Let Them Eat Data

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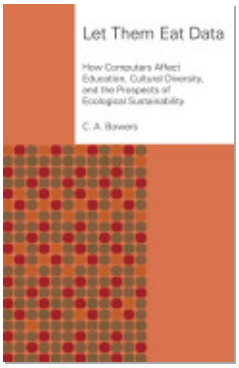

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7 Rethinking Technology: What Educational Institutions Can Do

There is an assumption shared by computer proponents such as Esther Dyson and Nicholas Negroponte, by the decision makers and computer system experts who create the virtual universities and Internet-based classrooms, the business leaders and engineers who are moving goods and services into cyberspace, the people who design educational software, and the parents who pressure school officials to purchase more computers for the classroom. The assumption equates the development of new technologies (particularly computer-based technologies) with progress.

To put this another way, they are addicted to technological innovation in the same way that people become addicted to drugs—and the destructive consequences of this addiction are little understood. Like a drug habit, technological addiction provides an experience of short-lived euphoria, followed by the need to acquire a more powerful fix as soon as possible. In computer-based technologies, the cycle of product innovation and obsolescence is becoming shorter and shorter, which fosters the continual obsession to own the latest innovation. Both addictions lead to the redirecting of economic resources to feed the habit while undermining activities essential to the well-being of individuals and communities. This compulsive behavior is also prevalent in our nation's educational institutions.

This increased dependence on technology represents a highly experimental orientation toward the future. That unanticipated consequences, or even major disruptions in the fabric of human-to-Nature relations, may far outweigh the benefits of the new technol-

ogies is seldom recognized. Ironically, this dominant aspect of modern life generally is not viewed as a cultural phenomenon; rather, it is viewed from the perspective of the experts who design and integrate technologies into the existing interlocking systems (which involve both mechanical and social technologies). The public understanding is thus shaped by the way scientists, engineers, and the business community perceive the uses and benefits of technology—which is like having the public understanding of drugs shaped by the addicts themselves. When the public is not being socialized to the perceptions and values of these elite groups, it will tend to fall back on the simplistic thinking they learned in public school and the university: that technology is a neutral tool that can be used according to the values and intent of the user. Ironically, it is the liberal view of the individual that contributes, in part, to maintaining this aspect of this cultural myth, which is such a central feature of public schools and universities. If it were understood that a technology such as the phonetic alphabet amplified a certain form of consciousness and patterns of social relations, it would be hard to maintain the idea that individuals are autonomous agents. In effect, the myth of the autonomous, self-directing individual requires the myth that represents technology as neutral.

The acceptance of this mythic understanding of technology carries with it the increasingly visible dangers of rapid environmental degradation. Indeed, these dangers should be understood in terms of the double binds that now characterize nearly every area of technological development. Generally, these double binds are manifested in the scale of efficiencies and control attained through new technologies that, at the same time, have an adverse impact on the environment. For example, as we are now witnessing in fisheries that previously were considered to be inexhaustible, the new technologies used to exploit various forms of marine life exceed the fishes' ability to reproduce themselves. Technological advances in agricul-

ture and forestry have led to similar negative impacts on aquifers, topsoil, and species diversity. The rapid reduction in the size and number of trees now processed in sawmills demonstrate the technological capacity to cut down hundreds of years of growth in minutes. Technological advances in transportation lead to more toxic chemicals being released into the environment. To cite a specific example, the introduction of cars into China's major cities is contributing to an alarming rise in the amount of lead that children are ingesting—a substance that has a particularly disruptive effect on child development. Even the many efficiencies and conveniences of computers cannot escape the double bind that brings into question whether this technology, on the whole, should be viewed as beneficial to humans and the environment. The double bind can be found in the loss of local knowledge and traditions, the undermining of subsistence economies, the further disruption of intergenerational communication and elder knowledge, the loss of noncommodified relationships and activities, the further diminishing of privacy, and the loss of in-depth knowledge informed by experience anchored in a long-term relationship with the environment.

