night air. She would have plunked down the credit card right there and gotten it over with quickly, but I needed a lot of preparation. This was just the first, halting step.

On the threshold of my 42nd birthday, well into middle age, I have never owned a television. Opposition to television has been one of the linchpins of my philosophical convictions. If I tolerated bumper stickers, I'd prominently display one that taunts, "Kill Your Television." I've always coveted the eccentric postcard that shows the futuristic space car crashing through a pyramid wall of flaming televi-

sion sets. And I have nursed a quiet, violent fantasy throughout my adult life.

I am sitting around with a group of friends. They are watching some insipid sitcom, loaded with commercials. I want to have a conversation, but everyone is distracted, preoccupied, talking out of the side of their eyes. A commercial invoking the purchase of toy weapons, or the safety of nuclear power comes on. I lurch toward the set and proclaim, "I can't stand this anymore!" With swift accuracy, I kick through the screen, the tube implodes with a sickening pop, and all of the debris falls harmlessly at our feet. After their initial shock, everyone congratulates me for freeing them from the thrall of the Sirens.

But now I waver on the cusp. I am perched in the gate at the top of the ski jump, waiting to launch myself and my family into the thin air of electronic images. Will we land smoothly, or will our family life and imaginations be shredded?

The decision

It must have been on a rainy Sunday at the end of last March when Wendy floated the idea. No social events had punctuated the weekend, and it had been raw and nasty outside. We had listened to all of the story tapes too many times. Someone's nose was running. The kids were tearing up the living room for the fifth time that day, and one of them was screeching, *"Get away from me!"* The other one fell to the floor and started to sob. "Next November," Wendy proclaimed with grim determination in her voice, "we are buying a television and a VCR."

April though October are mostly heavenly in southern New Hampshire. Except for a bout with bugs in May and early June, at least 50% of family life takes place outside in the natural world. November through March present a challenge to media-purist parents with active young children, however. Especially in these days of global warming, when rain and ice compete with snow in our region, winter has become a force to be reckoned with. And when the kids are sick, we both quietly and desperately yearn for the respite that television provides. In that moment of weakness, knowing that November was a long way away, I consented to the purchase.

Living without television

We have had a television-free home since before our kids were born. (We have two children, a daughter 5 years old and a son 2½). Our daughter has had access to video and a bit of TV at friends' houses, and at a neighbor's for Saturday morning cartoons on occasion. Our major indulgence is vacation television. Three times a year, we go away as a family. We rent a house for a week or two and, more often than not, the houses we choose are equipped with cable and a VCR. During these vacations, television consumption is clearly bounded: No television during the day, sometimes in the morning, an hour or two in the evening perhaps three nights a week.

We limit our diet to the standard educational fare — "Sesame Street" and "Reading Rainbow" from commercial television for snacks, videos as tasteful as possible for the main meals. Sometimes we tolerate, and find acceptable, Disney material, but we strive for more aesthetic, less culturally stereotyped movies. Tara loves *The Little Mermaid* and *Bambi*. The

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*T*he trade-off is between children's active engagement, which can become exhausting, and the placid but "pacifying effects of the electronic mind candy." Are they mutually exclusive? Is there a happy medium?

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original televised stage version of *Peter Pan* is immensely better than the Disney version. The *Nutcracker* and the *Wizard of Oz* can stand up to innumerable viewings. But for the most part we live happily with print and audio media. This special, time-bounded experience of television a few times a year seems just about right.

I am reminded of the only time I lived in a house with a television in the past 20 years. I was caretaker of an old, drafty house with my first wife. We chose to heat only the kitchen, dining room, and bathroom. The bedroom had a vent into the kitchen, but many nights the temperature hovered just above freezing when we crawled into bed. The living room was even colder, and that was where the television was. To watch it required the same kind of preparation and dedication as winter camping. We had to build a fire in the fireplace well before the show was on, wrap ourselves in blankets, and cuddle together on the couch to generate enough body heat. Because of the rigor involved, television watching was a special event, a night out rather than the habitual time-and-

space filler that it has become in most American homes.

The life of the imagination

As a result of this self-imposed discipline, I think our children's active imaginations have flourished. We engage in lots of storytelling with our children; they are surrounded by excellent and diverse children's literature; and our story tape collection is burgeoning. All of this material shows up in the children's dramatic play, and they seem to be able to enter into private worlds of their own making fairly easily. One indicator of this may be that about age 3, Tara started talking about her angel friends (Sobel, 1991).

First Annie showed up and became our constant companion on a trip to California and afterward. Tara could spend up to 2 hours playing alone with Annie. Tara and Annie would disagree about who would be the mother and who would be the daughter. Annie would wake Tara in the middle of the night and want her to come to her castle where there was a birthday party every night. Over the course of the next 6 months, a number of specific angels appeared on the scene: Annie was joined by Elena, Shalla, and Rainbow Starbright (we can't escape cultural influence completely).

About a third of all children experience imaginary friends in early childhood (between ages 3 and 7), and Tara's angels bear some of the conventional characteristics of imaginary friends (Giani-Gallino, 1991; Singer & Lenahan, 1976) When we require her to take a nap, Tara often says she can't because her angels keep her awake. When I ask her to clean up her room, her angels tell her not to do it. This clearly isn't the typical behavior of a benevolent angel; rather, it is characteristic of imaginary friends who become the locus of externalized bad behavior. The imaginary friends do the bad things that children don't want to acknowledge about themselves.

On the other hand, Tara reports fascinating, unsolicited knowledge about the angels. At dinner one night, Tara volunteered spontaneously, "The trees are really angels. A long time ago, you could talk to the angels in lots of ways, but now they hide in trees." And when we asked her if someone told her that, she responded definitively, "No, because I know myself how the angels live and be."

Whatever the nature of their existence, Tara's relationship with the angels is rich, and their presence in her life is certainly indicative of a thriving imagina-

tive life. I am fearful of the affect that television will have on this rich inner life — and I am fearful that television will tear at the fabric of family life that we have woven in the absence of television. Two stories that come to my mind illustrate these concerns.

Dying angels

One day in late January 1991, I picked up my children at the preschool program they attend 3 days a week. When I arrived, the teacher described how Tara, after just falling asleep for a nap, woke up crying and screaming, saying that all of her angels had died. She had been very distraught, the teacher reported, sobbing for 5 minutes or so and then finally settling down and falling asleep.

We got in the car and started to drive home when Tara asked, "Daddy, are you and Mommy going to go to the war?" I replied that we would never, never leave her and then realized that the news program "All Things Considered," was on the car radio broadcasting news about the war in the Persian Gulf. I also realized that we had just returned from vacation a week ago. We had been in a vacation house with a television when the war with Iraq had begun on January 16th. We, like most Americans, had watched the televised bombing in amazement and horror. Although we had been careful to watch only when the children were out of the room, I suspected that we hadn't been completely conscientious. I turned the radio off and started to talk with her. When I inquired about her angels dying, Tara eventually said, "There are lots of angels at the war, and they're using up all their power. My angels had to give their power to those angels in the war, so my angels got weak and died."

My eyes instantly filled with tears. I was struck by how vividly her comment illustrated the impact that "the news" can have on the life of the imagination. I resolved to avoid exposing both of the children to radio and television reports about the war and to abstain from discussing the war in their presence–unless they inquired about the war, or seemed upset about it. Certainly, it was impossible to shield them from other children's comments and social discourse about the events, but it was clear to both Wendy and me that we did not want the issue foisted on them unnecessarily by any form of electronic media.

This incident epitomizes my deepest fears about exposing children to television. The life of the imagination in early childhood is both rich and frag-

ile. Young children's minds are acutely permeable. Tara memorizes the lyrics to songs or the words in a book much more quickly than I do. She mirrors gestures and picks up on inflection almost unconsciously. Similarly, she and most young children are easy prey to the hypnotic nature of the television media. Information that is incapable of being processed sidles its way into children's minds, creating unnecessary anxiety and fear. Leaving the television on indiscriminately can, like leaving your headlights on, drain the power of angels.

All was not lost, however. Although this was a distressing event, we discovered that angels have regenerative powers and have at least as many lives as cats. A week later, most of Tara's angels were alive again.

Cracking open the door

The other story emerged out of my preparation for a conference I coordinated entitled "Children, Television, and the Life of the Imagination," held in April 1991 at Antioch New England Graduate School. Our featured speaker was Richard Lewis, noted collector and translator of children's poetry and ardent advocate for fostering the life of the imagination in childhood. Our objective was to be open minded but skeptical, to consider both the potential valuable and deleterious effects of television on the imagination. While some friends were away for 2 months, we borrowed their VCR and a television so that I could preview materials for the conference, and of course, so we could enjoy a few videos at home. We stuck it up in the loft above the kitchen, out of the normal traffic flow.

The *usual* afternoon scenario when I don't pick up the children at preschool and Wendy and the kids are already home, is cheerily "all American." As I walk through the woodshed I hear the excited pitter-patter of little footsteps. "Daddy! Daddy's home!" both kids giggle and squeal as they run to me for a hug with big smiles on their faces. I feel affirmed. But the picture is only half rosy. Just prior to my arrival home, my wife has been trying to fix dinner while keeping the kids from squabbling with each other. It's clear to both of us why the predinner time is sometimes referred to, by parents of young children, as the "arsenic hour."

But that particular evening, 3 or 4 days after the VCR had arrived, I came home to a distinct lack of pitter-patter. I walked in and found the kitchen eerily quiet. Then Wendy called from the loft, "We're up here," and I ascended the steps to find everyone gathered around the set watching *Willy Wonka and the Chocolate Factory*.

"Hey, Daddy's home!" I chimed in, trying to invoke the traditional excitement. Tara turned to me, smiled wanly, and turned back to the flickering image. Eli turned to me and smiled, pointed to the screen, and exclaimed, "Watch movie!" using the same tone usually reserved for me. I felt displaced. But then Wendy described how fixing dinner was a joy that evening — no fights, no hanging on her legs. The children watched the movie for a half hour by themselves with no squabbling. The kitchen was placid, dinner was ready, and the house wasn't torn up.

This vignette encapsulates one of the other major dilemmas of television in the home: The trade-off is

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I was struck by how vividly her comment illustrated the impact that "the news" can have on the life of the imagination.

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between children's active engagement, which can become exhausting, and the placid but "pacifying effects of the electronic mind candy." (Utne, 1990) Are they mutually exclusive? Is there a happy medium?

The antenna of the dilemma

The television and VCR stayed in our home for most of February and the early part of March. We didn't hook up an antenna and only used the equipment to play prerecorded videos. Since we didn't have that much to look at, the kids watched a few different videos numerous times, and then the novelty started to fade.

We discovered that our local library had a collection of about 30 excellent children's videos, and the turning point came when we discovered the four-part series of *Anne of Green Gables*. Now, I have been known to claim that there is no implicit greater merit to "Masterpiece Theatre" than there is to "Monday Night Football." Since "the medium is the message," both simply evoke passivity and invite addiction. Some of my colleagues consider me obstinate and closed-minded about the possible virtue of television. But after about 10 minutes of *Anne of Green*

Gables, I was completely won over. Elegantly filmed on location in Prince Edward Island, the movie's tempo was measured and soothing, unlike much television and film. Compared with most Disney productions, there was a noticeable lack of violence and sex-role stereotyping. But the story was gritty, and the characters were multifaceted and dealt with the big issues of life.

We were most persuaded, however, by the quality of the family experience that we enjoyed and the sources of imaginative and dramatic play that the videos provided. It was a joy to snuggle up all together and watch episodes of the story. We talked about it over dinner, and we used story elements to spawn games and other stories. Other fine videos served the same family supporting function, and when the VCR left in mid-March, we all felt a bit sad. It was in this context that we decided, on that rainy weekend at the end of March, to make the November purchase. In the intervening months, we really haven't desired it, but now that winter is closing in....

In the face of this momentous shift, we have started to evolve a set of informal rules for life with a VCR. Clearly, the first major decision is that we are *only* getting a VCR and a monitor. Yes, we know it's a television with the capacity for pulling in umpteen stations, but the kids won't know that for a long time. We have no interest in commercial television. Rather, we aspire to a practice of fully conscious television watching, although I am aware that this may be an oxymoron. If we really do make the purchase, we plan to:

A. Watch it with the children. Although I'm sure we'll use it on occasion for predinner mellowness and postdinner opportunities for discussion with guests, our objective is to have movies be an adult–child activity, like looking at books, or going to a dance.

B. Talk about what's happening. Much of what happens, even in designed-for-children programs, is puzzling and confusing for children. It's easy to get swept along in the flow, shush children when they have questions, and lose the opportunities for discussion. When puzzling events happen, we'll stop the movie and talk about it, and we'll make sure we

have time to talk about exciting or upsetting occurrences after the screen goes dark.

C. Have clear limitations about how much we watch. Maybe two movies a week, maybe an hour a night. The specifics aren't clear, but we'll work them out and hold to them pretty closely — with special exceptions for long spells of cold and rainy weather and the flu.

D. Dance and sing along. Television watching doesn't have to create a sedentary stupor. We have found that it's fun to dance along, or to act out the action while it's happening, especially if we have already seen the program once.

E. Use the stories as starting points. When something strikes the children's fancy, we will try to extend the fancy — by finding dress-up clothes that look like Anne's dresses, for example, and going on walks that mirror the adventures of the characters.

Are we striking a deal with the devil? That's certainly a gnawing fear. The crux, we think, is modulating the amount we consume. Each video can stand on its own if it's not immediately eclipsed by another and another. One of the great problems of American children and television is that they are awash in it. They see 25 hours a week, 20,000 commercials a year. (Herman, 1991). If we can pare down the experience so that stories stand alone — so that we can live into them, as we live into books — then we might be able to use television to enrich our lives and imaginations, rather than being used by it and the culture of consumerism. But then again, maybe we can wait until next November.

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Technological Time Values and the Assault on Healthy Development

William Crain

The technological worldview has a negative impact on education. Its emphasis on the future leads us to overlook the child's present needs, and its emphasis on speed leads us to expect the child to learn at a pace that is often too fast for deep thought.

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"Ethically, technology is neutral," a public relations piece for a high-tech firm states. "There is nothing inherently good or bad about it. It is simply a tool, a servant, directed and deployed by people for whatever purpose they want fulfilled" (Reinecke, 1991, p. 212). This position sounds reasonable, and it might accurately describe the role of most technology prior to the Industrial Revolution. But the writings of Jacques Ellul (1954/1964), Lewis Mumford (1970), and others suggest that this position misrepresents the role of technology in modern society.

For one thing, the neutrality argument greatly exaggerates the extent to which technological change is under our control. We can barely keep up with the latest innovations, let alone control them. Ellul (1954/1964) believes that modern technology has actually become autonomous, accelerating under its own head of steam. Ellul's view may be extreme, but technological change does often strike us this way. Could anyone, for example, convince a school district to stop using computers until it has a chance to evaluate their impact on education? It would be difficult to get people to listen, because most accept technological development as a fact of life. One either adjusts to it or gets left behind.

The value-neutral argument, moreover, overlooks the extent to which technology is supported by and promotes its own belief system, its own goals and values. The proponents of technology advocate efficiency, rational planning, objective analysis, and mastery of the environment. When it comes to the dimension of time, the champions of technology believe that we should focus on the future and perform tasks at the greatest possible speed. These values are sometimes unstated, but social critics such as Ellul (1954/1964), Mumford (1970), and Neil Postman (1992) argue that they have been steadily eliminating earlier values and ideals. In medicine, for example, the premium placed on efficiency, speed, and objective analysis (e.g., the reliance on laboratory data) has largely replaced the earlier ideal of the

physician who forms a personal and caring relationship with a patient.

This essay considers two components of the technological worldview — its value on the future and its value on speed — and indicates how these values are distorting our view of healthy development.

The technological value on the future

The proponents of technology constantly direct our attention to the future. High-tech corporations, for example, promote their products as "the wave of the future" and "links to the world of tomorrow." And these messages produce positive responses in us. For we in the United States pride ourselves on being a forward looking people. We aren't a people who live for the moment, nor do we revere the past. Instead, we seek a brighter future, and we embrace the technological innovations that promise to bring it about (Kluckhohn, 1961).

