1 Reimagining Computer Literacy

> Technology education is not a technical subject. It is a branch of the humanities.
>
> —Neil Postman,
> *The End of Education: Redefining the Value of School*

Since at least the 1960s, questions about computer literacy have been asked and answered repeatedly in instructional settings, but in ways that are often dissatisfying to teachers of writing and communication. Although academic institutions are investing in technology infrastructure and support at an astonishing rate—so astonishing, in fact, that it is futile to cite growth statistics, which increase dramatically from year to year—these investments are often driven by logics that fail to make humanistic perspectives a central concern. Cultural critic Neil Postman has argued cogently that a worthwhile education focuses on the consequences and contexts of technology rather than merely on the technology itself. But just what would such an education entail?

Computers are indeed a fact of life in educational settings, yet too few teachers today are prepared to organize learning environments that integrate technology meaningfully and appropriately. There are several factors contributing to this state of affairs, including the popular if mistaken view that learning how to use—and think about—computers productively is simply a matter of understanding, in operational terms, how computers work. Of course, knowing how to operate a computer is one important aspect of teaching and learning in contemporary instructional contexts. And, increasingly, there is much to know about the online applications developed to support writing and communication activities. But

simply understanding the mechanics of computing, particularly in decontextualized ways, will not prepare students and teachers for the challenges of literacy in the twenty-first century. For example, effective revision strategies for hypertext require a host of complex abilities, ranging from saving files as part of a shared network drive to restructuring the logical-deductive pattern of an essay. Unfortunately, students and teachers often find support for the former task but not the latter.

For that matter, computer literacy is a vexing and ongoing problem even for teachers who have good support systems. Many in the profession are understandably skeptical about getting involved in computer literacy initiatives. One explanation for this skepticism is that those who work with technology can quite easily find themselves in a number of precarious situations. Some are fortunate to have access to impressive computer facilities but find themselves operating in a culture that vastly underestimates what must be learned to take advantage of technology and to understand its social and pedagogical implications. Others function rather productively in relative isolation, organizing an active community of dedicated graduate students and part-time instructors, while bending over backwards to entice faculty colleagues to invest their time and energy in a new direction. Still others—the great majority of teachers, I would argue—are encouraged, even mandated, to integrate technology into the curriculum, yet no incentives are given for such an ambitious assignment, one that places an extra workload burden on teachers, adding considerably to their overall job activities.

Notwithstanding the genuine risks posed by such precarious situations, more than enough incentives for getting involved with computer literacy initiatives can be found in the educational realities of the current period. In the 1980s, teachers of writing and communication expended an enormous amount of effort in investigating whether computer programs could make students better writers (see Hawisher). This inquiry made perfect sense to a profession that was trying to decide whether or not to include computers in writing instruction. But, in this day and age, the need to

make such a decision is moot. A new round in the old debate over computer literacy has begun, or at least the grounds of this debate have shifted in substantial ways. For better or worse, computer environments have become primary spaces where much education happens. It is indeed a rare university student who does not use computers—on a regular basis—for writing and research activities, for communicating with classmates and teachers, for organizing and scheduling tasks, and for many additional purposes. The Internet and other computer applications have succeeded in becoming an undeniable part of the instructional landscape across the entire curriculum. In English studies, computers are implicated in a wide range of crucial literacy issues no matter the view of any particular teacher or program. And the stakes could not be higher. For at issue is the future shape of writing instruction and its significance to students.

This chapter begins a detailed investigation into the nature of computer literacy programs in higher education. Its purposes are to characterize the consequences and contexts that so frequently get overlooked in such programs, to discuss at least some of the reasons for this neglect, and to make a few initial proposals about what might be needed in order to create better alternatives. Toward this end, I begin with a brief discussion of several obstacles to more productive literacy practices, including technology myths as well as pedagogical and institutional barriers that are difficult to deal with. I urge teachers of writing and communication to adopt a "postcritical" stance, one that locates computer literacy in the domain of English studies while operating under the assumption that no theories or positions should be immune to critical assessment. Next, I elaborate on the central problem driving this book by taking a closer look at computer literacy requirements in higher education, requirements that tend to overemphasize and draw attention to technical concerns. To conclude, I move from rehearsing the existing failures of technological literacy to introducing a more positive portrait of the ideal multiliterate student that teachers should be trying to develop.