Before the population explosion of the twentieth century and the rise of worldwide consumerism, the double binds were hardly visible. Rather, the myth of progress seemed an attainable reality for many people who felt their lives limited by community traditions and restrictive governments. But the scale of human demands on the environment, including the power of technology to produce a vast array of consumer goods, has radically changed. As a result, natural systems are being exploited and chemically changed to the point where there is less margin for human error. We can no longer introduce cultural experiments into an environment that can now barely support basic human needs for adequate food, shelter, and meaningful work. One consequence of these cultural experiments, such as the increased reliance on technologies that contribute to global

warming, is that changes in natural systems are occurring on a scale that new technologies cannot reverse—at least in the time frame that is meaningful for humans. There is a growing awareness within certain sectors of society that technologies must be more carefully assessed in terms of their environmental impact. For example, physicians are being warned about the dangers connected with excessive prescription of antibiotics, and a few corporations are adopting recycling technologies that put fewer toxins in the environment. But this growing sense of caution has not fundamentally altered the technologies that are changing the symbolic systems of cultures that, until now, have not been centered on consumerism. In effect, the growing sense of caution, and even gains in ecologically sensitive technologies, have not eliminated the basic double bind that accompanies the spread of Western technologies, especially computer-based technologies.

We now need to take a radically different approach to technology. An in-depth assessment by the public should occur before experts introduce the technology rather than after it has been integrated into an interlocking system that the public becomes dependent on. There will always be a level of expert knowledge that will initially be more specialized; nevertheless, the public needs to become sufficiently educated about the broad cultural and environmental issues surrounding a new technology if this most fundamental source of cultural change is to be part of the democratic process. Making technology a central focus of the democratic process is very different from our current situation, where too often the scope of political decision making is limited to governmental groups making decisions about funding—largely in response to political pressure and economic inducements by those who are promoting a particular technology. For the general public, the scope of political decision making is mostly reduced to the economic realm, where the principal question is when to purchase the new technology (that is, when to upgrade to the digital camera, television, and so forth).

The suggestion that the public should become informed about the short- and long-term consequences of new technologies will not be welcomed by the elite groups working to develop these technologies. We have a long tradition in the West, particularly within universities, where technological development has taken on a nearly sacred status, of searching for the new without raising questions about the long-term consequences. Indeed, a history of the quest for new knowledge, although framed in terms of a higher moral pursuit of contributing to the further well-being of humankind, will reveal that it provided the new technologies essential to the development and spread of the Industrial Revolution. The need for an informed public debate is even more urgent because of recent technological developments that make it possible for scientists to create genetic duplicates of animals, grow new organs from cloned cells, and insert genes into plants that eliminate their ability to reproduce themselves.

Following the widespread public concern that the technology used to create a genetic duplicate of a six-year-old sheep would be used to clone humans, Edward Berger (1997), professor of biological science at Dartmouth College, published an article in the *Chronicle of Higher Education* urging scientists to convene a conference to clarify how the scientific community understands the scientific and moral issues raised by this development in cloning technology. Berger was emphatic about the need for scientists to retain control of the upcoming debate. "If we scientists do not initiate a detailed public discussion of the important issues," he warned, "we may find that the integrity and freedom of our research enterprise have been taken away from us by politicians and the conservative and religious forces that now so dominate the political and social atmosphere in the United States" (p. A44). A similar argument would have been made if the research leading to the development of DDT (which earned its inventor, Paul Muller, a Nobel Prize) and CFCs had received similar media exposure. As acknowledged earlier, there will always be a gulf that separates the depth of expert knowledge, which

is often quite narrow, from public understanding—which is more oriented toward issues outside the scientists' area of interest and competency. There will also be fundamental differences within the public over economic, political, moral, and religious perspectives. Differences in cultural ways of knowing, as well as varying degrees of awareness of environmental issues, will also be an inevitable aspect of public debates about whether public resources should be made available to groups pursuing new forms of knowledge and technology. With the new interpretation by the courts that allows the patenting of living material, the scientists' search for knowledge that leads to new technologies increasingly is being motivated by economic self-interest.