To understand how our emphasis on the future influences education, it is helpful first to review how this orientation developed in Western society. Initially, a concern for the future emerged in European family life, as the medieval family gave way to its modern counterpart.

The proponents of technology advocate efficiency, rational planning, objective analysis, and mastery of the environment. When it comes to the dimension of time, the champions of technology believe that we should focus on the future and perform tasks at the greatest possible speed.

During the Middle Ages, it was common for families to assume responsibility for their children for only a few years — until the children were 6 or 7 years old. At this point, parents frequently sent their children to neighbors to begin their apprenticeships. The children received room and board while they learned farming, arts and crafts, and other vocations on the job. And once they began their apprenticeships, they basically took their place in society as little adults. Thus, the time that parents devoted to preparing their children for the future was brief (Aries, 1962).

During the 16th and 17th centuries, the occupational world showed clear signs of change. With the invention of the printing press, the growth of commerce, and the rise of cities and nation-states, the occupational world began to take on a "white collar," bureaucratic look. New opportunities arose for merchants, lawyers, journalists, bankers, and government officials — professions that required reading, writing, and math (Roberts, 1980; Stone, 1965). Growing numbers of middle class parents tried to advance the future status of their families by sending their children to school, prompting the growth of new schools throughout 16th- and 17th-century Europe. Schooling, in turn, meant that parents maintained responsibility for their children for a much longer time — often until the children were well into their teens — and by the end of the 17th century, many parents were clearly giving careful consideration to the kinds of education that schools offered. Upwardly mobile parents saw that society was changing and wanted schools that would prepare their children for a new future (Aries, 1962; Pinchbeck & Hewitt, 1969).

Until the mid-18th century, the hope for a better future was primarily the concern of individual families. Then, during the Enlightenment, a new breed of intellectual turned this hope into a sweeping ideology. Diderot, Condorcet, and others attacked the old feudal state and church, not only because they stifled freedom, but also because they impeded progress. Through the *Encyclopedia* and other writings, Diderot and his colleagues tried to show how reason, science, and technology had already made some progress and could, if given free reign, produce a better world for all (Brinton, Christopher, & Wolff, 1976).

During the Enlightenment, there was a major dissenting voice: that of Rousseau. Rousseau contributed some early articles to the *Encyclopedia* and shared the opposition of other Enlightenment thinkers to feudal authority. But Rousseau questioned the new faith in progress. In his view, as civilizations advance and work becomes more specialized, people become more dependent on one another and on social approval. They become so concerned about making a good impression and saying the right

things that they forget how to think with their own minds. Rousseau hoped that people could somehow recapture aspects of a simpler, rustic life when people were more independent and self-reliant (Crain, 1992).

With respect to education, too, Rousseau questioned the emphasis on the future. When we focus too intently on what children will need for tomorrow's job markets, we overlook the ways they develop as strong, independent individuals. Rousseau urged us to consider Nature's ground plan for healthy development — the way Nature inwardly guides children to develop different capacities at different stages, according to Nature's own timetable. Instead of setting our own goals and directing children's development, we should give children a chance to grow as Nature intends (Rousseau, 1762/1964). Rousseau's writings had an impact, inspiring the romantic movement in the humanities and the child-centered movement in education. But it was the dominant themes of the Enlightenment — the prospect of a better future and the faith in technology to bring it about — that took a firm hold on the Western mind.

Nowhere have these themes been stronger than in the United States. Our nation was created by a people who were searching for a better future — a people, who, if unhappy with the land they initially colonized, had only to pack up and move westward. Two great inventions of the Industrial Revolution, the steamboat and the railroad, empowered a people on the move; and other technological advances, especially in weapons and explosives, enabled pioneers to conquer new territories. As marvelous new inventions multiplied (e.g., the telephone, automobile, and airplane), the United States developed a faith in technological progress that bordered on religious zeal (Mumford, 1970; Postman, 1992). As Kenneth Keniston (1962) has observed, not even the atom bomb gave us much pause.

The only events to alter U.S. optimism, other than the Great Depression, have been threats to our nation's technological superiority. In 1957, when the Soviet Union launched the first Earth-orbiting satellite, our confidence was momentarily shaken. More recent competitive threats from Japan, Germany, and other emerging industrial powers, which began in the 1970s, have been more serious. But recent events have not altered our faith in technology or our preoccupation with the future. We are less optimistic about the future, but we are, if anything, more concerned about it.

Our obsession with the future in contemporary U.S. education

To get our nation back on track, our leaders say, we must demand more from our schools. Government reports such as *A Nation at Risk* (National Commission on Excellence in Education, 1983) and *America 2000* (U.S. Department of Education, 1991) insist that our schools do a better job of preparing children for tomorrow's high-tech workplace. Schools must prepare children for the 21st century, for the next millennium, and we all must realize that those who aren't properly prepared will simply be left behind.

In this climate, I believe that it is especially important to step back and consider Rousseau's belief that

> *For the child seated at a computer terminal, there is no paint, sand, or water; no grass, wind, or bird song. The child is cut off from the rich, sensual experiences that are vital for perceptual and creative development.*

a preoccupation with the future is misguided. Children, he said, go through a series of stages during which they are naturally motivated to develop different capacities and orientations toward the world. Each stage has its own special virtues — a "perfection of its own" (1762/1974, p. 122) — and we need to give children opportunities to develop that perfection. Our focus on what the child will need in the future, Rousseau warned, can blind us to the experiences that the child needs at his or her present stage. Let us consider some ways in which Rousseau's warning has relevance today.

Rational problem solving. Everyone agrees that tomorrow's high-tech occupations will place a premium on rational problem solving skills, so schools are trying to teach these skills at every grade level, K–12. Inspired by Vygotsky and cognitive science, educators are trying to teach children to think logically, to stay goal directed, and to monitor their strategies as they work on problems. Many educators and psychologists believe that we can teach children to apply these think-

"Today we have multi-row planters that slap in a crop in a hurry, putting down seed, fertilizer, insecticide and herbicide in one quick swipe across the field" (p. 106). But Berry believes that the proper cultivation of land requires a slower pace, and he quotes an old-time English farmer: "Speed is everything now; just jump on the tractor and way across the field as if it's a dirt track…. [But] with a roll, the slower the better. If you roll fast, the clods are not broken up, they're pressed in further" (p. 106).

Today's workers, the old farmer observes, don't even take the time to get a sense of the land before planting. "A good practical man would hold on a few weeks, and get the feel of the land under his feet. He'd walk on it and feel it through his boots and see if it was in good heart, before he planted anything; he'd sow only when he knew what the land was fit for" (quoted in Berry, 1981, p. 106). Unfortunately, Berry says, modern technological farming has driven

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A preoccupation with the skills the child will need in the future, Rousseau warned, can blind us to the experiences the child needs at his or her present stage.

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out the small farmer, whose slower place made a more caring, nurturant attitude possible.

Most of us probably recognize that the emphasis on speed diminishes our own lives as well, and we sometimes complain about our hurried existences. Nevertheless, we expect and value speed. We want our microwave ovens, fax machines, and instant analysis of the news. When it comes to children's learning, we assume that faster is better. Parents are proud to hear that their children are fast learners — that their kids have been placed in accelerated classes. In fact, to say that a child is "slow" is just a polite way to say that the child is stupid. Even highly respected scholars believe that speed is the essence of good education. As psychologist Lloyd G. Humphreys recently said, "Effective learning requires starting students at their current level and helping (even pushing) them ahead as rapidly and as far as possible" (1990, p. 939).

In educational practice, an emphasis on speed goes hand in hand with an emphasis on the future.

Schools set their sights on the skills children will need in the future and try to instill these skills as rapidly as possible. In fact, the relationship between these two time values is so intimate that it is rather artificial to consider them separately. Nevertheless, a number of developmental theorists, from Rousseau (1762/1974) to David Elkind (1981), have specifically addressed the topic of speed, and we need to consider the possibility that children have a natural pace of development that we may be disrupting.

A natural pace. Many developmental theorists have maintained that the pace of development has a certain inherent slowness, and that it cannot be rushed. Rousseau and maturationists such as Gesell have argued that this is because development is an organic process; children, like plants, grow according to Nature's timetable. Gesell and contemporary maturationists believe that the pace of development, which varies from child to child, is basically controlled by the genes (Crain, 1992).

The Piagetian view places less weight on genetic variables. Instead, it sees cognitive development as a spontaneous construction process: Children construct new cognitive structures as they work on problems that they find interesting. We can, in the Piagetian view, sometimes accelerate this process a bit by providing children with interesting tasks. But there is a limit. Genuine cognitive development, Piaget argued, occurs only when children think things out for themselves, and this takes time. "Learning to master the truth for oneself," Piaget said, means "losing a lot of time going through all the roundabout ways that are inherent in real activity" (1973, p. 107). Piaget (1970) was deeply impressed by how long it took Darwin to construct his theory of evolution, and Piaget (1970, 1972) and his followers (e.g., Gruber, 1973; Kamii, 1973) have suggested that cognitive development has a certain natural slowness, with each child working at his or her own optimal pace.

Effects of computers. Many psychologists and educators, especially in the United States, have been impatient with Piaget's views on the pace of intellectual development and have studied ways of speeding it up. This research, which was very popular in the 1960s and 1970s, has produced mixed results (Crain, 1992), but the computer revolution has inspired new hope. Papert (1980) and others believe that the high-speed computer is just the tool for accelerating the development of logical thinking.

But studies on the computer's power to do this also have produced mixed results (Slavin, 1988). Moreover, informal but thought-provoking research by Craig Brod (1984) has raised some troubling concerns. On the basis of interviews and observations, Brod suggests that the computer may frequently establish a pace that is too fast for full and deep thought. When children are caught up in the speed and intensity of the computer, they are so busy making decisions and reacting to outputs on the screen that they don't take time to mull over ideas or reflect on experience.

Computers also might discourage thinking in another way. In the Piagetian view, independent thinking often occurs in social contexts, especially discussions and debates. For example, a teenage girl might articulate a political position only to find that her friend points out a flaw in it. The girl is then motivated to formulate a more comprehensive position to handle the objection. She might work on this problem entirely on her own, and as she does, her mind expands (Crain, 1992).

Yet Brod (1984) observes that young people who become deeply involved in computers frequently become impatient with social dialogues. Although they enjoy talking about computers, they find other discussions too slow. Thus, heavy computer involvement might discourage young people from the kinds of discussions and debates that promote intellectual development. Brod's evidence is impressionistic, and more research is needed on these points. But Brod's findings do suggest that we should be very cautious about using computers to accelerate cognitive development.

The assessment movement. On a broader scale, the rate of learning has been the focus of the assessment movement. Since the mid-1970s, state governments have administered standardized tests at various grades and have required all students to demonstrate state-determined rates of progress. State officials cannot, of course, literally force students to achieve certain scores. But states have employed powerful incentives. Some have made grade promotion or high school graduation contingent on specified scores, while others have pressured school districts to raise scores by releasing the results of every district to the press. Thus, teachers have felt the need to teach the knowledge and concepts that appear on upcoming tests, regardless of children's need to work at their own pace and take the time to think problems out for themselves.

Initially, in the 1970s, most states only tested minimum competencies, so the pressure to push most children to learn at rates that were too fast for them was not overly intense. But in the 1980s, states raised their expectations, and in the past few years there has been a growing national movement to assess children's progress with respect to higher level thinking. The assessments will probably occur at grades 4, 8, and 12 (Firestone, Bader, Massel, & Rosenblum, 1992).

There also is a growing effort to replace or supplement the standardized multiple-choice formats with more open-ended questions and even with authentic assessment — performances and portfolios (Case, 1992). Authentic assessment is heartily welcomed by child-centered educators. Nevertheless, we must be aware that the new assessment systems, whatever methods they use, may try to force all students to attain specified levels of abstract thinking at specified times. If so, then the assessment systems will pressure many students to learn too rapidly, robbing them of the time they need to think for themselves.

Conclusion

This article has described how two technological time values — an emphasis on the future and an emphasis on speed — can adversely affect education. When we focus on the future and try to hurry children forward, we deprive them of opportunities to develop their present capacities and we rob them of the time they need to engage in full and independent thinking. Our efforts to hurry children into the future also reflect more than a little arrogance on our part. We assume that our goals are all-important. If we are to become more respectful toward children, then we need to tailor education to their own deepest interests and ways of growing and learning. Like the old-time farmer who gets to know the land before planting, we need to get to know the child before deciding what tasks and materials to offer.

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Childhood and the Cultural Amplification Characteristics of Computers:

Some Critical Concerns

C. A. Bowers

Computers — like all technology — amplify and diminish certain aspects of cultural consciousness and values. By focusing on the fragmentation of knowledge into discrete bits, they may be subtly reinforcing a reductionistic worldview that is both humanly and ecologically unsustainable.

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The liberal image of the individual held by most educators has until recently marginalized the formative influence of culture on human development. But with the growing awareness of cultural differences among people in American society the modern individual is beginning to be understood in a new light. Instead of the image of an individual who achieves greater freedom and self-direction through the development of autonomous judgment, which meant learning to think and value independently of traditional norms, we are now beginning to recognize that all language systems that the "individual" uses (spoken and written discourse, body language, use of dress as a message system, art, architecture, and so forth) are culturally based. Even the natural attitude toward such sensory experiences as taste, touch, and sound are based on culturally shared norms and patterns. In effect, the individual is a cultural being and, depending upon the cultural group's schemata for organizing "reality," gives varying degrees of individualized expression to its symbolic world.

How children experience meaning and choices, interpret the nature of relationships, and make moral judgments reflect the deep and generally unconscious influence of culture. Cross-cultural studies of child-rearing practices provide overwhelming evidence of the reality-constituting nature of culture. I would like to suggest, however, that this cultural perspective on childhood formal education is itself limited by the Western categories of thought that influenced how anthropologists have understood the nature of culture. Although there are important differences among anthropologists about the nature of culture, the following definitions by Ward H. Goodenough and Clifford Geertz represent a funda-

mental level of understanding widely accepted within the field. According to Goodenough, "Culture ... consists of standards for deciding what is, standards for deciding what can be, standards for deciding how one feels about it, standards for deciding what to do about it, and standards for deciding how to go about doing it" (1981, p. 62). Geertz's (1973) definition also emphasizes the role of culture as a symbolic system that unconsciously guides thought and behavior in the everyday world. As he puts it, "Culture patterns — religious, philosophical, aesthetic, scientific, ideological — are 'programs'; they provide a template or blueprint for the organization of social and psychological processes, much as genetic systems provide a blueprint for the organization of organic processes" (p. 216). The achievement of these two definitions, and I think they are significant though fundamentally flawed, is to establish the primacy of the symbolic world the child is born into. But this view of culture, which helps illuminate how the present patterns of consciousness and behavior involve the re-enactment (often with modifications) of traditions deeply rooted in the past, continues to reinforce the anthropocentric metanarratives that are essential characteristics of Western thought. Following the lead of cultural anthropologists, educators may begin to focus on the formative influence of culture, and even begin addressing problematic aspects of modern culture. But if they do not recognize the problems associated with basing both their analysis and prescriptions for classroom practice on anthropocentric categories, their well intended efforts may contribute to further deepening the real crisis we face: the degradation of the natural systems upon which all cultures depend.

In addressing the problematic aspects of modern culture that influence the kind of cultural beings that youth will become as adults, I want to use a metaphor that overcomes the silences fostered by the anthropocentrism of understanding humans primarily as cultural beings. Gregory Bateson's (1972) metaphor of a mental ecology is useful here because it accounts for both the conceptual/psychological/behavioral mapping processes that cultural anthropologists are concerned with, and the way in which the individual interacts with the natural systems increasingly being put at risk. For Bateson, the basic unit of information or idea is a "difference which makes a difference," and an ecology is the totality of interactions (difference which makes a difference in response to changes in other organisms or elements) that make up a natural system. Changes (difference) in sunlight cause changes (difference) in the chemical processes within a plant; the changes in the plant (which represent complex information exchange processes) will lead down the road to changes in human action (perhaps there was not adequate sunlight for the plant to achieve full maturity and thus become edible). What Bateson is helping us understand is that humans are participants in a larger and vastly more complex system of information exchange. As he puts it, "The total self-corrective unit which processes information, or as I say, 'thinks' and 'acts' and 'decides' is a *system* whose boundaries do not at all coincide with the boundaries either of the body or what is popularly called the 'self' or 'consciousness'..." (Bateson, 1972, p. 319).

