1 / Literacy and Technology Linked: The National Project to Expand Technological Literacy

[T]he NII can transform the lives of the American people—ameliorating the constraints of geography, disability, and economic status—giving all Americans a fair opportunity to go as far as their talents and ambitions will take them. . . .

The . . . NII will "create as much as $300 billion annually in new sales across a range of industries." The . . . NII would increase the GDP by $194 billion . . . [and add] $321 billion to the GNP by the year 2007, and increase productivity by 20 to 40 percent. (*National Information Infrastructure* 4)

Technological literacy—meaning computer skills and the ability to use computers and other technology to improve learning, productivity, and performance—has become as fundamental to a person's ability to navigate through society as traditional skills like reading, writing, and arithmetic. . . .

[O]n February 15, 1996, President Clinton and Vice President Gore announced the Technology Literacy Challenge, envisioning a twenty-first century where all students are technologically literate. The challenge was put before the nation as a whole, with responsibility shared by local communities, states, the private sector, educators, local communities, parents, the federal government, and others. (*Getting America's Students Ready* 5)

Literacy's Changing Agenda

Literacy alone is no longer our business. Literacy and technology are. Or so they must become.

Who would have predicted that English studies, composition, and language arts teachers at the beginning of the twenty-first century would be so desperately needed? And needed not only for our expertise with language and literacy studies but for the attention we pay—as humanist scholars, teachers, and citizens—to the complex set of social, political, educational, and economic challenges associated with technology. But here we are.

Increasingly, literacy educators have recognized that Americans need help as they prepare to face the technological challenges of the next century, that the primary battles of the computer revolution are far from over. In print, television, and on-line media and thus in our country's collectively structured public imagination, significant battles are still being waged over computer technology and its relationship to various social agendas, both dominant and minority, within the United States. Americans continue to struggle with the government's responsibility for providing access to technology and with the corporate sector's responsibility for remaining competitive in an increasingly technological global market. Many wrestle as well with the role of the country's educational system in producing an informed citizenry that knows how to use computers and with the responsibility that parents have for providing children with computer support at home. Many are confronted with the changing nature of intellectual property in electronic environments, changing expectations about privacy in personal e-mail exchanges, and changing understandings of what it means to be a writer or a reader or even a person in cyber environments. And these questions represent only a few of the issues that technology raises.

These struggles—and the public debates that characterize them—are significant because they help shape America's ongoing relationship with technology, the ways in which citizens think of human agency within this relationship, and the ways in which Americans put computers to work in the service of those social projects that are most important to the nation's commonweal.

Nowhere are such struggles and debates rendered in more complex terms—and nowhere are they more influential—than in the field of literacy: composition, language arts, and rhetoric. For teachers, literacy instruction is now inextricably linked with technology. Moreover, since 1993, an official national project to expand technological literacy has been launched in America's schools, homes, and workplaces, changing the ways in which both literacy educators and the publics they serve think about, value, and practice literacy. This national project bears directly on the work we do as literacy specialists. Technology has become part of our responsibility, whether we like it or not.

My purpose is to convince teachers of English studies, composition, and language arts that we must turn our attention to technology and its general relationship to literacy education. On the specific project to expand technological literacy, we must bring to bear the collective strength of our profession and the broad range of intellectual skills we can muster as a diverse set of individuals. The price we pay for ignoring this situation is the clear and shameful recognition that we have failed students, failed as humanists, and failed to establish an ethical foundation for future educational efforts in this country.

The Challenges Associated with the New Agenda

If the increasingly strong cultural link between technology and literacy is the general area of concern in this book, the specific case study of this cultural formation is the current national project to expand technological literacy, officially identified as the Technology Literacy Challenge by the Clinton administration (*Getting America's Students Ready*). This project aims to create a citizenry comfortable in using computers not only for the purposes of calculating, programming, and designing but also for the purposes of reading, writing, and communicating. It is an excellent case study of a national literacy project because of the tremendous scope, significance, currency, and cost associated with such goals.

According to its sponsors, this large-scale literacy project will offer all Americans equal access to an education rich in opportunities to use and learn about technology. With such an education, the project's sponsors claim, graduates will be qualified for high-paying

high-tech jobs and thus have the means of achieving upward social mobility and economic prosperity within our increasingly technological culture.