Given the reduced ecological margin for human error, the general public must replace the current assumption that equates technological innovation with progress with an assumption that any new form of technology may bring unintended ecological and cultural problems. Instead of blind optimism toward technological change, we need to take a more cautious, even skeptical view. We also need to challenge our assumptions that limit consideration of how technological waste can be reintegrated into the food web of the environment rather than left as pollution, and of how new technologies can be used to strengthen rather than disrupt the patterns of interdependence within communities. If the public has a broad understanding that technologically based experiments with the moral and conceptual foundations of a culture often have consequences that go beyond economic considerations, they are likely to ask for a more complex form of accountability of the elite groups before they agree to the release of public funds or to grant the licenses necessary for using public space and other resources. This basic understanding of the non-neutrality of technology will lead to an awareness that groups representing the broader interests of society need to move more quickly in acquiring the expert knowledge necessary for chal-

lenging the litany of optimistic predictions that accompany the introduction of a new technology.

Although everyday life for most people in modern society is highly dependent on a web of interlocking technologies, there are few social settings where it is possible to learn about their cultural mediating characteristics. There are even fewer settings where people can learn about the principles of ecological design. While computer proponents proclaim the emergence of a new postindustrial era, the daily patterns of existence are mediated by technologies that embody the same deep cultural assumptions that guided the development of the Industrial Revolution. These earlier assumptions about technology have become institutionalized in the Western approach to formal education. Public schools and universities, rather than the home, church, or workplace, are the logical places to learn about the connections between cultures, technologies, and local ecosystems. Unfortunately, few public school teachers or university professors have given serious thought to the cultural mediating characteristics of technology, and even fewer have studied them systematically. The double bind can be simply stated: the one place in society where it might be possible to learn about the cultural nature of technology, other than how to promote its further development, is unable to challenge the myth that equates technological development with social progress. Indeed, public schools and universities are the chief promoters of the myth.

Education and Technology: An Overview

The reasons for this double bind are complex, but there is a thread of continuity running throughout the history of high-status ideas in the West that explains why the most dominant aspect of modern life is so little studied as a cultural phenomenon. The thread of continuity that connects the myopia of the present with the deep cultural as-

sumptions of the past can be found in the distinction the ancient Greeks made between *techne* and knowledge of the forms or ideas that were free of practical and embodied expression. What the ancient Greeks understood as *techne,* which we now call technology, was seen as a lower order of human activity—thus less important than philosophy (abstract theory) and an inappropriate concern of the educated person. The bias against the serious study of technology has been further sustained by the early Western mind-body dualism, and the history of social class distinctions that encoded the hierarchy articulated by the ancient Greeks and that is still perpetuated by institutions of higher learning.

While Western cultural development depended on a wide range of technologies, the early universities quickly shed their focus on passing on the technical and procedural knowledge that was the basis of law, medicine, and theology. As universities became centers of liberal studies, the acquisition of technological knowledge became the responsibility of the low-status institutes of technology—and, until recently, what were known as junior colleges. Modern universities now increasingly promote areas of study that lead to the development of new technologies—as an outgrowth of science and as a central focus of schools of business and education, departments of psychology, and so forth.

Thus, the bias inherited from the ancient Greeks has continued to be a dominant characteristic of all levels of formal education—but now there is an important difference. While the direct study of the moral and cultural mediating characteristics of technology continues to be viewed as unworthy of inclusion in a liberal education, the promotion of research leading to the development of new technologies has become the primary focus of most professors and university administrators.