This brings us to Bateson's "the map is not the territory" metaphor, which he uses to explain why a cultural group may be less or more aware of what is happening within the larger mental ecology of which they are an interactive part. An ecology, with its continual flow of information, is the "territory"; the "map" (the cultural way of knowing) as we know from the experience of using a map as a guide does not always represent all the features of the territory — or even the more important ones. That is, a cultural way of knowing may put out of focus (awareness) many of the information exchanges critical to the long-term survival of the system. To summarize the key points that help to correct the limitations of understanding humans only in terms of culture: (1) The person is always an interactive member of a natural environment (mental ecology); (2) Which information exchanges the person responds to depends largely upon the interpretative framework of the cultural group; and (3) Humans (cultural groups) cannot sustain unilateral control over the ecosystems upon which they are dependent or ignore the patterns of human activity that are degrading the system, and survive over the long term. Put more simply, recognizing the primacy of culture in the educational process is important, not only in terms of the kind of individual it helps to constitute, but also in terms of whether the human/natural environment relationship is sustainable over the long term.

As American society encompasses many distinct cultural groups, and allows for having multiple cultural identities, it is important to specify that the analysis here will focus on the dominant middle class culture that has its roots in the Western traditions of

thought. Not only does it set the standards against which other cultural groups are judged, it has also created a modern lifestyle that threatens to overwhelm the viability of the Earth's ecological systems. The influence of the dominant culture on the development of childhood is already well understood, although a strong case can be made that the cultural ideals children are supposed to internalize as part of their natural attitude are ecologically problematic. Greater self-autonomy, a consumer-oriented way of understanding success, continual preparation for change (viewed as progressive), and reliance on data as the basis of individual empowerment are the standards by which many classroom teachers still judge the character and potential of children. As we begin to understand the connection between these cultural orientations and the Industrial Revolution that put us on our current environmentally destructive pathway, as well as the characteristics of ecologically sustainable cultures, we may begin to recognize the limitations of these cultural ideals. What is less well understood about the dominant culture is the influence of technology on the formation of consciousness (both in terms of explicit and taken-for-granted patterns of understanding) and self-image.

Although both mechanical and social forms of technology permeate nearly every aspect of everyday life, technology is perhaps one of the least understood aspects of mainstream culture. Evidence to support this generalization can be found in the way university liberal arts and social science curricula marginalize technology as an area of study. Teacher education programs, ironically, make "training" in social and mechanical technologies the central core of professional knowledge and competency, but few teachers understand how technology influences thought and social relationships, or affects the forms of knowledge communicated from one generation to the next. Unknown to them will be Peter Berger and Thomas Luckmann's analysis of how technology has influenced taken-for-granted patterns of thought, and Jacques Ellul's arguments about the differences between technology in traditional cultures and in modern cultures (as well as his technological determinism thesis). Nor are Lewis Mumford, Joseph Weizenbaum, Theodore Roszak, Harry Braverman, and Michel Foucault likely to be names teachers recognize, even though they have written seminal books on aspects of tech-

nology most utilized in the classroom. In not possessing a deep knowledge of the cultural/existential mediating characteristics of technology, most teachers are limited to socializing students to the uses of technology and to an uncritical acceptance of the legitimating ideology that is now part of one of the most powerful mythic narratives within the dominant culture.

Ignorance of how technology influences the most fundamental aspects of experience does not, however, lessen its impact. Our task here will be to clarify how technology can be understood as something more complex than a tool people use for achieving their own purposes, and how such specific forms of technology as computers are becoming the most formative aspect of our culture (that is, how computers are helping to constitute a particular form of subjectivity). Lastly, we want to return to the question of whether a computer-centered culture (more commonly known as the "Information Age") is ecologically sustainable.

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*A**lthough both mechanical and social forms of technology permeate nearly every aspect of everyday life, technology is perhaps one of the least understood aspects of mainstream culture.***

Don Ihde gives us a basic vocabulary for understanding the human–technological relationship at all levels of socialization — from childhood through adulthood. This vocabulary helps to illuminate fundamental relationships that occur in the use of any technology, including such varied technologies as "mastery learning" and the use of a computer. First, Ihde expands upon Martin Heidegger's insight that technology mediates how a person will experience the world by pointing out that the nature of a technology influences human experience by selecting certain ways of knowing (experiencing) for amplification, and reducing others. That is, a technology mediates human experience through its selection/amplification and reduction characteristics. Ihde uses the example of a person who manipulates a stick in order to reach fruit located in the top branches. The technology extends (amplifies) the reach of the person but reduces those aspects of experience relating to

touch and smell — which may be important to determining whether the fruit is ripe (Ihde, 1979, p. 53). To use a second example of technology, the telephone amplifies the ability to project voice over great distances, but reduces the use of the other senses that come into play in non-technologically mediated (fact-to-face) communication. The amplification characteristics of computers are even more complex in that they alter our ways of knowing as well as communicating.

Second, Ihde identifies three different types or categories of existential–technological relationships. The first involves experiencing something *through* the technology, like the person who experiences the fruit through the use of the stick or the experience with another person through the telephone. The second type of existential–technological relationship is what Ihde refers to as an "experience *with* a technological artifact" (p. 54). In this relationship the technology is the focal point of the experience, like following the voice directions when using an automated answering system or synchronizing mind and body with the automated signals that regulate food preparation at a McDonald's fast food restaurant. The third type is what Ihde calls a background relationship. That is, most of modern life is lived within contexts that involve the presence of multiple technologies — the lighting, heating, acoustical systems, running motors, flashing signs, voices and images on a television, and so forth, that provide the background for the more focal experiences we have. The background of technological activity (now often unnoticed because it has become so much a part of our taken-for-granted reality) not only influences the ambience of daily experience but also reinforces the acceptance of the artificial world of technology as more real and vital than the "natural environment" — which is often treated as a pleasant escape from "reality." In examining the amplification and reduction characteristics of computer technology, particularly in educational settings, it will be important to keep in mind Ihde's categories of experiencing through technology, with technology, and as technological background.

Whereas the Heidegger/Ihde focus is on the person's relationship with technology, the selection/amplification/reduction characteristics of technology also relate to culture. That is, a technology selects for amplification certain cultural patterns, and reduces the presence of others in people's lives. As the mediating characteristics of a technology changes the cultural patterns (in language processes, ways of knowing, sense of time and space, etc.), it may have a secondary effect on the person's psychological development and sense of taken-for-granted reality that is far more influential than what is experienced *through* and *with* a technology. The cultural mediating characteristics of technology can be seen in the introduction of the phonetic alphabet, printing press, television, and computer. As computers incorporate elements of these earlier technologies, and are becoming the dominant symbol of power in the Information Age we are supposedly entering, I will limit the following discussion to the influence of computers on the cultural patterns that serve as the primary reference point in the cognitive, linguistic, and identity formation of the child.

The argument that computers amplify certain cultural patterns and reduce others goes counter to the way of thinking of most spokespersons within the field of educational computing. Because they view their task as that of expanding the educational uses of this technology, it is important to establish how they understand the connection between computers and culture, and how computers contribute to the student's ability to think. As I have written elsewhere (Bowers, 1988) on how the field of educational computing remains grounded in the seventeenth century epistemology of John Locke and Rene Descartes, I will cite several of the most articulate leaders in the field. As editor of a special issue of *Teachers College Record* devoted to "Computing and Education: The Second Frontier" (McClintock, 1988), Robert McClintock writes:

> To state it directly, the irreversible cultural action that we have initiated has two related components. The first consists in substituting a new form of coding — binary code — as the basis for storing and retrieving all the contents of our culture. The second consists in adding to the ancient cultural discovery of how to externalize memory outside the human mind, a very modern, portentous ability to externalize intelligence also outside the human mind. (p. 349)

"All culture," he continues, "can be coded so that it can be operated on with a digital computer" (p. 351). An extension of his argument would be that all cultures (Japanese, Hopi, Balinese, etc.) can be digitally coded and stored in a database without changing the culture. In effect, he is arguing that the technology is culturally neutral, and that computers simply represent an advance in data storage and retrieval.

The assumption that people use a computer as a tool (that is, they determine its purposes) can be seen

in how McClintock frames the educational challenge of computer technology: "The pedagogical problem encountered in shifting from a culture of memory to one of intelligence will consist of developing educational strategies through which people will learn how to control and direct the intelligent tools that will increasingly be available to them" (McClintock, 1988, p. 351). Writing in *Scientific American*, Alan Kay also restates the Lockean/Cartesian view that human intelligence, when based on "objective" data, is freed from the impositions of cultural traditions (i.e., memory), or as he puts it, "the barbarisms of the deep past" (Kay, 1991, p. 140). And like McClintock, he views educational computing as facilitating the thought process of a culturally autonomous individual. "Each of us," he writes, "has to construct our own version of reality by main force. Literally, to make ourselves. And we are quite capable of devising new mental bricks, new ways of thinking, that can enormously expand the understanding we attain" (Kay, 1991, p. 140). To summarize the assumption which underlies Kay's way of understanding the relationship of computers and human intelligence: Culture has no connection to language or thought processes; language (French, English, Japanese, etc.) is a neutral conduit for the communication of objective information and data; computers are a culturally neutral technology that empower individual intelligence and self-direction.

The epistemological/ideological orientation embedded in the thinking of McClintock and Kay is also present in the literature of educational computing, but is seldom explicitly articulated. Computer education textbooks and journals, such as *The Computing Teacher*, are used to explain the educational uses of the technology. The ambience of the literature is that of proselytizing rather than that of careful reflection on when computer-mediated learning is appropriate. While those in the field of educational computing can be faulted for their failure to recognize that computers involve the use of culturally specific languages and ways of knowing, and that these processes express the "reality" constituting orientation of a cultural group's metanarratives, the real source of the problem can be traced back to the parent field of computer science. In accepting the prestigious Turing Award in 1987, John E. Hopcroft's speech reiterated the Lockean/Cartesian tradition of excluding culture from how intelligence is to be understood in the modern world. According to Hopcroft (1987, p. 201):

The potential of computer science, if fully explored and developed, will take us to a higher plane of knowledge about the world. Computer science will assist us in gaining a greater understanding of intellectual processes. It will enhance our knowledge of the learning process, the thinking process, and the reasoning process. Computer science will provide models and conceptual tools for the cognitive sciences. Just as the physical sciences have dominated man's intellectual endeavors during this century as researchers explored the nature of matter and the beginning of the universe, today we are beginning the exploration of the intellectual universe of ideas, knowledge structures, and language.

His last statement about computer science helping to advance our understanding of the "intellectual universe of ideas, knowledge structures, and language" brings us back to the main theme of this discussion: How technology amplifies certain cultural patterns over others, and the implications of these changes for educating future generations to live in greater ecological balance.

The patterns of a culture are, in part, stored in the stories told in response to the child's questions: "What is that?" "What am I to do?" "What do others want?" As Alasdair MacIntyre (1984) observes, "I can only answer the question 'What am I to do?' if I can answer the prior question 'Of what story or stories do I find myself a part?'... I am part of their story, as they are part of mine. The narrative of any one life is part of an interlocking set of narratives" (p. 216). In some cultures the stories that both frame the questions and provide the group's answers that influence the child's development include experiences drawn from both the human and animal worlds. Among American Indian cultures these stories (tales of coyote, the women who married a bear, the wife of Swanset, he who hunted birds in his father's village, and so on) established for the child the forms of life that were to be included in the moral ecology, and how adherence to the reciprocal obligations dictated by the moral ecology was necessary to ensure the future survival of an interdependent world. Other cultures, such as ours, are based on more anthropocentric-centered stories which result in children acquiring the conceptual maps that make visible and real only historically selected aspects of the territory (e.g., the environment as a natural resource, as a wilderness to be conquered, as an empty wasteland). The key point here is that the form of child subjectivity, including ways of understanding relationships, is dependent to a significant degree upon the "world" constituted in the language processes of the cultural group.

Given this commonsense observation, the critical question becomes: What stories, languages, and ways of knowing do the technologists want to make the dominant feature of mainstream culture, and what is the nature of subjectivity that their form of culture will help constitute as the natural attitude toward everyday life? As computers are increasingly used to integrate social and mechanical techniques, the cultural amplification and reduction characteristics of this technology become crucial to answering this question.

As our own culture is so much a part of our taken-for-granted world, it is difficult to recognize fully the changes that are occurring; but certain changes are now becoming more visible. While the following discussion will focus on the cultural mediating characteristics of computers, it should be kept in mind that computers incorporate other traditions that have long exerted a profound influence on the development of Western consciousness. People are receptive to using this technology (even to thinking of it as a model

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*A**s the computer amplifies a culture-free view of language and communication, it reduces the awareness of several essential characteristics of the culture-language-thought connection.*

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for understanding the "intellectual universe of ideas" — to recall Hopcroft's scientific vision) becauseofpastnarrativesandexperiencesthathave equatedcertainformsofknowledgeandindividualism with social progress. For example, computers embody a print-based form of consciousness, an epistemology that translates gestalts into discrete bitsofdata,theliberal/scientificanti-traditiontradition of thought, and an anthropocentric attitude toward knowing nature in order to better control it. Computers are, in effect, simply the amplifiers of Western traditions that we currently associate with modernization.

Keeping these important qualifications in mind, I would like to use three different categories to frame the analysis of the form of subjectivity reenforced by those areas of cultural experience where computers have become dominant. The categories are: cognitive and linguistic cultural patterns, the political and moral world of play and work, and the ideology–ecologicalcrisisconnection.

Amplification of Cognitive and Linguistic Cultural Patterns

Computers both embody and facilitate mental processes, and they involve culturally specific ways of knowing: the design, engineering, and development of the machine's logic system and software programs; computing and word processing as part of a larger process of problem solving; and the use of a metaphorical language that encodes the analogue thought processes and experiences of people who had a specific historical/cultural identity. But the amplification characteristics of computers are very limited in the forms of knowledge that can be represented. Whether we are talking about a student using a database or a simulation program, or an engineer dealing with a set of mathematical relationships, there is a commonality in the form of knowledge that is the basis of the person–machine relationship. McClintock (1988) identified this form of knowledge when he claimed that "all culture can be coded so that it can be operated on with digital computers." That is, computers amplify the explicit knowledge of a cultural group, and represent this knowledge as bits of information that is, according to the conventional wisdom within the field, used as the basis for thinking, forming ideas, and so forth. What get reduced as legitimate knowledge are the tacit, contextual, and analogue forms of knowledge — which are learned at a prereflective level as the person unconsciously uses the patterns and practices of others as examples (models, templates) to be reenacted in similar existential/cultural situations. Furthermore, the explicit forms of knowledge amplified by computers is represented as "discovered" (observed) by an objective (disinterested, value-neutral) observer. This knower/known dichotomy, which Descartes further strengthened, also reinforces the mind/body and "man"/nature dichotomies so central to Western consciousness. The implications of this cultural orientation are immense, and I shall mention only three:

1. Local knowledge that cannot be made explicit in order to fit the language-processing characteristics of computers is de-legitimated.

2. Narrativized forms of knowledge (including the culture's moral codes) cannot be communicated

through this technology except in a sterile and distorted form that undermines the traditional sources of authority.

3. People who possess the ability to use the restricted language process associated with computer-mediated knowledge will take on more status and power relative to other groups who rely upon other ways of knowing.