Obstacles to More Productive Literacy Practices

Computer literacy is certainly a worthwhile project for teachers of writing and communication. Not only are teachers obligated to prepare students responsibly for a digital age in which the most rewarding jobs require multiple literacies, but students will be citizens and parents as well as employees, and in these roles they will also need to think in expanded ways about computer use. Teachers obviously have the potential to help enact productive change if they think about computer literacy in the right ways. And one thing that this means is removing themselves from several prevailing myths that compromise educational progress.

For example, all too often computer technologies are touted as the solution to all of our problems, an inclination deeply embedded in American culture and education. From a humanistic perspective, however, conversations about computers are often misguided by the cause-effect relationships they tend to assume, which typically attribute to computers alone the power to make deep-seated, positive transformations, above and beyond existing social, political, and economic constraints. The myth of the all-powerful computer is as vital in the classroom as it is in popular culture. But the fact is that although computer technologies can be one important part of an educational solution, they are almost always a relatively small part, and even then the solution is not a quick or necessarily sure one.

Other prevailing myths discourage targeted and insightful discussions of computer literacy. For example, there is the myth of equality through computers, the belief that computers will level the educational playing field. But although it is clear that the poor, people of color, and women too rarely enjoy equal access to technology and its opportunities and, in all likelihood, never will (Gomez; Grabill; Moran), teachers tend to forget that equal access, even if that were possible, does not guarantee parity for the ignored or disenfranchised. In order for equitable experiences to take place, these groups need access not only to networked computers that are reasonably current but also to extensive systems of pedagogical and

social support. In considering how teachers might improve the education of at-risk children, Saul Rockman put it this way:

> Ensuring that schools have the same amount of equipment will not do. Providing schools with teachers who care and know enough about how to use computers effectively will help. Installing a technology infrastructure without reason for using it does not help. Refurbishing a building and making it beautiful and safe, does. Making certain that children have enough to eat and warm clothes to wear in the winter, is also a good starting point. (28)

But too frequently, computing infrastructures are established without the human resources required to make them just and productive for educational purposes, creating what Lawrence Tomei describes as the technology facade: a "false sense of activity and substance with respect to the uses of technology" in a learning environment (32).

One of the more compelling current myths encourages university administrators to assume that computers automatically make people more productive and thus are a cost-effective way of doing business. This myth, which is particularly appealing in a time of shrinking fiscal resources, inspires distance education initiatives that increase enrollments and workloads but not faculty positions; intranets and e-mail exchanges that unrealistically inflate communication expectations; and massive archives of online training materials that fail to contextualize software applications for students and teachers in departments of English. But there is very little evidence right now to suggest that computers actually reduce instructional costs in any significant manner, or that they enhance the research and teaching productivity of faculty members (Green and Gilbert; Martin). Indeed, given the intellectual and human dislocations that technology can produce, computers may even be counterproductive in many educational settings.

As might be expected, such a stark reality is not limited to

academic settings. For example, in their review of the literature on business information systems, George Marakas and Daniel Robey cite numerous studies reporting the neutral or negative effects of computers on worker performance. Richard Franke reports declining productivity in the banking industry, which historically has been one of the industries most experienced in using high-tech information systems. And Dennis Hayes, who analyzes the layoffs and injuries associated with using technology in the workplace, concludes that the costs of litigating, treating, retraining, and replacing the computer-injured often remain unaccounted for in standard productivity measures (176). According to William Bowen, "So far productivity [in the United States] has grown more slowly in the computer age than it did before computers came into wide use" (267). For the moment, at least, the payoffs associated with technology seem to accrue more indirectly, as organizations exploit the symbolic dimensions of computers to help them create positive impressions that can produce an economic return on investments (Marakas and Robey).