Given the complicity of public schools and universities in promoting the myth that new technologies will provide solutions to the

increasingly complex and daunting problems faced by the world's cultures, the suggestion that they provide the best hope for democratizing decisions about technology development and use is likely to appear as naive. In *The Culture of Denial* (Bowers, 1997) I argued that universities, and by extension public schools, are unlikely to examine at a deep cultural level how they contribute to the globalization of the technological form of culture that is now commodifying and genetically redesigning the most basic levels of the natural world. As the various groups that make up the environmental movement document the dangers connected with the present economic and technological course we are on, and clarify the connections between the high-status forms of knowledge and the ecological crisis, the critical attitude fostered in universities must shift toward an examination of technology itself. The feminist movement has demonstrated that professors and university administrators, while unable to recognize on their own how patriarchy influenced curriculum development, hiring practices, reward systems, and even patterns of discourse in the classroom, were nevertheless capable of changing previously taken-for-granted patterns of thinking. It was a surprisingly slow process for an institution that prides itself on its superior powers of critical reflection, but it still represents a capacity for change. However, because of the rapid changes occurring in natural systems, there is likely to be less time to make the necessary adjustment in what students are taught about technology. We certainly cannot wait the centuries that it took professors to become aware of the mythic foundations of patriarchy.

This lack of understanding about technology cannot be attributed to a lack of scholarly writing in this area. The writings of Jacques Ellul (1964), Lewis Mumford (1934, 1967, 1970), Langdon Winner (1986), Don Idhe (1979), David F. Noble (1998), Theodore Roszak (1994), Richard Sclove (1995), and Alan Drengson (1995), to cite just a few of the scholars who have studied different aspects of mod-

ern technology, represent only a small part of the literature. Unfortunately, few universities offer courses that introduce students to this important body of literature and to the questions about the future direction of modern technology that most need to be examined. The concern about the nature of modern technology will soon have to move from the margins of academia to a more central place in student education. If the university does not provide for an in-depth understanding of these basic relationships, there will be little chance of it being promoted in the public schools.

Rethinking Technology

Newspaper articles on technology (especially computers) serve as the best evidence of the failure of universities. These articles seldom provide more than the most superficial understanding of issues that should be at the center of democratic debate. It would be more accurate to say that their usual treatment of computers demonstrates an inability to separate the computer industry–generated myths from the realities of the classroom and workplace. The complicity of universities and the print media in leaving the public unprepared to address the cultural non-neutrality of technology has another effect that works against the democratic process. The dumbing-down process, which various elite groups view as a necessary part of the business of promoting new products, makes it even more difficult for citizen groups that make the effort to inform themselves about the ecological and community impact of different forms of technology to influence the direction of public policy.

All citizens should understand the following aspects of technology and thus study them as a required part of university education:

1. *There are differences between technologies developed in Western cultures and traditional, more ecologically centered cultures.* Understand-

ing how the mythopoetic narratives, viewed cross-culturally, influence the direction of technological development is especially important. This should include understanding how changes in the dominant mythopoetic narratives in the West led to changes in approaches to technology, and how the introduction of modern technology undermined the noncommodified traditions of community life.

2. *Democratizing decisions about technology depends on understanding alternative assumptions that influence the dominant approaches to technology.* If the educational process fails to introduce students to alternative ways of thinking about technology, technological decisions will continue to be framed by the same cultural assumptions that gave moral and conceptual direction to the Industrial Revolution—which does not provide a good model of the democratic process or of ecological citizenship. Students should be introduced to the principles of ecological design that are now more widely understood and even applied in modern contexts. Many cultures have learned these principles through careful observation of Nature's design processes in their local bioregion, and they further refined this understanding through intergenerational communication. Students with a modern mind-set, on the other hand, must unlearn their dependence on decontextualized approaches to technology that are based on design principles derived from a machine-based way of thinking. Learning how to relate ecological design principles—solutions grow from place; ecological accounting informs design; design with nature; everyone is a designer; and make nature visible (Van Der Ryn and Cowen, 1996, pp. 54–56)—to different problem-solving situations and contexts should be a required part of the university curriculum (which might then lead to this form of learning filtering down to the public school classrooms). A deep conceptual and practical understanding of these principles is also essential to recognizing when a modern technology may degrade the environment and undermine the interdependence of community life. Ecological approaches to design must have as their goal the reuse of materials into a new industrial cycle or reabsorption into natural systems. That is, technologies need to be designed in ways that mimic

natural systems that do not produce useless and toxic waste. If students do not understand alternative design principles, the political process will continue to be driven by the technological determinism that Ellul identified as a key feature of modern technology—and universities will continue to be the chief promoters of the high-status technologies that have proven so environmentally destructive.