To achieve this goal, American schools must help "all of our children to become technologically literate" by teaching them to use communication technologies, specifically computers, in the practice of reading and writing effectively. The deadline for creating such a citizenry—one that understands literacy practices in terms of technological contexts—is "early in the 21st century" (*Getting America's Students Ready* 3).

But if the project to expand technological literacy has been justified as a means of achieving positive social change and new opportunity, to date it has failed to yield the significant social progress or productive changes that many people have come to hope for. Indeed, in the American school system as a whole, and in the culture that this system reflects, computers continue to be distributed differentially along the related axes of race and socioeconomic status, and this distribution contributes to ongoing patterns of racism and to the continuation of poverty.

It is a fact, for instance, that schools primarily serving students of color and poor students continue to have access to fewer computers and to less sophisticated computer equipment than do schools primarily serving more affluent students or white students. And it is a fact that schools primarily serving students of color and poor students continue to have less access to the Internet, to multimedia equipment, to CD-ROM equipment, to local area networks, and to videodisk technology than do schools primarily serving more affluent and white students (Coley, Crandler, and Engle 3).

These data, which are profoundly disturbing, become all the more problematic if we trace the extended effects of the technology-literacy link into the country's workplaces and homes. There, too, the latest census figures indicate, the link is strongly correlated to both race and socioeconomic status. Black employees are less likely than white employees to use a range of computer applications in their workplace environments. Employees who have not graduated from high school are less likely to use a range of computer applications than are employees who have a high school diploma or have some college experience. And families of color and families with low incomes are less likely to own and use computers than white families and families with higher incomes (see *Condition of Education 1997* 212; *Digest of Education Statistics 1996* 458–59; *Getting America's Students Ready* 36). In other words, the poorer and the less educated Americans are in this country—both of which conditions continue to be closely correlated with race—the less likely they are to have access to computers and to high-paying high-tech jobs.

In these terms, then, the national project to expand technological literacy has not resulted in a better life or more democratic opportunities or an enriched educational experience for all Americans, as most of us might wish. Rather, it has served to improve the education only for some Americans. This specific project—and the more general social forces and formations that sustain it—substitutes a value on competition and consumerism for a commitment to equal opportunity, democratic cooperation, and a public education that serves the common good of this country's peoples.

In a formulation that literacy educators will feel most keenly, the project to expand technological literacy implicates literacy and illiteracy—in their officially defined forms—in the continued reproduction of poverty and racism. And it implicates teachers as well, despite our best intentions.

The Social and Educational Effects of the New Agenda

An honest examination of the situation surrounding the project to expand technological literacy suggests that these two complex cultural formations, technology and literacy, have become linked in ways that exacerbate current educational and social inequities in the United States rather than addressing them productively. Such an examination encourages teachers to admit, moreover, that we may be partially responsible for this bad, even shameful, situation.

The project to expand technological literacy has not clearly benefited all Americans in ways that would warrant its expense, despite the size and scope of the efforts that have been undertaken thus far.

Of course, it is true that some Americans have benefited. Certainly the computer industry has grown during the 1990s (see *Economic Report of the President*; Freeman; Goodman; McConnell; Warnke). And the project has created some changes in the nation's schools. As of 1994, for example, 68.3 percent of fourth-grade students, 82.3 percent of eighth graders, and 86.9 percent of high school juniors were writing stories or papers on computers (*Condition of Education 1997* 56), and 43 percent of fourth-grade teachers and 17 percent of eighth-grade teachers reported using computers to teach reading (Coley, Crandler, and Engle 29). Today, 98 percent of all schools own at least some computers, and the ratio of computers to students, at 1:10, is at an all-time low (Coley, Crandler, and Engle 3). In some cases, these changes have resulted in educational approaches that are increasingly engaging and rewarding for students, that reduce some of the unnecessary labor associated with writing (e.g., recopying text in the effort of revising, photocopying, or reproducing copies of texts in order to share them with others), or that alleviate the workload of teachers (see *Getting America's Students Ready*; Hawisher et al.; Handa; Selfe and Hilligoss; and Strickland).