Technology myths, however, are not the only obstacles to more fruitful literacy practices in a digital age. There are, in addition to these discursive forces, a whole host of pedagogical and institutional impediments that must be dealt with. For example, although the National Council of Teachers of English and the Modern Language Association both have position statements articulating the need to value computer-related work in English departments, such work still remains invisible within far too many tenure and promotion reviews (Rickly; Unsworth). Teachers of writing and communication are often not consulted during the process of designing computer-supported writing environments, and thus these environments frequently fail to align with the pedagogical and programmatic directions of academic programs (Batson; Handa; T. Howard, "Designing"). And teacher education courses, which bear the enormous burden of preparing the next generation of writing and communication instructors, must be expanded in central ways to address the multiple and vexing problems associated with putting

computers in classroom settings (Bernhardt and Vickrey; Selber, Johnson-Eilola, and Selfe; Selfe, "Preparing"). Indeed, a recent survey by Sally Barr Ebest indicates that only 25 percent of the graduate teaching assistants in rhetoric and composition programs have an opportunity to teach writing in a computer-based classroom (68). Moreover, academic-industrial partnerships require considerable attention nowadays, as these partnerships have the potential to commercialize online spaces in ways that are incompatible with the goals of a liberal education. For example, my institution (Penn State) has entered into a large-scale agreement with Microsoft that has had the effect of discouraging important critique of the ongoing commodification of higher education (more on that agreement later).

But this book is not about identifying impediments to better ways of working. Although the obstacles that I have listed should be met head-on and with new approaches, critique alone will not prepare students to involve themselves fully, actively, and successfully in technological contexts. Critique is certainly one crucial aspect of any computer literacy program, for it encourages a cultural awareness of power structures. But students must also be able to use computers effectively as well as participate in the construction and reconstruction of technological systems. What is needed, then, is an approach to computer literacy that is both useful and professionally responsible, a somewhat unusual undertaking considering the binary oppositions so easily found in debates over the appropriate role of educational institutions in society. Some feel that the primary role of schools is to socialize students into the existing ideological order, while others believe that schools should teach various forms of resistance to power and authority. In Burkean terms, educators remain divided over whether education should be a function of society or whether society should be a function of education. However, neither an overemphasis on accommodation practices nor on resistance theories will result in a computer literacy program that is comprehensive, innovative, and relevant. For such a program to come about, a postcritical stance is needed.

Toward a Postcritical Stance

This book adopts a "postcritical" stance toward technology. My use of the term *postcritical* is straightforward and unambiguous and comes from two sources: the scholarship of Stanley Aronowitz on the impact of computers on the lives of working professionals, teachers included; and the scholarship of Patricia Sullivan and James Porter on critical research practices. From Aronowitz I take the pragmatic realization that, for a number of reasons that are culturally and historically determined (e.g., productivity myths, academic-corporate alliances, market demands, significant investments in educational technologies), computers in varying forms are here to stay in instructional contexts, and that the time and energy of teachers is therefore best spent not deploring computers but learning how to use them in ways that align with, and productively challenge, the values of the profession. From Sullivan and Porter I take the notion that any approach to computer literacy should have a "critical consciousness of its position (at least insofar as that is possible)" (42). Which is to say that teachers and students should be mindful of the ways in which they can unwittingly promote inequitable and counterproductive technological practices. Importantly, my use of the term *postcritical* does not consider technology to be a self-determining agent. In rejecting theories claiming that technology alone creates educational change, it locates the potential for such change in a nexus of social forces.

Rationales for a postcritical stance can be found in educational projects encouraging social change, especially in projects reasserting the importance of liberal arts instruction in a digital age, rearticulating the responsibilities of writing and communication teachers, and revealing the inequities perpetuated in officially sanctioned approaches to expanding the technological literacy of American citizens. To begin with, David Orr suggests why it might be important to locate computer literacy within the domain of liberal arts instruction. According to Orr and others concerned about the downsides of living in a technocratic world (e.g., endemic poverty, violence, and environmental decay; dehumanizing workplace practices; the

dizzying pace of everyday life in a technoculture), conventional approaches in scientific and technical disciplines often fail to illuminate the key issues of our time for a number of reasons. Chief among them are the way such approaches tend to decontextualize technological subjects and objects in the classroom, therefore risking "no confrontation with the facts of life in the twenty-first century" (207). Alan Kay, a pioneer of the personal computer, points out a related problem as he critiques various misconceptions about education in technology instruction today, including theories assuming that students are empty vessels waiting to be filled and that school subjects are bitter pills that can be made palatable only by sugar-coating them with multimedia eye-candy ("Computers"). Kay contends that sound pedagogical assumptions need to replace these and the other misconceptions he elucidates before computer technologies can be of real service in classroom situations.