3. *We need a systematic examination of how modern technology contributes to the culturally transforming process of commodifying knowledge and relationships.* Different groups in the environmental movement have recognized the role modern technology plays in a consumer-based lifestyle and the impact this has on the environment. But it is not generally understood in Western cultures, nor is it understood by the elite class in Third World countries who are attempting to use the Western model as the basis of development. The continual quest to turn knowledge, relationships, moral responsibilities, and Nature itself into commodities produced by international corporations is increasingly viewed as the expression of "progress." What needs to be studied as part of formal education (which itself is becoming increasingly commodified) is how different forms of technology contribute to the commodification of what previously represented personal, family, and community-based knowledge and skill. Understanding the long-term consequences of extending market principles into every area of cultural life, and into cultures that previously chose nontechnological forms of development, also requires that students learn about noncommodified aspects of community. Learning about what is now called voluntary simplicity and the networks of mutual responsibility that still exist within different cultural groups may contribute more to prospects of future generations than what is learned in most areas of the university curriculum.

4. *Modern technology requires a more complex view of tradition.* Unlike technologies in traditional cultures, modern technologies embody modern assumptions about change, context-free knowledge, anthropocentrism, and a secular view of Nature. Their design, use, and replacement assume that every form of technological innovation is superior to the traditions that are displaced. In the words of Edward Shils

(1981), modern technology is an expression of the "antitradition tradition" at the core of modern consciousness. The democratic process requires that citizens understand the relationship between technologies and the cultural traditions of everyday life. This, in turn, requires a more complex understanding of the nature of tradition than is provided in most educational settings. Traditions, in effect, are a form of intergenerational intelligence and communication. Earlier forms of cultural intelligence do not always meet today's moral standards, or represent lifestyles that we would find meaningful or even possible. But there are forms of cultural intelligence that continue to be viable, even essential to everyday life—many of which provide for genuine individual and community well-being. The study of the relationship between technology and cultural traditions should include the following: the nature and importance of elder knowledge; the shift from intergenerational communication to expert knowledge and its effect on self-sufficiency and mutual support; and the commodification of traditions and its effects on wealth and poverty.

5. *Technology has an impact on language and patterns of thinking.* In earlier chapters I gave examples of how machines are used as the analogues for understanding life processes such as thinking and genetic reproduction, and even the design aspects of material culture. Moravec (1988) and Kelly (1994) make no distinction between machines (particularly computers) and human life—thus, in their view, the replacement of humans by computers is an inevitable outcome of Nature's design principles. Students need to examine aspects of cultural life that are influenced by the language and thought patterns derived from machines. Furthermore, they need to consider how this language influences moral values and the ability to recognize differences in cultural ways of knowing—including the influence that mechanistic metaphors have on our views of globalizing consumer culture. The connections between technologically driven language and our understanding of human-to-Nature relationships should be considered.