A second area of cultural amplification is expressed in how computers reinforce a conduit view of communication and a representational view of language that are still deeply rooted in all levels of public education, from elementary through graduate level classes. According to this tradition, words stand for or represent real things and events. As Alvin Gouldner (1979, p. 28) put it in his criticism of the new class as a speech community: " 'one word, one meaning' for everyone and forever." Ironically, this representational view of language allows the computer-mediated culture to represent both the rational process and the individual as free of cultural influence. As the computer amplifies a culture-free view of language and communication, it reduces the awareness of several essential characteristics of the culture–language–thought connection. As I have discussed this more fully in *The Cultural Dimensions of Educational Computing*, I shall only touch on several implications of hiding the metaphorical nature of the language–thought connection. As a number of observers have pointed out in recent years, cultures are not built up on the basis of data. Rather, they are based on metanarratives, and these explanations of beginnings, relationships, and future possibilities (if everybody subscribes to the shared moral norms) are used to make sense of daily experience — including data (Roszak, 1986, pp. 87–107). Language both stores and reproduces these metanarratives in the daily processes of analogic thinking where the "new" is understood in terms of the familiar and proved. Just as the root metaphors or metanarratives of a culture influence the analogues that can be imagined, the iconic metaphors encode earlier processes of analogic thinking. The current use of such iconic metaphors as "memory," "access," and "intelligence" — to cite examples where the image or schema of understanding has been changed in ways that reflect the current practice of thinking of human attributes and processes in terms of computer characteristics (the latter were originally understood in terms of metaphors that reflected human qualities) are a significant aspect of the language/communica-

tion process. To put the problem more simply, computer-mediated language processes hide the metaphorical nature of language, and how the metaphorical constructions of reality are located in the history of a cultural group.

The way in which the processes of language (status given to spoken and print-based discourse, signifier/signified relationships, what is perceived as the power, authority, and function of language, etc.) influence the child's experiences of primary socialization is critical both to the way fundamental relationships will be understood and to the process of identity formation (Bowers, 1984, pp. 31–48). By amplifying both the view of language as representing real events and things, and the accompanying "world conceived and grasped as a picture," to recall Heidegger's phrase, computers help to hide the way in which the linguistically encoded schemata representing prior understandings influence the thought process of the student. To make this point more succinctly, computers help to obscure the way in which language thinks us as we think within the language — to paraphrase a key Heideggerian insight into the nature of language. The metaphors of "pioneer," "wilderness," "nature," and "Indians," etc., are examples of an encoding process where earlier analogic thought processes provided a schema or image that frames how current situations are understood. To put this another way, while the computer reinforces our specific cultural way of understanding thinking as an autonomous/data-based process, the person using the computer is actually participating in a thought process deeply influenced by earlier people who were trying to solve problems and make sense of their lives within very different historical and cultural circumstances. The mindset of the British Empire, for example, is still present in the metaphorical language that divides part of the world into Near East, Far East, and "down under." Similarly, the schema of understanding that until recently framed how we understand "intelligence," as well as such other currently used metaphors as "natural resource" and "individualism," are examples of how the mental/experiential processes of the past continue to influence the present. If future generations are going to understand the current condition of the "territory" (the natural systems we interact with and are absolutely dependent upon), they will need a profoundly different view of the culture–language–thought connection than the distorted understanding that computers help to foster. As it becomes

clearer about how thought is part of a larger symbolic ecology, perhaps it will be easier to recognize the interactive relationships that characterize our place in the larger information exchange system that Bateson calls a "mental ecology." But this will involve radical changes in the schemata of understanding based on the metaphorical image of the autonomous individual now reinforced by computers.

Other Forms of Cultural Amplification and Work Settings

The child's development is now being influenced by a variety of other cultural message systems that reflect the amplification/reduction characteristics of computers. I shall simply identify several of the more problematic ones in order to save space for a brief discussion of the critically important issue of how computers relate to the ecological crisis: a topic that

It will be very much as Kafka envisioned it in **The Trial,** *where everything is known by decision makers who are themselves unknown — but objective, efficient, and networked together.*

deserves book-length treatment.

The impact of computer technology on children's play has been as profound as it is disturbing. According to the findings of Eugene Provenzo, Jr., 25 of the 30 top selling toys in 1989 were video games or video game-related. The simulation games that supposedly challenge the person's reaction time in making quick judgments also reinforce the cultural messages that connect violence, revenge, death and destruction, and competition with the excitement of the fast moving and manipulable images on the screen. As Provenzo notes, most of the games teach another message: Winning requires following the rules exactly as defined (Provenzo, 1991, pp. 13, 19). In fact, part of the challenge is figuring out the decision-making process that the game embodies. If the child's taken-for-granted reality is, in large part, constituted by the language patterns (including stories) that make up their symbolic environment, and there is overwhelming evidence to support that this is the

case, the impact of these games and similar-value-oriented television programs can only have a pathological and thus destructive effect.

Just as students spend more time watching television programs that rely upon video game plots and heroes, they are encountering more areas of the curriculum that have been adapted for computer use. The values used to justify the more widespread use of computers are often associated with economic need, the necessity of computer literacy for full participation as citizens in the Information Age, and the need to learn problem solving, decision making, and "higher order" thinking skills. These values provide an important clue about the conception of the good person ("Of what story or stories do I find myself a part?" — to recall MacIntyre's question) reinforced through educational computing. Douglas Noble's observation, as I see it, addresses the deeper levels of the technological/cultural amplification process hidden by the rhetoric that connects computers with individual empowerment and international competitiveness. Writes Noble: "Educators have unwittingly adopted the framework of a larger military/scientific enterprise that only appears to be an agenda for public education because the language — intelligence, learning, thinking and problem solving — is the same.... This is the enterprise to harness intelligence, both human and machine, for use within complex military and corporate technological systems." But the ultimate goal, he concludes, is to increase the effective use of technology (Noble, 1991, p. 171).

The integration of techniques now made possible by computers is changing the culture in ways that will have important implications for educators who want to foster a form of subjectivity that complements rather than subverts the potentialities of computers. However, educators who view the full potentiality of computers, particularly in the area of surveillance, as a threat to democratic values and traditional civil liberties, will face a different set of challenges — particularly since all technological experiments with the culture are viewed as inherently progressive in nature and thus not requiring any sort of questioning attitude. Basically, the capacity of computers to collect, store, and retrieve massive amounts of data is turning American society into a Panopticon culture where work performance, con-

sumer habits, personal communications and travel, and economic circumstances are recorded and stored in data bases. The databases of governmental agencies relating to various aspects of people's lives are now interconnected with databases in the corporate world — and soon will be connected with the data bases of the medical establishment (Roszak, 1986, pp. 156–176). The translation of individual lives into digital code that allows economic and political decisions to be made on the basis of "objective data" by impersonal authorities will require a new form of subjectivity — one that accepts as normal the limited human characteristics that can be encoded and communicated through computers. The Panopticon culture, where the invisible data collectors keep everybody under constant surveillance in order to make decisions more rational and efficient, will lead to a new genre of stories — of lives ruined by personal behavior, character traits, and beliefs that do not conform to computer-established norms, and of successful lives attuned to the moral/political requirements of the Information Age. It will be very much as Kafka envisioned it in *The Trial,* where everything is known by decision makers who are themselves unknown — but objective, efficient, and networked together. How far we have already progressed in this direction in the work setting is described in Barbara Garson's *The Electronic Sweatshop.* New stories reflecting people's experiences with the early stages of development of a Panopticon culture are already being told, and will have an impact on the process of growing up in America.

Computers and the Ecological Crisis

Computers are the epistemological machines of the scientific/technologically oriented middle class culture. Computers can also be understood as embodying the liberal ideology of this cultural group, which is now influencing the form of modernization being embraced by countries around the world. The chief elements of this liberal ideology include (a) a view of the individual as the the basic social unit, (b) knowledge as derived from objective data and formulated by individuals who are in control of their own thought processes, (c) change and technological innovation as manifestations of humankind's progressive mastery of nature, and (d) a "man"-centered universe that now requires that science and technology be utilized to ensure the successful "stewardship" of natural resources that are the inheritance of future generations. It is also important to recall that this epistemology/ideology

has had a long history of using a metaphorical language derived from machines for understanding both humans and the rest of natural phenomena.

The problem of a computer-centered culture is that it leads to treating the ecological crisis as further evidence that more systematic planning and efficient technologies are needed. Ironically, the ways of knowing, technological practices, and moral analogues that characterize ecologically sustainable cultures (as well as groups living on the margins of the dominant culture) would not be considered as legitimate responses to the problem of living beyond the carrying capacities of the Earth's ecosystems. Ecologically sustainable cultures, while varying widely in their rituals, technologies, and art forms, nevertheless appear to share common patterns that do not fit the mediating characteristics of computers. The identification of several of these characteristics will help to make two fundamental points: that the computer is a totally inadequate technology for addressing the deeper cultural roots of the ecological crisis, and that the education of youth needs to be framed in terms of an epistemological/ideological orientation that makes long-term sustainability, rather than economic and technological progress, the primary concern.

Ecologically sustainable cultures have evolved language systems (the process of semiosis in the broadest sense) that ground relationships with the nonhuman world as essentially moral and reciprocal in nature. Like Bateson's mental ecology, their moral ecologies de-center humans as possessing a privileged status in relationship to other forms of life. Although all languages are about relationships, computer-mediated languages frame relationships in instrumental terms. In effect, knowledge derived from computer models, simulations, and data become the basis for human action. This instrumental language also contributes to eroding the authority of the metanarratives that are the basis of a culture's moral norms. A second characteristic of ecologically sustainable cultures is that knowledge (including technologies) must meet the test of long-term sustainability. That is, ideas, values, and technologies are not embraced just because they are new. The conservatism of these cultures is grounded in a reluctance, borne of past collective experiences, to experiment by making new demands that will have unpredictable consequences for the local bioregion. Modern cultures, with their myth of progress and scientifically based view of knowledge, have made

experimentation with their own patterns the ideal cultural norm — which has been sustained through the exploitation of the bioregions of other cultural groups. A third characteristic of ecologically sustainable cultures is that they appear to rely more on oral forms of communication. That is, the stories about how to be a moral person (and of immoral behavior that will bring the entire community to a tragic end), the uses of technologies, and the social patterns that sustain community life are shared through face-to-face forms of communication where local context, community participation, and memory play a more vital role. These aspects of the knowledge/communication process do not fit the patterns associated with the literacy-encoding process utilized by computers. Computers, as mentioned earlier, amplify the representation of data as context-free, as well as a visual/thought process between a student and the printed symbols appearing on the screen that have anonymous authorship.

Although this entire discussion has focused on the importance of understanding the culture–technology connection, and that a computer-centered culture is continuing the very traditions that have contributed to the ecological crisis, computers themselves are especially unsuited to the task of understanding the influence of culture on human development. Education during the formative years of childhood and adolescence is further complicated by the ecological crisis that now brings into question the most basic assumptions and ideals of the dominant culture. At least part of the answer to the question, "What are we to do?" as Noel Gough and Kathleen Kesson put it, "is to participate in the creative reconstruction of a language which foregrounds our kinship with nature. We need myths and metaphors that 'sing' [They are referring to the Songlines of Australian aborigines that combine their cosmology, local knowledge of life forms and geographical features, and the pathways that connect sacred sites, which is another form of cultural coding.] the earth into existence *in the conditions of urban and late industrial lifestyles.* Clues to such constructions can be found in the symbolic languages of pre-modern societies but we cannot, and should not, attempt to appro-

priate the metanarratives of another culture to replace our own" (Gough & Kesson, 1992, p. 8). As the metaphorical foundations of modern thought and lifestyle become increasingly untenable, we will need to evolve a form of individuality, including an image of the creative person, that is grounded in a sense of connectedness and dependency within the larger biotic community. This will have profound implications for every aspect of the educational process, including the cultural norms educators use for making judgments about what forms of knowledge, language processes, and images of the good person that are to be part of the process of classroom socialization.

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Schooling in an Era of Limits

Gregory A. Smith

Schools have a responsibility to reexamine current perceptions of the nature of the world and human society in the light of the reality of resource depletion and to modify curriculum, structures, and even attitudes to prepare students to deal with a world of limits rather than expansion and development.

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One of the consequences of the compartmental thinking characteristic of the modern era is that it is very difficult to imagine the impact events in one area of our lives may have on another. A few years ago, in the process of writing a dissertation for a degree in educational policy studies, I found two intellectual domains converging in a way that was at once distressing and hopeful. In the midst of an exhaustive examination of the nature of schooling in the United States, my mind continued to return to the environmental crisis and its potential implications for the shape of education in the future. This is a topic that few educational spokespeople choose to acknowledge, and I discovered that in exploring it I had to venture into new terrain that more often than not felt like no-man's land. If it hadn't been for the concern I feel for my children, I would have opted for an easier subject to investigate. As it was, my intellectual (and spiritual) journey took me to a set of fundamental principles that seem to underlie modern industrial civilization and the schools that transmit it. I have become increasingly convinced that preparing our children for the world that may await them could well require seeing these principles for what they are and exchanging them for others that promise to offer more support for both the planet and its human communities.

Let me begin by saying more about the world I imagine awaits either us or our immediate offspring. Most industry forecasts suggest that we are nearing the end of the fossil fuel age. Known petroleum reserves, for example, are likely to be exhausted within two generations if usage rates continue expanding at the rate they have since the 1950s.[1] New fuels may be developed, but it is unlikely that we will again encounter sources of energy that are as abundant, accessible, or inexpensive as oil. We have tended to equate the efflorescence of the modern world with human inventiveness; this is only partially true. Without oil, little of the world that has emerged around us during the past century would exist. Even if petroleum supplies were inexhaustible, the consequence of their continued use could upset global climate patterns. Furthermore, the production

and consumption practices that undergird modern economies have become increasingly harmful for the natural environment that supports them. When these trends are coupled with the impact of human overpopulation, it is difficult not to believe that humanity will have to absorb deep and potentially painful changes in the coming century.

One of those changes could well be a major decline in industrial productivity as a result of resource depletion and the avoidance of further ecological damage associated with unrestrained development. If this were to happen, the economic growth that has allowed many of the residents of industrialized nations to achieve a standard of living unheard of in any other era could be slowed if not reversed. In this scenario, the recession of the late-1980s and early 1990s would become a harbinger of ever more pervasive forms of economic and social dislocation. Few of us are prepared to deal with the implications of this possibility. We have instead been schooled to believe that the world will provide us with ever-expanding opportunities for individual development and comfort. Yet as the homeless people on our streets and the growing deterioration of the infrastructure of our society attest, this possibility is becoming reality for a growing proportion of our population. I would argue that these problems are likely to become more rather than less intense, and that they will require a major reassessment and then recrafting of our place on the planet and as members of human societies. Our continued survival could well depend on our ability to acknowledge and then respond with wisdom to the limits the Earth places upon the economic expansion that has been the driving force of modernization.

At question is where this reassessment and recrafting can take place. From one perspective, such a question is not worth asking because change will occur despite our best or worst intentions. A transformation in the nature of production will almost certainly bring about changes in social relations and the cultural practices that support them. Marx's insight is likely to apply to us now as much as it applied to industrializing agrarian societies. Allowed to run its own course, however, this process could lead to grave and dangerous forms of social dislocation that could potentially jeopardize both human beings and the planet in ways that might be avoided if we were to take a more active hand in shaping future alternatives. And it is here that I believe education could help steer us in directions that promise to be less destructive than others. While schools are only one of the sites where culture is transmitted in modern societies, they remain powerful socializing agencies that have played an essential role in preparing children for the requirements of contemporary institutions. If schools were to socialize children in a different direction, the effect on the society as a whole could be profound, especially if other major domains of our common life were also in flux.

If schools are to play such a role, however, it is critical for us to examine two things. As I indicated earlier, we must first look more closely at central principles regarding the nature of the world and human society that underlie industrial civilization. It is these principles that constitute the ideological basis of our lives. If they are not examined and changed, then moving beyond the social and economic practices that have brought us to our current impasse will not be possible. Second, we must then turn our attention to the way in which most schools confirm and extend these principles in their day-to-day practice. Although changes in curriculum will almost certainly have to accompany the development of an educational process more appropriate for an era of limits, the most important changes needed in schools could well be structural and attitudinal. Once these principles and practices are clarified, it then becomes possible to imagine schools capable of preparing children for a world very different from the one imagined by the architects of modernity.