However, the national project to expand technological literacy has also failed to yield some of the expected reforms. For example, although it has resulted in some surface changes in how literacy is practiced and what Americans consider literate behaviors, it has not resulted in an improved life for all citizens—especially poor students or students of color who, within this country's educational system, continue to have less access to technology (Coley, Crandler, and Engle) and who suffer from a higher incidence of educational failure than wealthier students and white students (*Condition of Education 1997* 212).

Indeed, although the project has been justified as a means of achieving positive social change and new opportunity, it actually serves a fundamentally conservative role. This project is linked to the continued reproduction of the following familiar social elements:

- A "literate" segment of society—composed of individuals with relatively high levels of technological literacy skills, distributed generally along existing axes of wealth and privilege—who will yield the country's leaders and productively employed workers.
- An "illiterate" segment of society—so labeled because individuals within it fail to acquire sufficient skills in technological literacy—on whom our culture relies for the most undesirable tasks in our society and who will continue to suffer disproportionately from persistent social problems like poverty and crime.
- A stable citizenry that continues to be sorted hierarchically into social subgroups based systematically on links between race and class and the related effects of differential literacy levels, educational opportunities, health environments, and access to technology.
- A citizenry that believes in the potential of high-tech literacy instruction to make lives better, to ensure progress, and to provide a route to economic prosperity. Unfortunately, the very hopefulness of this group generally blinds them to the important connection between the literacy instruction in our existing educational system and that system's role in reproducing persistent social problems.

Our Professional Responsibility

Surprisingly, given its broad cultural significance, this extensive national project has received little or no focused attention or comprehensive response from literacy teachers and scholars. In part, literacy issues have enjoyed such a low profile in discussions of this national project because teachers remain comfortable with the culture's traditional separation of arts and technology (see Snow; and Latour, Preface) as it has served to structure the responsibilities of

English studies professionals. This conventional separation, after all, has allowed us to use technology in our classrooms while generally absolving ourselves from the responsibility for planning for technology, thinking critically about technology, systematically assessing the value of technology, and making the difficult decisions associated with who pays for and has access to technology (see Hawisher and Selfe 1993; R. Selfe; Selfe and Selfe).

Even recognizing this historically determined set of attitudes, however, it is an understatement to say that literacy educators have failed to recognize the project to expand technological literacy as a coherent nationally funded venture. Indeed, teachers have not responded in any comprehensive or systematic fashion to this project, nor have the professional organizations that represent them demanded any involvement in shaping its goals, even though all teachers have been affected by it.

What makes this decided lack of professional involvement most disturbing is the increasing recognition that the claims associated with this large-scale literacy project have not been borne out. Our profession's reluctance to engage in focused ways with such a significant national effort is both disappointing and problematic. We cannot responsibly afford to maintain our current disinterested profile much longer without engaging in a willful ignorance that yields serious consequences.

What Is Technological Literacy?

In this book, readers will encounter two definitions of technological literacy. These definitions overlap, but they also differ.

The first definition is associated specifically with the national project to expand technological literacy and is identified in the 1996 federal publication *Getting America's Students Ready for the Twenty-First Century*:

> [Technological literacy involves] computer skills and the ability to use computers and other technology to improve learning, productivity, and performance. (5)

It is clear, however, that this specific—and, in some senses, more narrow—functional definition, like the national project to expand technological literacy, grows out of a broader cultural link between technology and literacy. And this broader link—characterized by a related set of social values, formations, and activities—suggests the need for a second definition of technological literacy as a cultural phenomenon, one that includes cultural dimensions, incorporating what Brian Street identifies as both literacy "events" and literacy "practices" (2).

In this context, the second definition of technological literacy that this book offers (and, indeed, focuses on) refers not only to what is often called "computer literacy," that is, people's functional understanding of what computers are and how they are used, or their basic familiarity with the mechanical skills of keyboarding, storing information, and retrieving it. Rather, *technological literacy* refers to a complex set of socially and culturally situated values, practices, and skills involved in operating linguistically within the context of electronic environments, including reading, writing, and communicating. The term further refers to the linking of technology and literacy at fundamental levels of both conception and social practice. In this context, technological literacy refers to social and cultural contexts for discourse and communication, as well as the social and linguistic products and practices of communication and the ways in which electronic communication environments have become essential parts of our cultural understanding of what it means to be literate.