6. *Social justice issues arise from the influence of modern technology on the nature of work.* Technologies such as computers make it possible to

export jobs to regions of the world where unprotected worker rights and low wages have a major impact on the economic viability of families and communities. While this process also disrupts the economic basis of communities in North America, modern technologies continue to be represented in our educational institutions and in the media as embodying our highest forms of knowledge. There are other double binds in our approach to technology that are equally problematic and that our educational institutions continue to ignore. How modern technologies de-skill and progressively replace workers is a trend that needs to be part of the systematic study of technology. Similarly, how different forms of technology influence the distribution of wealth and power in society needs to be recognized if a democratic polity is to be revitalized. The connections between the nature of modern technology, the assumptions that influence how it is used, and the need to expand consumer markets also need to be considered. As knowledge and reciprocal relationships of community life are increasingly commodified there is a growing need for all family members to work in order to purchase the goods and services previously acquired through mutual exchanges. This increase in consumerism, in turn, leads to more energy and resources being converted to consumption and to more waste materials returned to the environment. The dynamics of the modern commodification process needs to be contrasted with cultures that have retained values and relationships that are not mediated by modern technologies and market transactions. In short, students need to recognize how different cultures have retained a balance between work, noncommodified relationships and activities, and the values that have influenced their ability to keep technology more in balance with the needs of the community rather than the needs of the market.

7. *It is important to acquire knowledge about how the cultural mediating characteristics of computers threaten cultural diversity and ecological sustainability.* This should be understood by every responsible citizen, regardless of the culture of origin. The displacement of local knowledge by data, intergenerational communication by arbitrary subjective decision making, and face-to-face relationships by electronic communities

should be a focus of democratic decision making. Similarly, the substitution of computer-mediated learning for human teachers, with their potential for imparting cultural nuances, should also be a central concern in a democratic polity. In addition to contributing to a more rigorous level of public discourse about the influence of computers in the classroom and workplace, as well as on our civil liberties, understanding the cultural amplification and reduction characteristics of computers is essential background knowledge for people who create educational software. Indeed, the "greening" of educational software is absolutely dependent on understanding how earlier forms of cultural intelligence are encoded in the language students encounter on the computer screen. The minds that students encounter as they interact with the software, to restate Roszak's insight, have a formative influence—especially when they are reinforcing patterns of thought that students already learned to take for granted. People who create educational software, as well as expert systems used in other areas of social life, need to understand that the simulations, facts, data, and decision-making frameworks are expressions of a particular cultural way of thinking. Journalists writing about the influence of computers also need to understand the cultural gains and losses connected with their use in different social contexts. Since public schools and universities fail to address technological issues in any systematic and culturally grounded way, journalists take on the role of educators by framing the issues for the public. Too often they contribute to the further dumbing-down of the public in one of the most critical areas of social life.

With more universities undergoing reforms that will make them more responsive to the "forces of the marketplace," and state departments of education using the myth of "worker needs" in the next century as the basis of reforms in public education, there is little ground for optimism that this critical perspective on computers will be taken seriously. Nor is there a real basis of optimism that the above suggestion for curriculum reform will be discussed by educators. When viewed from a historical perspective, we can see that

challenges to current orthodoxies have seldom been taken seriously by those in power—until the reform-oriented minority identifies the moral principle that serves as leverage for adjusting to a new set of relationships and priorities. The American Revolution started as a marginalized form of resistance to the existing orthodoxies. The same holds true for the recent antiwar and feminist movements. These challenges to existing power structures and their supporting mythic cultural narratives succeeded in awakening a deeper, less conscious sense of what constitutes essential relationships in life. In the past, concerns about representative government, peace, and equality served as the moral leverage for transforming existing orthodoxies and the elites that perpetuated them. The growing awareness that Nature is responding to the impact of modern technology by reducing the support systems on which our lives depend perhaps will serve as the moral leverage for a new set of educational and technological priorities.

Translating this awareness into curriculum reform will be an especially daunting challenge. Ideological differences that are becoming more visible between and within academic departments represent just one of the many barriers that reformers will face. Even among the small segment of the academic community that studies the impact of science and technology on society, there is disagreement over whether to take a scholarly or activist approach—with the latter being closely linked to efforts to address issues of ecological justice. But the main impediment to making one of the most dominant forces in modern life the focus of systematic and critical study is the myth that, while the use of technology always reflects the outcome of a political process, the technology itself is politically neutral.