Guiding principles of the modern/industrial world

There is always a danger of caricature in discussions regarding broad trends, themes, or principles at work in complex social organizations. Despite this, such discussions can play a helpful role in illuminating and calling into question taken-for-granted assumptions and practices that may have become counterproductive to the health of communities or the society as a whole. Although the principles outlined below represent such a simplification, they are based upon a distillation of the work of a number of social scientists and commentators who have sought to explore the unique characteristics of the modern world.[2] As such, they can turn our attention to elements of our own lives that we might not otherwise examine with the same care. The principles I will devote my attention to — individualism, centralization, the ideology of progress, and a depersonalized and mechanistic view of the universe — are all frequently cited components of modernity. My aim in

recounting them here is to construct a lens through which we might come to see contemporary educational practice in a different way.

In the past ten years, the celebration of individual freedom and development that has been at the heart of modernization in its American form has been subjected to a new level of study and criticism. The work by Robert Bellah and his associates in *Habits of the Heart* (1985) and now *The Good Society* (1991) has received widespread attention. Their commentary on the impact of individualism on the integrity of American communities and democracy has raised serious questions about the way in which this fundamental set of belief structures is now affecting our common life. At base, the ideology of individualism posits that individuals are the social atoms from which societies are constructed. Through a social contract, individuals agree to form groups capable of sustaining and extending the development of their members, and the less these social organizations interfere, the better. Our society's preoccupation with individual rights and its faith in the ability of minimally restrained individual economic activity to improve the welfare of all are indicative of the extent to which this perspective has become part of our collective common sense.

This perspective stands in contrast to the way individuals in premodern societies were normally defined. Identity was achieved not through personal merit and displays of talent but as a result of one's relationship to others. One's place in a family and community played a central role in determining personal commitments, obligations, and possibilities. Without question, this definition could be and often was constraining, but within this context people often achieved a level of community responsibility, security, and meaning absent in modern society. Because of that membership, they knew that their fundamental human needs would be met if the needs of the entire community were met. Ubiquitous patterns of gift-giving and sharing encountered in premodern communities worldwide point to the way in which this experience is part of our shared history. Even among the poor in industrialized societies, these patterns of mutuality persist.[3]

Bellah and his associates have argued that because of our preoccupation with individual rights and development, many Americans have come to neglect the forms of interpersonal commitment encountered

both earlier in our own history and in other societies. They suggest that without this commitment, the lopsided focus on individualism that has been so much a part of our national life threatens to weaken the ties that are also essential in a democratic republic. As people turn inward to their own needs or the needs of their families and immediate neighbors, a broader recognition of the needs of the "commonwealth" is diminished. Allowed to withdraw into their own personally identified enclaves, people become less willing to make the personal sacrifices necessary to support the whole. Yet it is just such sacrifices that will have to be made if

> *Both individualism and centralization weaken the will of people to join collectively in the solution of shared problems.*

we are to reverse trends that have become so corrosive of our public life. The revitalization of our communities and schools, for example, will not occur unless we as taxpayers are willing to pay the cost. Nor will the environment be protected unless corporations and the people who manage and profit from them circumscribe their own gain in the interest of a definition of the good that goes beyond the pursuit of self-interest.

Until recently, individuals have remained insulated from the consequences of the narrow focus of their activities because of another of the fundamental principles of modernity: centralization. Problems not dealt with locally could be deflected to more comprehensive institutions we believed would assume responsibility for what we could not or would not address. The growth of the modern state and multinational corporations has accompanied the diminished authority of communities, providing a haven for individuals cut loose from the habits of support that once sustained them. Such a process seemed acceptable when this transfer of power from the periphery to the center promised and appeared to be delivering increased welfare for all. Economies of scale and the broader distribution of goods meant that individuals did not have to be as dependent upon the continued success of family enterprises or small factories with limited economic clout. Similarly, it seemed both more sensible and more secure to turn to insurance companies or the government rather

than loved ones to handle the expense and care required in old age. Unemployment, at least for a number of years after World War II, could also be weathered thanks to state assistance.

By citing such programs, I do not wish to call into question their value given our current social formation. Without them, the prospect of living in industrialized societies would be even more daunting, something which is evident in comparisons of general public welfare in the United States versus more socially responsive governments in Western Europe. What is problematic about this centralization of economic and political power and support is that most people have limited influence over any of the most basic issues that affect their well-being.[4] If, for example, a General Motors plant in Dayton, Ohio, is closed by corporate executives who reside elsewhere, neither local workers nor even community leaders can bring much weight to bear upon this decision. The deindustrialization of the United States during the previous decade and a half bears witness to the vulnerability of people in this country to centralized economic and political interests over which they hold little control. A second disadvantage of centralization is related to the first. As people lose control over the issues that matter most to them, they have a tendency to direct their attention elsewhere. Participation in government therefore becomes of secondary importance. Both individualism and centralization thus weaken the will of people to join collectively in the solution of shared problems.

The abandonment of the commitments and security once experienced in extended families and more closely knit communities as well as the transference of power to distant managers and governors, however, has seemed reasonable to most people over the previous century given what was promised: increased levels of personal comfort, security, and wealth thanks to the material progress made possible by the advanced technologies and forms of social and economic organization sponsored by centralized institutions. The federal government, for example, could promise public works projects on a scale unimaginable to local or state governments. Similarly, large corporations could develop production and distribution systems capable of making available to an ever-growing number of people the appurtenances of the good life. This belief in both the possibility and the value of progress is the third central principle underlying modernization, and to some

extent, it provides the inspiration for the entire process.

Faith in this linear species of progress has in many respects replaced the faith in the divine or supernatural that once offered people both a sense of meaning and solace in eras prior to our own. The Reformation, the Age of Discovery, and then the Scientific Revolution in the 1500s called into question the verities upon which European society had restructured itself after the fall of Rome. Pivotal to these developments was a reassessment of the place of human beings in the universe. No longer was it assumed that people must remain passive in the face of forces that lay beyond their understanding. The development of a scientific perspective that viewed the world as resource rather than spirit opened up new possibilities for human inventiveness. In the writings of a Sir Francis Bacon or René Descartes or even Sir Thomas More can be found a level of profound excitement about the potential inherent in the ability of human beings to uncover the workings of nature or human societies in ways that would obviate the need to wait for supernatural redemption. The world need no longer be viewed as a vale of tears, but as a workshop where humankind could play out its possibilities.[5]

This faith in progress is now so profound that it is difficult for many residents of the late-twentieth century to come to grips with the devastating impact our technological wizardry has had on the natural environment that provides the grounds for our species' existence. Thus economist Julian Simon can argue that overpopulation and resource depletion are not problems because economic growth is predicated on human inventiveness and productivity rather than material resources.[6] Similarly, it is not uncommon among even sophisticated intellectuals to believe that the grave problems we are now facing in regard to resource depletion and pollution will in the end be solved as a result of technological innovations that remain as yet unimagined and undeveloped. It is this faith in our ability to solve most problems thrown our way that leads many individuals to downplay the significance of the potentially life-threatening crises that confront us and to disregard what may be necessary changes in our way of life and the assumptions that undergird it.

This is not to say that the belief in human potential unleashed by the Scientific Revolution should be discarded. This sense of our own possibilities has brought with it both new understandings and new technologies that have improved the welfare of mil-

lions of human beings, understandings and technologies that could also contribute to overcoming our current social and ecological dilemmas. This belief in our potential has furthermore gone far toward eliminating the blind acceptance of poverty or powerlessness that has prevented social change in one civilization after another prior to our own. Problematic in this faith in progress, however, has been the way in which we have allowed it to manifest itself in our dealings with others and with the planet.

By focusing primarily on material progress rather than on spiritual progress, we have fallen into the trap of hubris with its unwarranted faith in our own capacity to control our destinies. While the previous five centuries have demonstrated the power we in fact have to influence the conditions under which we live, the problems we now face are ample evidence that our lives are also constrained by the physical conditions of existence. We must continue to eat, keep from getting too cold or wet, and seek to live in places where our bodies are not threatened by toxins. We must also acknowledge that despite all of our efforts, we in the end will die. Seemingly, in our attempt to forget our own limitations, we have forgotten or ignored the limitations of the planet. Dealing with the environmental crisis and its accompanying social and economic ills will require an acceptance of those limits and a recognition that being fully human may well entail reconciling ourselves to the inevitability of suffering and our need for one another. As Shakespeare's King Lear observed when he had been stripped of his own reasons for pride, we are little more than naked forked creatures subject to all the vagaries of nature. In the modern world we have been able to mitigate, at least for a while and for a small proportion of the planet's peoples, some of those vagaries. In the end, however, it is the comfort and support of others — not technological wizardry on its own — that will provide us both solace and security. The ideology of progress offers little guidance that may aid us in the fulfillment of this process.

Also problematic in regard to our relations with the natural world is the fourth underlying principle of modernity, our desacralized and mechanistic view of the universe. Prior to the Scientific Revolution, the cosmologies adopted by most human groups tended to see nature as well as people imbued with spirit. Even within medieval Christianity with its assumptions of human dominance, the vision of a great chain of being linking men and women to other life forms provided a powerful integrating image. This link, however, was broken with the advent of a new paradigm that stripped nature of its meaning and spiritual significance; Weber labeled this process the disenchantment of the world.[7] With this disenchantment came the abrogation of patterns of restraint and stewardship that human communities worldwide had constructed to govern their dealings with the ecosystems upon which they depended for their existence. Instead of supporting interactions based upon awe, respect, and care, the new scientific vision was predicated on mechanical understanding and exploitation. Sir Francis Bacon wrote of subjecting nature to the rack in order to uncover her secrets.

Although empiricism and reductionism have proved to be extraordinarily powerful and useful intellectual tools, they have also blinded us to the way our actions in the physical universe can rebound upon ourselves. In assuming a position of detached and impersonal objectivity, many of us have come to believe that we in some way stand above the physical requirements of the rest of the natural world. We are taught to see the remainder of that world outside of ourselves and divested of both feeling and meaning. How many of us, for example, question the morality of dissecting frogs or other animals in high school biology classes? Yet, to their teachers' surprise, in some communities in rural Alaska children will fail their science courses rather than participate in such activities. Longstanding assumptions about the treatment of other species interfere with their willingness to assume that frogs — or other animals — have nothing to do with them. Our depersonalized approach to these beings runs counter to cultural patterns and assumptions that allowed the ancestors of Eskimo children to live in extraordinarily harsh conditions for millennia. This does not mean that these children do not take the life of other creatures; when they do so, however, it is with an attitude of respect and mutuality. They recognize that if they do not care for the resources that maintain their lives, those resources will no longer be available for their support. Fundamental to their learning about the world is an understanding not of their detachment from the natural environment but of their interdependence. It is exactly this lesson that an epistemology based on isolating specific phenomena from the whole subverts.

These four principles — individualism, centralization, the ideology of progress, and an epistemology premised on detachment from the world around

us — have proved to be exceptionally liberating in their ability to stimulate the release of human inventiveness and power. This release, however, has tended to be unchecked by wisdom and now appears to be threatening the continued viability of our species. Any effort to prepare children to deal with our current predicament must take these principles into account and work toward their transformation. This process does not need to entail a wholesale rejection of modernity in favor of a return to either premodern communities or technologies; it will require, however, a reaffirmation of the interdependencies that exist among ourselves as well as between our species and the rest of the planet. For educators, accomplishing this task will depend on our ability to see how these principles inform current educational practice and how to then change this practice.

Schools and the perpetuation of modernity

Schools have been commonly seen as one of the primary agents by which the central principles of modernization have been transmitted to the young. It is within the context of classrooms that children begin to learn how to negotiate the complex eco-

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nomic and political institutions that are the foundation of life in modern societies.[8] Although institutions such as the family and the media play a critical role in this process as well, the ritualized and regularized environment students encounter within the school provides a powerful and subtle form of socialization through which they learn the expectations and patterns of behavior that promise to bring them success in the world beyond the classroom door.[9] This process, however, tends to divert them from the forms of social participation and identity formation that may be required of the young in the years ahead.

Schools provide one of the first sites where children come to think of themselves as independent individuals. On the most basic level, schools remove children from the home and neighborhood and place them in the company of strangers. The time children

would have once been able to spend with their parents and siblings and perhaps other members of their extended family is significantly reduced because of the hours they must devote to the school. Within this context, children are viewed not as members of families but as individuals with unique identities that stand apart from the identities they possess within the home. Furthermore, children from backgrounds that varied from the culture presented by the school until recently found little support from their teachers for the ethnic or religious traditions imparted to them by their parents. Within the school, children are redefined not according to the categories important to families, but to categories tied into the organization of the school. Children thus become first graders, talented and gifted or in need of remediation, bluebirds or crows. The sense of identity they may have achieved within the home becomes supplemented and to some extent replaced by new definitions applied to them by their teachers, definitions that are not based upon relationships but often upon individual achievement and perceived potential.

Secondly, within the school, children are taught a very different pattern of interaction with adults. They learn that in school they can no longer turn to adults for the support and care they expect from their parents. In their effort to nurture the independence that accompanies the ideology of individualism, teachers often assume a position of emotional aloofness. Children who are unable or unwilling to demonstrate the desired level of independence are generally viewed as problematic. Achievement within school and the rewards that accompany it are also predicated on the ability of children to act independently, further emphasizing that identity is linked to individual performance rather than family membership. These experiences teach children that their well-being will depend more on their ability to demonstrate their worth as individuals in public and competitive settings than on their membership in mutually supportive groups. The mastery of such lessons is essential for people who eventually must participate in a wage economy.

Third, within their classrooms, children must learn to interact with their peers in a new manner. Whereas in most premodern societies, young children spend most of their time in cooperative play with one another, when they confront the school they

are drawn into an ongoing process of evaluation vis-à-vis other students in their classroom. Once again, their sense of who they are is based not upon relationships but upon individual achievement. Children are remarkably sensitive to who is placed in which group and which children are either commended or criticized by their teachers. This process is often subtle, so subtle that teachers themselves are not aware of the consequences of their often unconscious reactions to students.[10] The impact of these judgments and expectations, however, can make the difference between school success and failure, and without active intervention a child who assumes the identity of a slow or incompetent learner in the early grades will find it difficult to become anything other than this throughout the remainder of his or her educational career.

In regard to centralization, schools take great pains to socialize children to the expectations they will later encounter in larger and even more complicated bureaucracies. As educational scholar Philip Jackson has observed, the most important lessons students learn in school have less to do with content knowledge than appropriate forms of organizational behavior.[11] Perhaps more significant is the way children learn that they must obey adults with whom they share no deep or abiding personal relationship. As Jackson notes, teachers are children's first bosses, and from them they learn to submit to people whose authority derives from their institutional role rather than who they are. Under the guidance of this institutional authority, children then learn to defer their own personal desires and spontaneity. Asked to wait time and again throughout a routinized schedule, children acquire a peculiar detachment from their own activities, a detachment that seems especially appropriate considering the decontextualized and impersonal nature of most contemporary workplaces. Finally, children learn to act as if they are alone while in the presence of 25 or 30 other children, an ability that is crucial if order is to be maintained when large numbers of people are crowded into small places. All of these skills are directly transferrable to many occupational settings and are among the essential attributes of "good workers."

If the behavior of children at home or other less formal settings is compared with their behavior in most schools, the exceptional nature of this form of socialization will become apparent. Students who are slow to adopt these behavior patterns, however, are quickly labeled as the victims of one form of behavioral or psychological problem or another. They are diagnosed as either hyperactive, unable to attend, or emotionally impaired and then subjected to treatments involving either medication or psychotherapy. Those who do not respond to this treatment then become the recipients of the school's disapproval and are often denied its rewards. Their failure and approbation become object lessons to everyone else as they become living demonstrations of what happens to individuals who refuse to be molded by the school.

Michel Foucault has written tellingly about the nature of the process by which citizens in modern states are inducted into the requirements of centralized bureaucracies.[12] Through a process of *disciplinary power*, institutions shape the habits and attitudes of people so that over time they learn to fulfill their roles as parts of complicated organizational machines. Foucault speaks specifically about the way in which peasants were crafted into soldiers after the development of citizen armies in the 1800s. In his study of a kindergarten classroom, Harry Gracey has pointed to a remarkably similar phenomenon.[13] After only a short amount of time, young children learn when to speak or be silent, how to stand up or sit, how to form lines and pass from one classroom to another. They respond, furthermore, to the most subtle signals from their teacher. In doing so, they internalize the rule structures and expectations of the highly stylized and formal organizations in which most of them will have to live out the remainder of their lives. In these ways, all of us have been prepared to submit as individuals to the organizational requirements of a highly centralized society. We learn as well, that both our sense of self-respect and our security as individuals are dependent upon our willing compliance with those requirements. In this way, individualism and centralization are conjoined.