At the level of literacy events, this second definition of technological literacy refers to the events that involve reading, writing, and communicating within computer-based environments, all of which have come to be socially identified as literate activities. These include understanding and valuing the uses of common computer applications for generating, organizing, manipulating, researching, producing, and distributing information, discourse, and texts (print, still graphics, moving images); and using such tools as databases, word-processing packages, multimedia production packages, e-mail, listserv software, bulletin boards, and graphics and line-art

packages. At this level, the term *technological literacy* also refers to the activities associated with navigating on-line communication environments such as the World Wide Web (WWW), the Internet, activities that require, for example, the use of browsers and search engines in order to locate information and engage in on-line conversations.

This second definition of technological literacy, however, also operates at the level of literacy practices. These practices, when examined within the context of a larger social fabric, as literacy scholars such as Street and Gee both point out, reveal robustly defined cultural understandings of the term *literacy* as they are constructed by individuals and groups in specific social settings. When practices of technological literacy are studied closely, they reveal complex sets of cultural beliefs and values that influence—and are influenced by—collective, individual, and historical understandings of what it means to read, write, make meaning, and communicate via computers and within on-line environments.

Cultural values, which are often deeply "sedimented," to use Anthony Giddens's term (22) in history and practice, help determine why some technological literacy skills and practices are associated with this country's official system of literacy and literacy education (as represented in more regulated sites such as school standards and curricula, government documents on education and educational programs, public criteria for the hiring of corporate employees, or educational software products published for home tutoring use) and other practices—in contrast, with a system of nonofficial technological literacy (e.g., as represented in less regulated sites on the WWW, in homes, and in computer games). Given this social and cultural context, those technological literacy skills and practices associated with official efforts are generally considered useful and appropriate (e.g., using the WWW to do research for a project assigned in the workplace, using an e-mail list to communicate with people from other cultures or to practice a skill in another language as assigned in a schooling context, or using a graphics package to illustrate a formal report to a local government representative); and those technological literacy activities associated with nonofficial

situations and settings are often considered to be either problematic (e.g., frequenting WWW chatrooms predominated by marginal social groups, cruising the web for pornographic pictures, using the Internet to find recipes for designer drugs, using a web site to join a cult) or outside the official realm of technological literacy altogether (e.g., using an ATM machine, playing a handheld video game, programming a VCR).

Our culture's understanding of official literacy events and practices is shaped by complexly related social formations that function within historical, economic, political, and ideological contexts. Government values on control, competition, and research, for instance, influenced technological literacy practices on the original ARPANET and continue to do so on the National Information Infrastructure (NII). These communication environments first supported government-sponsored military research and, later, corporate research and communication, educational research activities, the distribution of information to citizens, and the provision of citizen-based input to elected officials. Related to the social formation of the state, moreover, are those formations associated with capitalism, including the corporate and industrial sectors. And these sectors, too, contribute to a collective cultural understanding of the official skills that make up technological literacy.

Many corporate literacy practices and values, for example, are determined within the regulating environments of state or federal legislation, government grant programs, or military contracts. Corporate-sponsored projects necessitating the use of the NII, the WWW, or in-house intranets, for instance, often place a high value on the efficiency of communication. In such environments, employees learn to value the speed of e-mail exchanges, the ability to distribute information quickly and widely, and the transactional functions of language. Within the daily operations of the workplace, employees also come to understand that some computer tools and activities are seen as more useful, more focused on corporate outcomes, more productive—and hence more official—than others. Among these might be the use of database tools to enhance the efficient structuring of information within a corporate setting, the use

of report-generation and archiving systems to contribute to the efficient production and control of information in an organization, and the use of computer-supported group decision-making packages to solve problems efficiently. Within such contexts, a collective sense of official literacy becomes part of a system that serves to further regulate and control employees' literacy practices in various ways and at various levels with the goal of improving performance and reducing operating costs (see Zuboff; Duin and Hansen; Johnson-Eilola and Selber).