Langdon Winner (1986) and others argue that technology is inherently political. For example, the steam engine that could power many other machines transformed the nature of work, led to the

commodification of time, and made intergenerationally based craft knowledge irrelevant—to cite just a few of the radical changes it introduced. Closer to home, as Winner points out, the mechanical tomato picker in California led to a reduction in the number of growers from approximately four thousand in the 1960s to six hundred in the 1970s. Overall, the tomato industry witnessed a decline of thirty-two thousand jobs. These and thousands of other examples bring out how the nature of a technology alters social relationships and traditions, changes the basis of self-identity and guiding values, and benefits specific groups while undermining the well-being of others. What makes technology (both social and mechanical) inherently political is that it embodies the thought process and values of the people who designed it—which means the technology embodies the form of cultural intelligence that the designers have acquired in learning the language of their cultural group.

The different aspects of technology I suggested as areas of study (differences between traditional and modern technologies, cultural assumptions that influence the technological direction, the parallel growth of modern technologies and commodification processes and so forth) are also inherently political. Using Michel Foucault's way of putting it (1983), the action of the technology on the actions of other people and other technologies represents the exercise of power. The changes introduced by the technology are thus political in nature. There are gains, losses, and transformations that reflect differences in perspectives and traditions. The introduction of print technology, for example, led to a new network of power relationships displacing older networks—even to the point of changing the patterns of awareness and social interaction. The amplification and reduction characteristics of computers discussed in previous chapters also involve the exercise of power and thus are political.

The recognition of technology's political nature, both in its design characteristics and in its impact on the complex ecologies of

human relationships and practices, should lead to broadening how the political education of the public is understood. The recommendations for curriculum reform at both the public school and university level are thus intended to put a more complex understanding of the cultural transforming characteristics of technology (especially computers) on equal footing with other areas of political education—many of which are equally ignored by our educational institutions.

There are a number of groups, such as the International Forum on Globalization and the Loka Institute, that are attempting to raise the level of citizen participation in deciding issues of technology, communities, and the environment. The Loka Institute, for example, is promoting the Danish approach to establishing citizen panels that provide an opportunity for the public to question experts about possible dangers associated with a new technology. The institute is also promoting an understanding of the differences between democratic technologies and those that contribute to the centralization of power and the loss of local knowledge. One of the recent successes of the institute's effort to promote community-based research, as reported in a 1999 "Net Alert," was in getting symposium participants at the American Academy for the Advancement of Science to support a resolution declaring that "decisions on scientific and technical issues should incorporate input from affected communities and other members of the public, as many European nations have done."

The teach-ins held by the International Forum on Globalization and the efforts of the Loka Institute strengthen the networking among other groups working to regenerate democratic decision making at the local level. But it is doubtful whether their efforts succeed in reaching beyond the small segment of the population already informed about the globalization of Western technologies and economic policies. Nevertheless, this is an important segment to reach,

as their commitment to eco-justice issues and level of communicative competence helps to identify the important policy issues—which sometimes even get reported in the media.

Given the rate and scale of technological innovation that is putting the world's cultures on an highly experimental and risky pathway of development, there is an especially urgent need to educate a larger segment of the public in ways that will enable it to recognize how present and future lives will be affected by new technologies. The institutions that reach the larger segment of the population and have the potential to counter the dumbing-down process of the corporate-controlled media, are the public schools and universities. Faculty of these institutions need to recognize both the special opportunity and responsibility they have for providing the background knowledge necessary to democratize technological decisions. They also need to recognize that if they continue to ignore the more complex and subtle linkages between technology and hierarchical systems of increasingly centralized political control, they will themselves be transformed in ways that further marginalize forms of education that do not contribute directly to economic growth. Corporations are already acting on the premise that the nation's educational systems represent a huge market for computer-related technologies and brand marketing campaigns (witness the growing visibility of corporate logos in public schools and universities). As corporations further exploit this market, they will change the educational process in ways that will further undermine the potential of democratic decision making to reverse the trend toward globalization and its corresponding ecological consequences.

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