To some extent, our willing submission to this process is predicated upon the allure of increased personal freedom and comfort held out to us by the ideology of progress. Those who succeed in school ostensibly increase their opportunity to successfully negotiate the demands of a competitive occupational market, thereby making available to themselves the physical advantages that have accompanied the development of modern industrial civilization. This promise of upward social mobility has proved to be extraordinarily attractive and continues to be a magnet to the hundreds of thousands of immigrants who

continue to seek out industrialized nations to fulfill their dreams of a better life. This focus on material acquisition and comfort, however, has led to a corrosive disregard of the social institutions such as the family, neighborhoods, and churches that lie between the individual and modern bureaucracies. It has led us as well to the neglect of those who are unable to make their way in today's increasingly unforgiving job market. By deflecting our attention to material success, the ideology of progress as presented by the schools has diminished the attention we once devoted to the cultivation of compassion and communal responsibility. We are taught not to learn for what we can share with one another but to advance our own careers. In this process we forget our connectedness and fail to master the social skills and attitudes required to act collectively. In an environment of decreasing opportunities and increasing strife, this is a recipe for growing social chaos and turmoil.

This failure to connect is furthered by an educational process that emphasizes ways of knowing characterized by an emphasis on decontextualization and abstraction rather than direct personal experience. Although progressive educators and others have attempted to stimulate the development of classrooms in which children are drawn into more active forms of exploration and inquiry, the predominant model of teaching and learning in most schools remains teacher- and text-centered.[14] Sociologist Mary Metz has labeled this form of instruction *incorporative learning*.[15] In classrooms where it is practiced, students are expected to do little more than ingest the information presented to them and find few opportunities to interact with the material or to discuss it with one another. What is learned appears to be detached from their own lives and to some extent meaningless. This form of learning contrasts with the way in which children in earlier societies came to terms with the world. In these settings, knowledge was based upon observation and action and grew out of both mental and physical experience. For children in modern societies, learning that comes from their own physical encounters with the world is being increasingly replaced with experiences mediated by others — either through words, images on film or television, or now computer graphics. This process keeps us from confronting in an authentic manner what we know and do. Events that happen on screens or in texts exist in ways that are not quite real.

This mediated experience makes possible a detachment from the world similar to the detachment of fighter pilots whose knowledge of the destruction they have unleashed on civilian populations is restricted to electronic patterns little different from those they may have seen in video arcades. This disjunction between what is learned and what is lived may explain the surprising responses Arthur Levine encountered in his interviews of college graduates in the early 1980s.[16] Successful students were asked about their assessment of world conditions and their own personal prospects. Although most felt that modern societies face a variety of serious crises, few saw these crises as having any impact on their own careers. They believed, instead, that given their educations and current job prospects, they would be able to carve secure and affluent lives for themselves after graduating. Young people so insulated from the implications of what they "know" are unlikely to take action that might address the problems they believe are so threatening to others.

In a number of ways, then, assumptions, practices, and structures encountered in most contemporary public schools induct children into behaviors and attitudes that could prove to be counter-productive and inhibiting when they are faced with the requirements of a world in which the opportunities that to this point have characterized modern civilization become significantly reduced. If our current market economy ceases to expand, fewer and fewer people will be able to find security as they compete for a shrinking supply of desirable jobs in an environment that could become increasingly precarious and unpredictable. Creating the security we require to live decent lives could then demand a very different response from the individual striving that has served some of us so well during the preceding two centuries. These conditions could force us to look once more at patterns of behavior and knowing that have been instrumental to the well-being of human communities throughout earlier eras of our species' residence on Earth.

Shaping schools that foster social and environmental interdependence

Preparing children for the social and environmental conditions they are likely to encounter as adults will necessitate reevaluating and transforming many of the assumptions that have undergirded public schooling as it has evolved since the mid-1800s. Rather than serving the needs of individuals, we may

need to shape schools that are more consciously aimed at serving the long-term needs of human communities and the physical environments that support them. A transformation of these assumptions must then be accompanied by the implementation of new structural and pedagogical forms aimed at imparting to the young the skills and dispositions needed to act collectively in ways that foster the common good. In what follows, I will briefly discuss a set of guiding assumptions drawn from the work of leading environmentalists and social critics and possible educational innovations that parallel them.[17] In doing so, my intention is to lay the groundwork for a more extended dialogue about the shape of schooling in an era of natural limits. It is important to note that many of the suggested educational practices outlined below have in fact been adopted in a wide variety of currently existing schools. Their practice, however, is generally not widespread. Stimulated by a recognition of their relevance to changing global conditions, however, they could become more broadly adopted.

At the outset, it will be critical to inspire in the young a different understanding of the relationship between individuals and communities. This will require directing children's attention to more inclusive social responsibilities in a manner that has not been consistent with the focus on individual achievement and mobility that has to this point dominated schooling in the United States. If such a communitarian ethic is not developed in the young, it will be extraordinarily difficult to weld the collective organizations needed to address community problems. Accomplishing this end will necessitate explicitly exploring the nature of community ties and nurturing relationships that are characterized by a sense of personal bonding and commitment. Rather than extracting individuals from their communities, as has too often been the case in schools as they exist now, educators will need to develop ways to more firmly root their students in the place they call home.

Some of these ways might include the development of a curriculum that confirms local cultural traditions and develops in children a deep knowledge and sense of affinity with the regional environment. Such a curriculum would be very different from the national curriculum described as early as the 1930s by Willard Waller in his exploration of the

tension between public schools and the communities they served.[18] In the conflict between what can be labeled the center and the periphery, the center has consistently won. In the years ahead, however, this center may not hold, as W. B. Yeats warned in his prophetic poem, "The Second Coming." Our well-being will then be tied to the strength of local traditions and cultures. The efforts of Eliot Wigginton and the many educators who have followed his lead in the development of school programs that direct students' attentions to these traditions and cultures provide obvious examples of what might be done more extensively.[19]

Similarly, children could be provided with multiple opportunities to experience learning within the context of their homes and neighborhoods so that the

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acquisition of important skills and knowledge is not decontextualized but embedded in a process of shared existence. These experiences could confirm social relationships by offering students the chance to learn from a wide variety of people and in so doing forge friendships and patterns of mutuality that will tie them to others rather than weaken these bonds. Innovative programs like New York's City-As-School and the California-based Partnership Academies offer students the opportunity to gain both academic and practical knowledge in carefully developed internship settings.[20] Such programs demonstrate that schooling need not be isolated from surrounding communities. An important benefit of these programs is that participating students often come to experience deeper levels of social membership and connection to others and as a result demonstrate higher levels of motivation and self-worth.[21]

Within the context of the school, itself, the adoption of new structures, social relationships, and instructional strategies can mitigate some of the impact of individualism. Smaller schools, or reorgan-

izing large schools into smaller units, can do much to reduce the anonymity that characterizes most secondary educational institutions throughout the United States. The success of educators in District 4 in New York City has demonstrated the value of the personalized learning environments that result from such a process. Placing students with a team of teachers with whom they remain for a number of years can also allow for the development of more supportive ties between children and adults in the school and in the end foster relationships that are more family-like than institutional. Anne Ratzki's description of such efforts in German secondary schools provides ample evidence of the positive impact of this kind of community-building orientation. There, students allowed to remain with the same team of teachers and group of children for up to six years demonstrate much higher levels of school retention and academic achievement than students in comparable German institutions.[22]

Central to the success of these more personalized schools are fundamental changes in the relationship between students and teachers and among students themselves. One of the most striking characteristics of schools capable of overcoming the alienation of "at-risk" students, for example, is the way teachers in these institutions adopt what can be described as an extended role. Rather than presenting themselves as the carriers of very particular responsibilities and services to students, they become what some alternative educators have described as the school's "resident adults."[23] Such adults are willing to act as confidants, counselors, and advocates as well as classroom instructors. For contemporary students whose access to adult guidance has been seriously reduced by changes in the structures of our families, neighborhoods, and economy, simply finding an older person who is willing to listen to some of the demands they encounter in the process of growing up can make a significant difference in their sense of social connectedness and support.

Similarly, changes in instructional practice can help students begin to internalize a more communitarian understanding of their relationships to one another. The growing utilization of cooperative learning strategies promises to nurture an ethic predicated more on mutuality rather than competition. Although these practices remain more occasional than widespread, as they become more broadly implemented students will find increasing opportunities to experience school as a set of collective rather

than isolating activities. In doing so, they may come to look for the strengths each can offer to group projects and begin to learn how to balance these against the weaknesses that are also part of any team effort. This altered orientation can do much to shift the perspective of both strong and weak students. Instead of being put down for doing well, strong students often find their peers celebrating their contributions at the same time that weaker students discover that their own contributions can be as valuable as those of anyone else.[24] In such a situation, motivation and effort are viewed not as a means for escaping group membership and obligations, but as keys to becoming even more integrated into one's community.

The development of these communitarian skills and attitudes, however, can only succeed if they are cultivated in a broader environment in which the work of groups can lead to positive results. If conditions preclude the ability of people to affect their environment in desired directions, even people living in premodern societies eventually abandon traditions predicated on mutual support.[25] Disaffection, anomie, and alienation are the seemingly inevitable results. This is one of the primary reasons for developing institutional structures that are responsive to the demonstration of commitment and concern at the local level.

Schools can do only so much to alter the patterns of decision making found in most economic and political institutions. They can, however, instill in the young a set of expectations about the way things could be. This vision of preparing the young to reshape their society as a result of their experience in schools that function as small communities remains one of Dewey's most important contributions to educational discourse in the United States.[26] Dewey's vision has rarely been acted upon, but this does not diminish its power. If, for example, students were educated in schools that drew them into the process of governance, it seems likely that most would develop a very different understanding of their relationship to authority and their communal responsibilities than students who attend schools that deny them this opportunity. They would have gained at minimum an experience of the process of negotiation and of the assertiveness and humility that are part of living and working in self-governing groups. Thomas Jefferson observed that one of the reasons he believed the American democratic experiment would succeed was linked to the broad experience in

self-governance that average citizens encountered as they took care of the health and business of their own communities.[27] As such experiences become increasingly rare for more and more American citizens, schools could play a critical role in giving children the chance to live democracy as well as read about it.

One school that has attempted to provide this kind of opportunity is the Jefferson County Open School outside of Denver, Colorado. This school holds weekly governance meetings during which students and staff make many of the institutional decisions normally reserved for administrators, including the hiring of new teachers. Students who wish to facilitate these meetings must enroll in a leadership class that provides training in group process skills essential for effective decision making. Students, furthermore, are given the responsibility for planning the school's many trips to sites of educational interest across the United States. Routes, meals, and housing arrangements for generally more than a dozen students must be plotted out, again giving young people a chance to grapple with what it means to administer human endeavors. Students are given comparable forms of authority and responsibility at Brookline High School outside of Boston. Here a town meeting of approximately 50 people including faculty and staff representatives meets regularly to make fundamental decisions about the life of the school. In both of these examples, students are placed in positions where they must acknowledge the needs of an entire school and the desires and needs of individuals within it. In doing so, they are required to think beyond their own or their own peer group's narrow perspective and consider their membership in a more extensive social environment.[28]

To prepare students to take an active role in the care and governance of their communities once they have graduated from high school, they must also be presented with opportunities aimed at enabling them to grapple with social problems that extend beyond the boundary of the school. Teachers in many places are engaging their students in just such work. Hilton Smith, a colleague of Eliot Wigginton, describes the efforts of a group of high school students to address the problem of homelessness in their community.[29] After learning that one of their friends had unexpectedly become homeless, they sought to educate their neighbors about the widespread nature of this problem. This eventually led them to raise funds that resulted in the opening of local shelters for the homeless. Now students in

other communities are turning to them for guidance about how they might be able to accomplish the same thing. Similarly, a group of elementary school students in Utah discovered their own power to effect meaningful change during the course of a unit on the environment.[30] When one student mentioned that he regularly passed a lot with rusting barrels on his way to school, the class took it upon itself to find out what was in the barrels and who was responsible for them. After contacting the owner of the property, they quickly found themselves in the midst of a political controversy. Their letters to state assembly members, however, eventually resulted in legislation aimed at preventing the creation of such toxic hazards in the future. In each of these instances, students were provided with experiences that demonstrated the way that concerned and persistent citizens can take steps to improve their own communities.

It would be false to assume that instituting such changes has been easy for the teachers who have decided that stepping beyond conventional educational practice is important if their students are to gain both a stronger sense of their own potential and the needs of the people around them. Such changes do not fit well with the schedules and expectations encountered in most schools. As difficult as inducting children into a world predicated on communitarianism and social participation is likely to be, however, helping students move beyond the ideology of progress could be even more challenging. At bottom, what must be addressed is the source of our sense of purpose and meaning. Throughout the modern era, this purpose and meaning have been intimately tied into our ability to create increasing levels of material comfort and security for ourselves. To accomplish this end, inventiveness and power have been cultivated at the expense of compassion, generosity, service, and humility. In a sense, those of us who have reaped the benefits of modernity have made a Faustian bargain that entailed forgetting our connection both to the planet and to others less fortunate than ourselves. What we must do at this late date is acknowledge that attempting to live without those connections now threatens our very ability to survive.

One way to shift the attention of children away from the glitter of ephemeral technologies to more abiding human values may be to provide them with the experience of meaning that comes with the lived recognition of connectedness. School reforms such as those described above may offer one route to dealing

with this on a social level. This will be especially true if schools become willing to participate more explicitly in the moral training of the young. Such training would ideally transcend the narrow prescriptions of different religious traditions and incorporate values encountered across cultures — values such as honesty, compassion, generosity, self-restraint, friendship, and courage. These values stand in contrast to the forms of greed, hatred, and self-delusion we have allowed to become dominant factors in our common life in the late-twentieth century. If schools, as one of the few sites where children are able to interact regularly with adults, refuse to take on this task, children will be faced with the responsibility of accomplishing their own socialization into meaningful

> *Instead of seeing the world as a mine of resources for playing out our own purposes, we must come to see ourselves as just one part of a complex and delicate web of forces and beings whose welfare depends on the health of all.*

communal relationships.[31] The consequence of adult neglect, however, is too often the development of youth cultures predicated on attitudes and behaviors that threaten the well-being of everyone. As moral philosopher Alasdair MacIntyre has argued, it is incumbent upon the citizens of the modern industrial world not to shy away from defining what we mean by virtue.[32] Without this shared understanding of what a good society entails and the willingness to transmit it, we run the risk of falling into a moral vacuum in which all actions become possible.

Our sense of meaning is also closely related to even more fundamental mythologies around which we construct our sense of place in the universe. Given the environmental catastrophes that have come to dominate the news, it is time to replace the myth of material progress with a myth that more realistically acknowledges the fragility and interdependence of the systems that sustain life on this planet. In a very real sense, our continued existence as a species may depend on our ability to reinfuse the physical world with meanings and values that transcend human understanding and needs. In other words, we must reenchant or resacralize the world.

Instead of seeing the world as a mine of resources for playing out our own purposes, we must come to see ourselves as just one part of a complex and delicate web of forces and beings whose welfare depends on the health of all. Such a vision of the world is not foreign to our species and can be encountered in a wide variety of premodern societies. When coupled to the growing scientific recognition that human ways of knowing and acting are inextricably linked to the world around us, earlier cosmologies premised on an understanding of interconnectedness could provide us with the principles to govern our relationship with the natural environment.[33]

These cosmologies could then influence the way we choose to learn about our planet and the phenomena beyond it. Rather than standing apart as detached observers of the life around us, we would once more acknowledge our place in the ebb and flow of events. Such an epistemology need not require the abandonment of scientific perspectives that have done much to reduce the unpredictability of life for the citizens of the developed world. The Nobel-prize winning geneticist, Barbara McClintock, for example, embodies an approach that has grown out of her "feeling for the organism."[34] Rather than investigating the universe as an inert machine, she has attempted to enter into personal relationships with the objects of her research. In a study of the fungus *Neurospora*, McClintock has described her experience of "friendship" with cells undergoing mitosis. In her investigation of genetic transmission, she set aside time to get to know not only the ears of Indian corn upon which she based her new theories, but the plants from which those ears were produced. For McClintock, investigating the world has thus not required the decontextualization of phenomena; these phenomena are instead studied as parts of more comprehensive wholes.