Government and corporate values and practices, moreover, help shape the official programs of technological literacy that the American educational system offers to students. Most schools, for example, now recognize an obligation to teach transactional and functional communication practices within electronic environments. The goal is to provide students with marketable skills and to produce a technologically skilled citizenry that can contribute to the national commonweal and to a healthy economy based on the production of increasingly sophisticated technological products and services. Such goals directly inform official versions of technological literacy and are explicitly codified within the standards documents of various professional organizations and the performance frameworks of state educational systems. In the case of technological literacy, both the NCTE *Standards for the English Language Arts* and the *Michigan Curriculum Framework*, for example, mention the need for a computer-literate citizenry.

Finally, the technological literacy practices and skills characterizing official schooling environments often affect technological literacy practices at home (e.g., the use of a home computer and the WWW to complete homework assignments or to practice approved literacy skills) and shape corporate practices (e.g., the design and marketing of educational software packages and hardware products for use on home computers).

Our culture's understanding of unofficial technological literacy practices are generally associated with less regulated—or less overtly regulated—aspects of citizens' lives at home in informal social groups. For example, unofficial technological literacy practices

and values are shaped by individuals' access to electronic entertainment and leisure equipment (e.g., electronic games, programmable VCRs and coffee makers, electronic kiosks in shopping malls). Unofficial literacy practices and values are also shaped by individuals' participation in self-selected discussions (e.g., on-line discussions on golf tips, religious cults, raising guppies, designer drugs, ways to avoid paying taxes, or homeopathic remedies) and by their association with informal social groups that use computers (e.g., gay teens who meet on-line, cooking clubs that rely on programmable breadmakers, students who exchange pirated software without paying commercial vendors, friends who get together to play games.).

The Social and Financial Costs of the New Literacy Agenda

The broadly distributed costs of the general link between literacy and technology, manifested in both social and financial terms, are difficult to assess because they affect so many areas of American life (e.g., the costs associated with using computers in schools, developing infrastructure for the Internet, conducting computer research in technology-based industries, making computers available in public libraries) and because, in each venue, these costs must be figured at numerous levels and in different ways (e.g., the costs to individuals, organizations, corporations, communities, states, and nations). Literacy educators can derive a more concrete sense of such costs, however, from the specific case study of the national project to expand technological literacy.

In financial terms, for example, this project has required the collective investment of federal and state governments, funding from the corporate sector, significant commitments from already strapped educational budgets, and direct financial support from individual families across the nation. And this funding has been distributed in many ways.

By 1993, for instance, the general costs of upgrading the NII—the national computer network designed to serve as the foundation for technological literacy practices—were already estimated at $1-2

billion annually (*National Information Infrastructure* 6). And expenditures projected for the specific national project to expand technological literacy indicate that this particular literacy project may run up to $109 billion—averaging either $11 billion annually for a decade or between $10 and $20 billion annually for five years—from various sources at the national, state, and local levels (*Getting America's Students Ready* 6).

Where has this money come from, and where has it gone? As Todd Oppenheimer notes:

> New Jersey cut state aid to a number of school districts this past year and then spent $10 million on classroom computers. In Union City, California, a single school district is spending $27 million to buy new gear for a mere eleven schools. (46)

Secretary of Education Richard Riley, in *Getting America's Students Ready* (60–68), lists other funded projects from various states, including the following items:

California	$279 million (one time, state board) for "instructional technology, deferred maintenance, technology."
	$13.5 million (state board) for educational technology.
	$10 million (state budget) to "refurbish and update used or donated computers."
	$100 million (one year, governor) for "educational technology."
	$35 million (Pacific Telesis) for rate overcharges.
Delaware	$30 million (state, three years) to fund "infrastructure initiative."
District of Columbia	$9 million for "hardware and software purchases."

Idaho	$10.4 million (Idaho Educational Technology Initiative) for "technology in the classroom."
Maine	$15 million (governor) to "establish a distance-learning network."
Montana	$2.56 million (NSF) to support "SummitNet."
	$100,000 (state) "for technology."
Texas	$150 million (state, Telecommunications Infrastructure Fund)
	$30/student (state) for "purchasing electronic textbooks or technological equipment . . . , training educational personnel directly involved in student learning, . . . access to technological equipment."
Wisconsin	$10 million (state) for "improved access to advanced telecommunications and distance education technologies," with 24 percent local match required.

In comparison to the federal funding for other literacy and education projects, these amounts are staggering. The 1999 budget that President Clinton sent to Congress for the Department of Education, for example, requested $721 million of direct federal funding for educational technology, but less than half of that amount, $260 million, for the American Reads Challenge and less than one-tenth of that amount, $67 million, for Teacher Recruitment and Preparation ("President Clinton Sends 1999 Education Budget to Congress" 3).

Even more important than these financial expenditures, however, is America's moral and social investment in literacy education. As Graff, Olson, Street, Gee, and other scholars point out, literacy has historically been considered "the most significant distinguishing feature of a civilized man and a civilized society" and illiteracy has been understood as a condition that carries with it the most "dreadful social and personal consequences" (David Olson, qtd. in Graff 1987, 2). We have come to understand that cultural definitions of literacy have had such import as social constructs because

of the potent "normative assumptions and expectations" (Graff 1987, 3) associated with them. The definition of literacy determines not only who will succeed in our culture—and the criteria for such success—but also who will fail.

On a pragmatic level, definitions of literacy serve as triggers, or requirements, for other socially determined systems of support. Literacy levels have been used to determine state allocations and eligibility for federal assistance, access to further educational opportunities, employment qualifications, and social assistance. Citizens who can demonstrate sufficient levels of official literacy can obtain a driver's license, apply for a home loan, seek financial support for higher education, and apply for a higher-paying job. Citizens who cannot demonstrate such skills may be unable to accomplish many of these things within the social systems we now have in place. Through these mechanisms, definitions of literacy play a significant role in creating and maintaining a cohesive hegemonic system in the United States that affects every citizen's chances for success.

In terms of our case study examination, the public discourse surrounding the current national project to expand technological literacy—as expressed in the language of state and federal legislation, official educational standards documents, reports from governmental agencies, and news articles—has already figured significantly in determining who is perceived as literate and illiterate in this country. Language that links literacy practices to technological environments, for instance, now directly influences whether children are perceived as ready for preschool in Maine (Blom), whether students fulfill eighth-grade performance standards in Michigan (*Michigan Curriculum Framework*), and whether graduates can meet entry-level job requirements in Florida and California (Geewax; "Tearing U.S. Apart"; Nax).

Brian Street explains the general cultural importance of such discursive phenomenon by pointing out that national and social values are made manifest in—and clearly shape—official definitions of literacy. As he notes, the rhetoric associated with large-scale literacy programs not only draws "public attention to literacy" in particular ways and serves to encourage "financial and organiza-

tional resources" (13). It does so along the axes of existing power formations in a society, often following all-too-familiar class patterns, for instance, or racial patterns. For these reasons, Street explains further, large-scale literacy projects often serve not to change a society's educational efforts for the better but, rather, to reproduce stereotypical patterns of responding or failing to respond to individuals from nondominant groups such as the poor or people of color.

Moreover, as Street cautions, the public discourse associated with large-scale literacy programs, while revelatory in terms of national values, can also be misleading in terms of actual outcomes. It often implies erroneously, for example, that the acquisition of literacy leads, autonomously and directly, to improved "job prospects, social mobility, and personal achievement" (17) and that individuals who remain "illiterate" in terms of officially defined skills lack either the cognitive ability or the personal discipline to succeed. "The reality," Street reminds us, "is more complex" and "harder to face politically."

> Recent studies have shown, for instance, that when it comes to job acquisition, the level of literacy is less important than issues of class, gender, and ethnicity; lack of literacy is more likely to be a symptom of poverty and deprivation than a cause (Graff 1979). . . . Governments have a tendency to blame the victims . . . and "illiteracy" is one convenient way of shifting debate away from the lack of jobs and onto people's own supposed lack of fitness for work. (18)

Street's warnings reinforce the moral and ethical obligations that responsible literacy educators and citizens have in connection with the current national project to expand technological literacy. The ways in which we define literacy in state and federal documents; the literacy practices we support and teach in schools; the official literacy values that we recognize and inculcate as a culture; citizens' chances for jobs, social mobility, and prosperity in this country—all

of these are at stake in the current national project, and they are therefore among our professional responsibilities to address.