Such an approach could be made central to the learning of children as well. If knowledge and skills were set within the communal and environmental contexts where students live their lives, the forms of disembodied learning that have come to characterize most formal education in the 20th century could be replaced with a pedagogy grounded in direct rather than mediated experiences of the world. Participation would supplant observation, and children could be encouraged to become the discoverers and pro-

ducers of knowledge rather than its consumers. This kind of learning could be extended beyond the natural sciences to nearly all areas of human inquiry. Projects, internships, a focus on discovery — these commonly recognized but rarely practiced forms of instruction could come to dominate life in classrooms. Perhaps then intellectual activity would not be seen as the antithesis of practical work or the schools as distinct from the world.

Conclusion

Circumstances during the coming century seem likely to stimulate a set of economic, political, and social changes at least as revolutionary as the developments that gave birth to the modern era. Much that we have come to take for granted may be swept away as contemporary institutions prove themselves unable to respond to a world that no longer matches the assumptions upon which modernity has been based. In the face of such vast changes, schools seem the least of our worries. Still, the role of public education in the transition from agricultural to industrial society suggests that the shared socialization provided in such an institution can do much to prepare children for altered conditions. Early supporters of the common school such as Horace Mann were social visionaries who anticipated many of the changes that accompanied industrialization and urbanization. While we may not subscribe to their vision and the institutions that emerged from it, their foresight contributed to the development of new means for inducting the young into an evolving society. It is not inconceivable that by anticipating the transformations that will accompany our confrontation with planetary limits, schools could once more provide a means for helping the young make the transition to a very different social order.

If contemporary centralized institutions become unable to meet our fundamental needs, then it will become incumbent upon citizens acting at the local level to invent their own solutions to the crises that have become increasingly endemic in the modern world. Prepared to act as members of communities who understand the nature of ecological interdependence, they may be able to construct the social, economic, political, and cultural patterns appropriate for an era based on limits rather than expansion and development. In doing so, they will be emulating the way our species has achieved its own survival for millennia. Educators could potentially play some part in reconnecting children to

this wisdom and in clearing their minds of the dream of omnipotence that has brought us to our current dilemma.

Notes

1. The *International Energy Annual* (1988) published by the U.S. Department of Energy reveals that world oil consumption in 1988 was 23.4 billion barrels. Known reserves are currently estimated to be 990.6 billion barrels. If there were no increase in usage rates and no increase in available reserves, this would leave us with 42 years of oil. Estimated undiscovered recoverable oil resources increase potential reserves to between 1,060 and 1,720 billion barrels, giving us at most 75 years. In *World Petroleum Resources and Reserves* (Boulder, CO: Westview, 1983), Joseph Riva argues that even these figures are overly optimistic in that they disregard the increased costs of oil extraction and transport that will be incurred as energy corporations are forced to go further afield in their drilling operations. Drilling in the North Sea or Gulf of Mexico, for example, can entail as much as 65 times the cost of Middle East production.

2. This analysis draws on the work of sociologists, historians of science, ecologists, political scientists, students of religion, and educational scholars. The works that have most influenced this characterization of modernity include Robert Bellah et al.'s *Habits of the Heart: Individualism and Commitment in American Life* (New York: Harper & Row, 1985); Morris Berman's *The Reenchantment of the World* (Ithaca, NY: Cornell University Press, 1981); C. A. Bowers's *Elements of a Post-Liberal Theory of Education* (New York: Teachers College Press, 1987); Fritjof Capra's *The Turning Point: Science, Society, and the Rising Culture* (New York: Bantam, 1984); Gary Coates's *Resettling America: Energy, Ecology, and Community* (Andover, MA: Brick House, 1981); Bill Devall and George Sessions's *Deep Ecology* (Layton, UT: Smith, 1985); Michael Ignatieff's *The Needs of Strangers: An Essay on Privacy, Solidarity, and the Politics of Being Human* (New York: Penguin, 1984); Ralph Ketcham's *Individualism and Public Life: A Modern Dilemma* (Oxford: Basil Blackwell, 1987); Carolyn Merchant's *The Death of Nature: Women, Ecology, and the Scientific Revolution* (San Francisco: Harper & Row, 1980); Donald Oliver and Kathleen Gershman's *Education, Modernity, and Fractured Meaning: Toward a Theory of Process Education* (Albany: State University of New York, 1989); and Huston Smith's *Beyond the Post-Modern Mind* (New York: Crossroad, 1982).

3. Paul Radin's survey of premodern communities in *The World of Primitive Man* (New York: Shuman, 1953) points to the fundamental role that mutual support has played in the survival of human individuals and communities. Carol Stack's *All Our Kin: Strategies for Survival in a Black Community* (New York: Harper & Row, 1975) and Kai Erickson's *Everything in Its Path: Destruction of Community in the Buffalo Creek Flood* (New York: Simon & Schuster, 1976) provide contemporary examples of a comparable phenomenon.

4. In *Small Town in Mass Society: Class, Power, and Religion in a Rural Community* (Princeton, NJ: Princeton University Press, 1968), Vidich and Bensman describe the narrowing of public authority that occurred in a small town in New York State as decision making over fundamental economic and political issues was transferred away from the com-

munity to power brokers in government state houses and corporate centers.

5. A quote from Descartes in his *Discourse on Method* captures the spirit of this era: "[My discoveries] have satisfied me that it is possible to reach knowledge that will be of much utility in this life; and that instead of the speculative philosophy now taught in the schools we can find a practical one, by which, knowing the nature and behavior of fire, water, air, stars, the heavens, and all the other bodies which surround us, as well as we now understand the different skills of our workers, we can employ these entities for all the purposes for which they are suited, and so make ourselves masters and possessors of nature" (in Berman, *Reenchantment*, p. 25).

6. Simon is one of the most unrelenting apologists for modernity. His position is described at some length in Herman Daly and John Cobb's *For the Common Good: Redirecting the Economy Toward Community, the Environment, and a Sustainable Future* (Boston: Beacon Press, 1989).

7. See Berman (*Reenchantment*) for a more extensive discussion of the way in which this "disenchantment" occurred and its implication for life in the modern world.

8. Sociologists who have directed their attention to the schools have frequently focused on the relationship between schooling and modernization. Selected works that touch on this process include Robert Dreeben's *On What Is Learned in School* (Reading, MA: Addison-Wesley, 1968); Alex Inkeles and David Smith's *Becoming Modern: Individual Change in Six Developing Countries* (Cambridge, MA: Harvard University Press, 1974); and Talcott Parson's article, "The School Class as a Social System: Some of its Functions in American Society," in *Harvard Educational Review*, 29(4), pp. 297-318.

9. Philip Jackson's *Life in Classrooms* (New York: Holt, Rinehart, & Winston, 1968) remains one of the most provocative and insightful analyses of the way schools contribute to children's induction into the modern world.

10. In their classic study of Roger Harker, George and Louise Spindler described how a young elementary school teacher who prided himself on fairness and ethnic sensitivity in fact related most favorably to students who were from a class and racial background similar to his own. The teacher's initial response to this revelation was anger. When presented with the ethnographic evidence, however, he had to acknowledge the validity of the anthropologists' conclusions. See George and Louise Spindler's *The American Cultural Dialogue and Its Transmission* (Philadelphia: Falmer, 1990) for a discussion of this study.

11. Jackson, *Life in Classrooms*.

12. See Michel Foucault, *Discipline and Punish*, translated by Alan Sheridan (New York: Vintage, 1977).

13. See Harry Gracey, *Curriculum or Craftsmanship: Elementary School Teachers in a Bureaucratic System* (Chicago: University of Chicago Press, 1972).

14. John Goodlad's comprehensive survey of educational practice in the United States, *A Place Called School: Prospects for the Future* (New York: McGraw-Hill, 1984), chronicles the widespread nature of this impersonal and detached form of learning. Lectures and worksheets continue to dominate the educational activities in most classrooms, especially at the secondary level.

15. See Mary H. Metz, *Classrooms and Corridors: The Crisis of Authority in Desegregated Secondary Schools* (Berkeley: University of California Press, 1978).

16. See Arthur Levine, *When Dreams and Heroes Died* (San Francisco: Jossey-Bass, 1981).

17. The writings of environmental theoreticians as well as some of the students of modernity cited earlier form the basis of this discussion. Central to this analysis are the following texts or articles: Rudolf Bahro's *Building the Green Movement* (Philadelphia: New Society, 1986); Morris Berman, *Reenchantment*; Carol Boggs's *Social Movements and Political Power: Emerging Forms of Radicalism in the West* (Philadelphia: Temple University Press, 1986); Murray Bookchin's *Toward an Ecological Society* (Montreal: Black Rose, 1980); C. A. Bowers, *Elements*; Fritjof Capra and Charlene Spretnak's *Green Politics* (New York: Dutton, 1984); Bill Devall and George Sessions, *Deep Ecology*; Caroline Merchant, *Death of Nature*; Oliver and Gershman, *Education*; William Ophuls's *Ecology and the Politics of Scarcity: Prologue to a Political Theory of the Steady State* (San Francisco: Freeman, 1977); Kirkpatrick Sale's *Dwellers in the Land: The Bioregional Vision* (San Francisco: Sierra Club, 1985); Huston Smith, *Beyond*.

18. Willard Waller, *The Sociology of Teaching* (New York: Wiley, 1967).

19. Wigginton's book chronicling the history of the Foxfire experiment, *Sometimes a Shining Moment: The Foxfire Experience* (New York: Anchor, 1985) provides a rich source of information about how schools can be more closely linked to the environments surrounding them.

20. The City-As-School is described in Eileen Foley and Susan McConnaughy's *Toward School Improvement: Lessons from Alternative High Schools* (New York: Public Education Association, 1982). Charles Dayton et al. have written about the Partnership Academies in an article entitled, "The California Partnership Academies: Remembering the 'Forgotten Half,'" in *Phi Delta Kappan* (March 1991), pp. 539–545.

21. This was one of the central findings of a study of 14 alternative schools for "at-risk" youth reported in Gary Wehlage et al., *Reducing the Risk: Schools as Communities of Support* (Philadelphia: Falmer, 1989).

22. Anne Ratzki, "The Remarkable Impact of Creating a School Community: One Model of How it Can Be Done: An Interview with Anne Ratzki," in *American Educator* (Spring 1988), pp. 10–17ff.

23. See Wehlage et al., *Reducing the Risk* and Thomas Gregory and Gerald Smith's *High Schools as Communities: The Small School Reconsidered* (Bloomington, IN: Phi Delta Kappa Educational Foundation, 1987).

24. Students in one of the California Partnership Academies studied by Wehlage et al., *Reducing the Risk*, commented on their delight in not being "put down for doing well." In this program, the Media Academy at Fremont High School in Oakland, all students participated in the production of the school's publications. A wide variety of talents were required to accomplish this task, and everyone's work mattered. Excellence benefitted the entire group rather than only individuals.

25. Colin Turnbull's disturbing study, *The Mountain People* (New York: Simon & Schuster, 1972), chronicles the disintegration of a small band of hunters and gatherers when their traditional territory is turned into a national park. Unable to

guarantee their collective survival given impossible conditions, the tribe's social order disintegrates in a struggle of each against all. Similarly, Edward Banfield's study of peasants in rural Italy, *The Moral Basis of a Backward Society* (New York: Free Press, 1958) points to the way in which structures that favor mutual support are abandoned if the requirements of daily existence are denied as a result of inequitable patterns of land distribution.

26. John Dewey, "School and Society," in Martin S. Dworkin (Ed.), *Dewey on Education* (New York: Teachers College Press, 1959).

27. Jefferson discussed his faith in the power of "Little Republics" to perpetuate the practice of democracy among common citizens in letters to John Cartwright, 5 June 1824, and to John Tyler, 26 May 1810. Both letters are collected in Thomas Jefferson, *Writings*, Merrill D. Peterson, ed. (New York: Library of America, 1984), pp. 1490–1496 and pp. 1225–1227.

28. The Jefferson County Open School is described at some length in Gregory and Smith, *High Schools as Communities*. The governance process at Brookline High School is discussed in David Purpel's *The Moral and Spiritual Crisis in Education: A Curriculum for Justice and Compassion in Education* (Granby, MA: Bergin & Garvey, 1989).

29. Hilton Smith, "Authentic Work Via the Foxfire Approach," *Newsletter*, Vol. 5, No. 3 (Winter 1990–1991), Madison, WI: National Center on Effective Secondary Schools, pp. 7–9.

30. A more complete account of this example of student activism can be found in Barbara Lewis's *Kids' Guide to Social Action: How to Solve the Social Problems You Choose and Turn Creative Thinking into Positive Action* (Minneapolis, MN: Free Spirit, 1991).

31. In *Class, Codes, and Control: Towards a Theory of Educational Transmissions* (London: Routledge & Kegan Paul, 1975), Basil Bernstein discusses how a preoccupation with instrumental as opposed to expressive values in schools leaves children with limited guidance regarding what is important or meaningful in their own lives. As a result, they turn to one another to construct that meaning, and in so doing often remove themselves even further from sustained and purposeful interaction with the society of adults.

32. Alasdair MacIntyre, *After Virtue: A Study of Moral Theory* (Notre Dame, IN: University of Notre Dame Press, 1981).

33. J. E. Lovelock's *Gaia: A New Look at Life on Earth* (Oxford: Oxford University Press, 1979) provides one perspective on the shape that a new mythology premised on the understandings of modern science and premodern cosmologies might take. By viewing the planet as a single organism, we may become more likely to treat it with the care it demands. James Gleick's *Chaos: Making a New Science* (New York: Penguin, 1987) also points to the highly interdependent and interconnected nature of all phenomena on our planet.

34. Evelyn Fox Keller describes McClintock's approach in *A Feeling for the Organism: The Life and Work of Barbara McClintock* (New York: Freeman, 1983).

Book Reviews

Toward Curriculum for Being: Voices of Educators

by Louise Berman, Francine Hultgren, Diane Lee, Mary Rivkin, and Jessie Roderick in conversation with Ted Aoki

Published by State University of New York Press (Albany, NY), 1991. 189 pages, hardcover or softcover.

Reviewed by Susan M. Drake

This book charts the course of a group of five women academics who met together over a period of three years to reflect on and discuss their research agendas and teaching philosophies and how these connected to curriculum. Ultimately they seemed to move from a questioning of the positivist assumptions they found to be the rule in the university culture, to a discovery of a way of Being that allowed for an authentic path in research and teaching. Although they met initially to discuss research concerns and approach their reflections through an academic lens, these women were primarily concerned with the act of teaching itself. The stories of these women offer provocative reflections for those in the academic world who are concerned with curriculum, whether they are in a professorial role, or are students who are educators by profession.

This is not a text for practitioners to pick up and discover ways of implementing a Curriculum for Being. Nor does it ever clearly describe the hows of such a curriculum. Rather it serves to stretch one's concept of what curriculum is and/or could be. For Francine, Mary, Jessie, Diane, and Louise a Curriculum for Being involves the caring for and enhancement of the student. It focusses on being and not only knowing or doing. Persons are considered to be sacred, holy, whole thinking, meaning-making, trusting, and questioning beings. Education is a journey that may involve obstacles, detours, and turns as each person travels both together and alone.

Curriculum was perceived as nonlinear, recursive, and evolving with the interests of the traveler. As educators, the authors were interested in ways of knowing and how language could shape the knowing. Knowledge was acknowledged as socially constructed, and therefore reflection was critical to knowing. Personally constructing knowledge gave them a greater sense of aliveness and joy. Metaphor, then, was a powerful tool occurring extensively throughout these women's stories as a way of extending their thinking and probing more deeply into layers of meaning. For them, teachers were fellow pilgrims with their students on a journey to discover meaning and purpose for their lives. They emphasized a sense of caring for the student and questioned their own assumptions even as they encouraged students to do the same.