The import of the national project to expand technological literacy, then, far exceeds the relatively limited impact such an effort will have on the professional efforts of literacy educators, national, state, and local budgets, or school curricula. Rather, it affects the future of all citizens within our democratically conceived society and the opportunities they perceive as their own. For these reasons, we should all think about where we are headed in terms of technological literacy—and why.

The costs associated with the project to expand technological literacy have a basis in family life as well. Parents and families, for example, continue to be charged with the role of preparing their children for the literacy practices that they will encounter in the educational system. In the case of the current project to expand technological literacy, such a task entails supporting children with technology at home. In 1996, for example, Eric Blom reported that "between one-third and one-half of the nation's preschool-age children now have some computer experience." For parents, adapting to such changes may be difficult, in part because many adults raised in the print generation do not possess the skills that students will need to practice in computer-based literacy environments. Indeed, if Margaret Mead is correct, our culture may be changing so rapidly that adults raised in the twentieth century may be incapable of educating children for the world of the twenty-first century.

The project to expand technological literacy has additional implications for parents. Computers are expensive. Americans purchased more than 9.5 million home computers in 1995, making PCs a fixture in approximately 39 percent of U.S. households. By the year 2000, Freeman estimates, 60–65 percent of American households will own computers. On-line service providers, educational software, and computer literacy classes also represent significant costs.

Given such facts, it is not surprising that more children from middle- and high-income households had at-home access to a computer between 1984 and 1993 (from 10.8 to 23.7 percent and from

26.1 to 55.3 percent, respectively, for students reporting in grades 7–12) than did children from low-income households during the same period (from 3.6 to 6.1 percent) (*Condition of Education 1997* 212). Parents in poor households, in other words, are the least able to prepare their children for success in an educational system that defines literacy in terms of being able to operate in technologically based communication environments, many of which are costly and far from universally accessible in this country. Similar inequities are associated with families who live in rural America. For example, rural schools enrolling high populations of low socioeconomic students have less access than urban districts enrolling high populations of such students (*Getting America's Students Ready* 36).

More about Paying Attention to the New Literacy Agenda—Additional Challenges

Given these realities, teachers need to understand as much as possible about the broad cultural link between technology and literacy and how this formation has come to determine not only official definitions of literacy but also the lived experiences of individuals and families.

More specifically, the national project to expand technological literacy is crucial to teachers and scholars at all levels, and we need to address this project directly, systematically, and collectively. It bears on our professional responsibility to understand and work with the complex relationships between humans, the language they use, and the social contexts within which both exist.

Unfortunately, anyone familiar with the traditional values of humanism knows that, as a group, English studies, composition, and language arts teachers prefer that technology remain quiet and well behaved in the background of our lives, where we can use it when we choose—but pay very little attention to it most of the time. Although we are tolerant of those colleagues interested in the "souls of machines," to use Bruno Latour's term, we assign them to a peculiar kind of professional isolation "in their own separate world" of computer workshops and computer classrooms and pro-

fessional conferences that many of us feel are influenced more by the concerns of "engineers, technicians, and technocrats" than by those of humanists (vi).

It is this same set of historically and professionally determined beliefs that informs many faculty members' actions within our home departments and schools, where we often continue to allocate the responsibility of technology decisions—and often the responsibility of computer-supported classrooms—to a single faculty or staff member who doesn't mind wrestling with computers or the thorny issues that can be associated with their use.

In this way, we manage to have computers available for our own studies, in support of our classes and our profession, but we also relegate these technologies to the background of our professional lives. As a result, computers are rapidly becoming invisible. When we don't have to pay attention to machines, we remain free to focus on the teaching and study of language, the stuff of real intellectual and social concern.

As literacy educators, we prefer things to be arranged this way because computers—when they are too much in our face, as unfamiliar technology generally is—can suggest a kind of cultural strangeness that is off-putting. We are much more used to dealing with older technologies like print, a technology old enough that we don't have to think so much about it, old enough that it doesn't call such immediate attention to the social or material conditions associated with its use. Books are relatively cheap, they are generally accessible to students, districts, families, and educators; and they are acknowledged by our peers to be the appropriate tools to use for teaching and learning. As a result, our recognition of the material conditions associated with books has faded into the background of our imagination. Although we understand on a tacit level that the print technology in which we invest so readily, and in which we ask students to invest, contributes to our own wallets (e.g., when we edit or write textbooks) or to our own status in the profession and in the public eye (in terms of performance assessment, promotion, and sometimes salary rewards), we seldom notice it.

There are other things that don't often occur to us. When we use the more familiar technology of books, for instance, it is mostly within a familiar ideological system that allows us to ignore, except for some occasional twinges of conscience, the persistence of print and our role in this persistence. It allows us to ignore the understanding that print literacy functions as a cultural system, as Lester Faigley and others (Gee; Graff; Stuckey; Rose) have noted, that not only carries and distributes enlightened ideas but also supports a pattern of continuing illiteracy in this country.

I offer this example to suggest that literacy teachers, educated in the humanist tradition, generally prefer our technologies and the material conditions associated so closely with them to remain in the background for obvious reasons, and the belief systems we construct in connection with various technologies allow us to undertake a comfortable process of naturalization. In the case of computers, we have convinced ourselves that we and the students with whom we work are made of much finer stuff than the machine in our midst, and we are determined to maintain this state of affairs.

This ideological position, however, has other effects and costs. As a result of the negative value we generally assign to discussions about computers, our professional organizations continue to deal with technology in what is essentially a piecemeal fashion. We now think of computers, for instance, as a simple tool that individual teachers can use or ignore in their classrooms as they choose but also one that the profession, as a whole, with just a few notable exceptions, need not address systematically.

Exacerbating this situation is the fact that literacy teachers and scholars generally claim allegiance to one of two camps. Computer-using teachers enthusiastically endorse computers in their classrooms, but all too often they do not teach students how to pay critical attention to the issues generated by technology use. Teachers who choose *not* to use computers in class believe that their decision absolves them and their students from paying critical attention to technology issues. And so, as a profession, we have given technology issues precious little focused attention over the years.

We have begun to recognize that allowing ourselves the luxury

of such positions is not only misguided but also dangerously short-sighted. We are teaching students who *must* know how to communicate in an increasingly technological world. Further, these students need not only have the capability of using computers. They must also have the ability to understand, from a critical perspective, the social and cultural contexts for on-line discourse and communication and the ways in which electronic communication environments have become essential parts of our cultural understanding of what it means to be literate.

These recognitions are only the barest of starting points. They have brought literacy educators only to the point of *using* computers—or not doing so—but not to the more important point of *thinking* about what we are doing and trying to understand the implications of our actions. It has become increasingly clear over the past five years that we also have two much larger and more complicated obligations: first, we must try to understand—to *pay attention to*—how technology is now inextricably linked to literacy and literacy education in this country; and, second, we must help colleagues, students, administrators, politicians, and other Americans gain some increasingly critical and productive perspective on technological literacy.

2 / The Problem of Polemic: Representations of Technological Literacy in the Popular Press

I sit at my keyboard and . . . spew out my words easily, unthinkingly, at no psychic cost to myself, and launch them into a world already drowning in its own babble. The swelling torrent threatens to engulf every deeply considered word. . . . [T]here is no lucent depth of meaning, no set purpose—but only the random discharge of surface energies. . . .

The word's dreary passage through the information machine may enable us to recognize the desiccation of meaning, the mechanization of thinking to which we ourselves are liable. (Talbot 182–93)

Technological Literacy: A Step Forward or a Step Back?

One of the most visible forums in which Americans discuss their views of technology and its relationship with literacy is the popular press. Popular news magazines such as *Time*, *Newsweek*, and *Scientific American* have run regular thematic issues on computers and their use as literacy tools for the past decade. And publishers have found a market in trade books that address technology and literacy issues: Marshall McLuhan's *Gutenberg Galaxy* (1962), Michael Schrage's *Shared Minds* (1990), Howard Rheingold's *Virtual Community* (1993), Sven Birkerts's *The Gutenberg Elegies: The Fate of Reading in an Electronic Age* (1994), and Sherry Turkle's *Life on the Screen* (1995). These publications illustrate how Americans understand technology and its general social relationship to literacy at this particular time. They also reveal the general values we attach to the national project of technological literacy.