Stressing that they make no claims for a common voice, the authors move away from their common understanding of a Curriculum for Being. They go on to describe their many different paths as pilgrims. Their roles varied from tenured to untenured professor to doctoral student. They met on a regular basis, over food and drink, in a home setting. This occurred in spite of sometimes pressing events in their external worlds. Clearly these meetings, and their personal interactions with one another were most important to them. During their time together they would explore appropriate texts written by group members and others to create and re-create new texts as they moved through the process of meaning-making. They saw themselves as engaged in an interpretive inquiry process that was intimately connected to themselves as persons and to one another in communicative relationships.

The book's format consists of hearing each woman's voice through a series of her papers presented over a three-year period at American Education Research Association (AERA) conferences. These papers are academic versions of their individual journeys that weave together reflections, experiences, and theory. For each, this was a dialectic process. During the AERA conferences, Ted Aoki reflected on their individual papers; his voice is heard in this book as a reflection at the end of each woman's papers. Aoki exemplifies the qualities that the women have established as criteria for a teacher involved in a Curriculum for Being: a caring journeyer who both questions and supports each pilgrim to extend her own horizons. He hears the tension in each woman's story and challenges her to further explore the horizon by continuing the dialectical process.

The book begins with Francine who entered academia as a home economics teacher seeking freedom from the bondage of that identity by bringing together knowing and being through questioning and metaphor-making. Mary teaches science education to preschool teachers and searches for ways in which to move beyond the traditional worldview of science through the transformation of personal metaphors. Jessie explores the detours and turns of creating curriculum. Diane reflects on herself as professor and working in community with students to develop a curriculum that leads to self-understanding. Louise describes her doctoral students as sacred and sees herself as called upon to minister to them.

But one sentence to describe each woman's journey does a disservice to a text that offers a tapestry of rich

and compelling complexities. Each of these pilgrims has her own story to tell. In reading one gets the sense of both the interconnections among the authors and their independence as travelers. Essentially they seemed to be in search of Self.

I personally was entranced while reading *Toward Curriculum for Being*. This was perhaps because I am currently involved with other female academics in setting up the Brock University Faculty of Education Centre on Collaborative Research; through the center, we are developing collaborative partnerships with practicing educators in the field. Our research agenda is to identify the process of effective collaboration. We are, therefore, a group of women searching for ways of collaborating. The territory that the *Curriculum for Being* authors cover in often eloquent and moving stories rang uncannily true to me; I was astonished by the similarities of their experiences to my own group's. Like them we moved through concerns with quantitative inquiry to a more interpretive approach; collaborative reflection on our own and others texts was one way we explored in coming to common meaning; we, too, were deeply concerned with our identity as teachers (that sometimes seemed to conflict with our identity as researchers); we also discovered the power of metaphors for meaning-making and adopted the same metaphor of a quilt to describe ourselves; as well, we held the same deep values for caring and support.

We had not deliberately limited our group to women participants; yet it was only women who expressed interest in our venture. In the book, it was important for some that there were no men; thus they were comfortable dropping all of their masks to come to a shared understanding "only thought possible between women" (p. 25). Given our center's like experiences, I wonder how much this is a women's experience or if only women can successfully engage in it. Certainly, the authors situate themselves in the feminist camp at the outset of the book.

Will men resonate as deeply as I did with the experiences described in this book? A Curriculum for Being is obviously a concern for men too. It should be a curriculum for people. For Aoki and Max van Manen who dialogued with these women from the sidelines, it seems to have been a rewarding experience that both validated and challenged all participants. Much of the text weaves Heidegger's concept of Being through each person's journey. It seems then that men who are interested in like journeys will be engaged by the dialogues found in this book.

This is an academic text first, a book about Being and/or curriculum second. The reason is, of course, obvious — these are academics presenting at a major research conference; their audience is meant to be others in academia. Readers unfamiliar with Heidegger, Gadamer, phenomenology, and hermeneutics may occasionally find the language daunting and jargon-laden. This book should appeal to those who are already in the interpretive camp or others who find themselves disaffected with the traditional academic culture and its implications for teaching. Following these authors' paths can offer a stimulating catalyst; perhaps others will be inspired to involve themselves in a like community where they can be challenged by the reflections in this book to peel away their own layers of meaning to encounter their own Curriculum for Being.

Conscientious Objections: Stirring Up Trouble About Language, Technology, and Education

by Neil Postman

Published by NY: Vintage, 1992. pb. 201, $10

Reviewed by Jack Petrash

In recent years we have witnessed a dramatic increase in concern for the environment. We have sharpened our focus on a growing list of problems concerning our water and soil, our air, and even our climate. This sharpened focus has brought to clarity the causes of our problems. Consequently, it has become increasingly clear that the technical advances that had been hailed as progress have turned out to have an adverse effect on our environment. Asbestos, chlorofluorocarbons, chemical fertilizers, and fiber-glass insulation were all hailed when they were introduced and yet now they are suspect. Our technological capabilities have betrayed us.

But who voices concern for the condition of our inner environment? What if our inner resources are being depleted at the same alarming rate as our forests or the ozone layer? What if the technological advances that have brought us the "electronic revolution" have diminished our ability to generate original ideas, to look beyond the superficial, to express our thoughts adequately in spoken or written word? These are the concerns that Neil Postman raises in his book, *Conscientious Objections: Stirring Up Trouble About Language, Technology, and Education*.

These concerns are as valid as they are unsettling. This collection of essays is concerned with the "triumphs of technology and how these triumphs have laid waste some of our most creative, not to mention charming, habits of thought" (p. xiii).

According to Postman, our infatuation with technology has blinded us to the effects that these "advances" have had on our lives: "Introducing Americans to a new technology is a little like bringing a case of gin to celebrate an opening of Alcoholics Anonymous. It is very dangerous. When it comes to technology, our defenses are weak, our need insatiable, our judgment unreliable, our perspective short-sighted" (*Washington Post Education Review*, November 2, 1992). Postman hopes that his essays will lead to a serious consideration of the impact that modern electronic technology is having on our lives.

What underlies Postman's concern about technology is his direct and immediate experience of the depletion of our mental acuity, our very intelligence. It is evident in what Postman describes as "the humiliation of the word" (p. xiii), a decline in our ability to convey and understand thoughts clearly through language. Many of these essays focus on how language has become ambiguous, euphemistic, and intentionally obscure. Postman presents a number of instances where political and legal considerations are undermined by obscuring the truth, such as when former Presidential Press Secretary Ronald Ziegler said that President Nixon's previous statements about Watergate were "inoperative" and when the Reagan administration said that the American public had been "disinformed" about Libya.

Postman feels that visual forms of communication are responsible for dramatic changes in the lives of Americans, causing us to become a culture of pictures rather than a culture of words. In his essay, "The News," he examines the difficulties that we encounter when our information about the world's events comes to us through the nightly news. Postman does a good job of exposing the illusory nature of television news: how this type of presentation always seeks to reduce events to action and images of change from what normally exists. For this reason hurricanes and tornadoes make good nightly news spots, while issues of substance such as treaties, laws, or studies require too many words to be conveyed in a short time or in a lively manner. Such news shows attract a large number of viewers and essentially leave them uninformed, or worse, mistakenly feeling that they are informed.

An additional concern for Postman is the growing rate of *aliteracy* in our country. A large number of Americans who can read choose not to. His astute investigation of this trend uncovers new aspects of the issue of literacy. In his essay "A Muted Celebration," Postman describes different types of reading and in so doing comes to the heart of an important matter. Serious reading, that activity which we hope our students will engage in, "requires patience, a ready capacity for reflection, the training to be challenged by complexity and, above all, a willingness to suspend the distractions of the world so that reader and text may become a unity of time, space, and imagination" (p. 55). Yet, "the availability of a variety of media (including the stereo and the much-underestimated telephone) [has] altered both the sound and distraction levels of the average home so that conditions for serious reading [have been] degraded" (p. 63).

Culture and language and certainly technology have a direct bearing on education and consequently on our children. The essay, "The Disappearance of Childhood" underscores a theme that Postman explored in his book, *Amusing Ourselves to Death*: the negative effect of television viewing on children. For Postman, it is not a question of appropriate children's programming versus inappropriate children's programming because children are watching adult programs and the content and character of those programs are having an effect on them. Rather, it is the recognition that television is blurring the line that separates children from adults. Postman states, "However you wish to describe the transformation taking place, it is clear that the behavior, attitudes, desires, and even the physical appearance of adults and children are becoming indistinguishable" (p. 159).

When we turn our attention to the problem of violent crimes committed by our youth, there is startling evidence linking these crimes and television viewing. According to FBI statistics, since 1950, when the television began to appear in households across America, violent crimes committed by children under 15 years of age have increased by over 11,000%. Certainly, there are other factors affecting this trend, but how many have an influence equal to that of the visual media.

In compiling this collection of essays, Postman has taken an unpopular position. Yet his are "dutiful" objections stated out of feelings of concern and responsibility for our American culture, not disdain. And, although the underlying theme of the book is serious, there are many instances in which humor acts as a leaven to lighten the reader's spirits — as in his essays on nuclear technology. The essays, "The Naming of Missiles" and "Megatons For Anthromegs" were both written during the 1980s and the very real nuclear threat of the Reagan Presidency. Their lighthearted tone serves as a perfect balance for the serious concern about our most blatantly destructive technology.

While raising serious questions, *Conscientious Objections* manages to be thoroughly enjoyable reading. The independence of each essay, the perceptive and convincing nature of each argument, and above

all the style in which the author conveys his concern, make this book easy to read and thought provoking. I only wish that *Conscientious Objections* had an essay on the computer and its role in education, for that is a subject on which Neil Postman obviously has much to offer.

Some may feel that Postman's indictment of technology is unwarranted, that his concerns are overstated, or that the blame rests elsewhere. I don't think that Neil Postman would mind those objections as long as they served to initiate a serious discussion — but I'm on Postman's side.

Moral Leadership: Getting to the Heart of School Improvement

by T. J. Sergiovanni

Published by Jossey-Bass (San Francisco), 1992. 173 pp.

Reviewed by David W. Zuckerman

To get my eyeglasses on straight at the start, I need it stipulated that leadership is fostered through a relationship between generations, by means of volunteerism on the one hand and supportive guidance on the other, not through reading books; we know that. I make my living in the choppy currents connecting print and practice ("researching" practice in the effort to generate descriptive and analytical words that are not entirely false or misleading, and churning through others' print in the effort to find bits of use to practitioners), and I have a very limited view of its utility to any of the practical arts. At best I will acknowledge that it can be inspirational to those already primed, and that it can offer the illusion of a map, a hope that one can get "there" by whichever gritty road one is on.

That said, I am willing to acknowledge that prospective school leaders will nevertheless be asked to "take courses" as the primary means of proving their readiness for leadership responsibility. They *will* be reading books to credential themselves. Lacking a wide spread of inspired leadership or a system that supports its development, prospective teachers and principals are asked to learn the basics of their craft by sitting in lecture halls and reading books. Within that frame — the one of common practice if not common sense — this is a pretty good book for prospective school leaders to read.

Certainly its author, Tom Sergiovanni, could not himself be better credentialed. Year after year, book after article, he has been our primary source for a humanistic point of view about supervision in schools — one of the few sense-speakers, I often felt, in a sea of blather. But even for him this book is quite a departure, for it is about supplanting leadership instead of perfecting it, about getting the man off his horse instead of giving him a new and better battle plan and direction to charge. "Much of my work in leadership over the years has been more part of the problem than the solution," Sergiovanni says (quoted by Brandt, 1992, p. 47). It

seems Sergiovanni has been liberated and now embraces a more feminist,[1] a more holistic, point of view.

Beginning with a ritual nod toward his predecessors (Bennis, Stogdill) and his own earlier work, Sergiovanni notes that writings on leadership have tended to emphasize technique at the expense of values, yielding "a leadership literature that borders on vacuity" (p. 3). Passing over the irony that he is nevertheless producing yet one more brick for that vacuous edifice, he grounds the case that this one is needed on the assertion that successful practice has leaped ahead of theory. "Things are different today. The standard recipe does not quite work as well as it used to" (p. 69); *this* book is needed "to catch up." It is the weakest argument presented, for every latest management manual trumpets that times are changing and that it, uniquely, represents the latest word from the field.

More substantively, the argument begins with the point that traditional "control" approaches to leadership (carrot and stick, expect and inspect, psychological manipulation of one sort or another) carry an inordinately high price in the time and attention of the leader, and that once his or her attention or energy flags the change process slows and stops. A similar argument was put forward marvelously by Herzberg 25 years ago, that it is the wielder of the carrot and the stick who is well motivated, not the recipients: "Who is motivated? *I* am motivated, *you* move." (1968, p. 54). In Sergiovanni's terms such strategies "tend to change the way things look but not the way they work" (p. xii).

The point is extended in Chapter 7, where the argument is made that all "direct" forms of leadership such as tight supervision, standardization of work, and standardization of outputs not only require complex management systems but are useful for only simple behaviors — even *causing* simplification of practice if it is too complex for the evaluation system in place, dumbing down teaching to its lowest form, for example. While such control may be necessary in the initial stages of bringing order to a disordered school with no culture of support for good practice and probably no standards of practice at all, it must eventually be set aside if a true learning community is to be achieved. Rule by barter ("you do what I want and/or I do such-and-such"), gives way to management through building (trust,

shared standards, respect, a stake in outcomes), which in turn becomes less important than leadership through binding as each member of the community feeling "bound" to uphold the common standards.

In this argument, the void that yawns and threatens to swallow us in the absence of our efforts at control is filled through socialization around professional standards, "purposing" based on shared values, and the development of collegial interdependence — the "moral leadership" of the title. Each of these approaches is presented as an *addition* to the usual leadership lexicon, something "also to be valued" rather than some new grail; each is explained and supported by citation and example; each is shown to be within reach. ("Purposing" is a partial exception in that it is presented swaddled in jargon and, even after it is explained and exampled, does not rise above the mundane point of showing people through your own actions what values the organization stands for.)

It becomes clear that each of these approaches is simplifying and effective because it leads to *self-managed* behavior at many levels, and a depth of complex activities far beyond the reach of any leader. It is this shift from leader-centered change to community interdependence that forms the basis of Sergiovanni's thesis that he wishes to lessen the influence of leadership. Technique and even charisma can stretch only so far; only the obligations and energy flowing from membership in a covenantal community are sufficient to guide and inspire the many players — students, teachers, parents, and administrators — necessary to the running of a good school. In that change the role of the hierarchical leader is to become steward; by becoming the servant of the whole he or she gains the moral authority to guide right action without needing to control it. Sergiovanni offers some solid examples of good schools in which such values rule.

It is to Sergiovanni's credit that by the last quarter of the book one is comfortable with phrases like "covenantal relationship," "sacred authority," and "servant leadership" in a mainstream book about regular schools. The values of community, usually relegated to the pages of *Utne Reader* and the fringes of technocracy, flow forth here as the means of achieving good schooling in PS 100. These values. usually "thought to be weak, impressionistic concepts, and more myth than reality" (p. 13) are shown to be not only fundamental to the creation of healthy schools in ordinary circumstances, but practical as well. It is a *tour de force*.

References

Brandt, R. (1992). On rethinking leadership: A conversation with Tom Sergiovanni. *Educational Leadership, 49*(5), 46–49.

Herzberg, F. (1968). One more time: How do you motivate employees? *Harvard Business Review, 46*(1), 53–62.

Note

1. The debt to feminist theory is acknowledged belatedly (ten pages from the end of the book) and incompletely. I found it profoundly frustrating, throughout, to be faced with arguments about "the importance of group membership, sense and meaning, morality, self-sacrifice, duty, and obligation" (p. xiii) without mention of the writers, generally women, who have pushed forward these values in the face of a literature about school leadership, generally male, which ignores them. Not until the Brandt interview does Mr. Sergiovanni frame the thesis/antithesis as between a management literature written by and for men, based on researchers who used only male subjects, and espousing male values (independence, competition, individual success) versus a feminist point of view that may lead to more successful schooling.