Needless to say, there are consequences associated with such conventional instructional approaches and misconceptions. In the context of computer literacy, for example, computers will be understood primarily in instrumental terms—as systems for supporting status quo, relatively hierarchical student-teacher relationships, or for automating repetitive and routine tasks, or for making difficult texts and concepts ostensibly more interesting to study. Relying on these articulations of technology, students will learn how to download lecture notes from the World Wide Web, register for courses using administrative software applications, run multimedia tutorials, exchange files with classmates over wide-area networks, employ graphics programs to create visual representations for reports and papers, and use personal digital assistants (small hand-held devices) to store—and share, through infrared beams—important e-mail and Website addresses. But although students will develop some extremely useful skills under an instrumental approach, they will have a much more difficult time thinking critically, contextually, and historically about the ways computer technologies are developed and used within our culture and how such use, in turn, intersects with writing and communication practices in the classroom. However, encouraging students to situate technology in broad

terms is the job of humanities teachers, not only because the mission of liberal arts instruction is to develop whole persons capable of making balanced judgments in a technocratic world (Orr) but also because this crucial task is so rarely undertaken explicitly and concretely by the units most often charged with computer literacy initiatives in higher education: academic computing centers; departments of engineering, information science, and technology; and professional development services.

If situating technology broadly is one rationale for a postcritical stance, another is participating in the development and reconfiguration of literacy technologies, to the extent that is possible and desirable. Over the past several years, teachers have begun to question increasingly the perspectives informing the human-computer interface designs that support writing and communication activities. Dennis Hayes, for example, has discussed the Newtonian quests for speed and raw computing power that are driving hardware and software developments and leading to computer designs instantiating the objectives of generating capital and controlling networks and hierarchies of work. Johndan Johnson-Eilola has traced the cultural models influencing interface development practices in online research spaces, arguing that certain cultural tendencies toward valuing information can have the negative effects of technical decontextualization and social fragmentation ("Accumulation"). Cynthia Selfe and Richard Selfe have contended that human-computer interfaces, in certain popular instances, can be read as maps that value "monoculturalism, capitalism, and phallologic thinking" (486). And Sherry Turkle, in discussing the design of computer operating systems, has distinguished the values of simulation from those of calculation organizing visual approaches to interacting with computers (*Life*). But even though teachers have begun to question the perspectives informing human-computer interface designs—perspectives that are "far from immutable" and, in fact, "utterly negotiable" (Hayes 178) on some level—teachers have not always seen the development and reconfiguration of literacy technologies as their job or as the instructional domain of students in writing and communication courses.

Christina Haas and Christine Neuwirth attribute such myopia to the instrumental view of technology so often pervading departments of English. This view, which has been fully articulated and critiqued by Andrew Feenberg and other critical theorists, produces two diametrically opposed perspectives that, ironically, both position technology design as an out-of-bounds activity. In the first perspective, computers are not embraced at all, because what teachers should be focusing on, in a traditional sense, are text-based analyses of written artifacts. Associated with this belief, according to Haas and Neuwirth, is an antitechnology stance, the logic of which often goes something like this: Computers are evil, tools of the devil really, and English professors, as a last bastion of liberal humanism, must resist their encroachment on purer pursuits (326). The second perspective celebrates technology, but only insofar as it can support the more traditional goals of textual studies. So, in this case, for example, English professors use e-mail to exchange manuscripts with colleagues, subscribe to Internet discussion lists to engage in professional conversations about canonized authors, and search scholarly databases to retrieve archived materials. In neither perspective, however, is technology design considered to be the purview of English departments. Instead, an instrumental view allows for only two possible responses to technology: Users either accept or reject it, for technology is simply a neutral tool employed to understand experience and solve problems.

The implications of an instrumental view are entirely unambiguous. As Haas and Neuwirth explain, "other people are redefining reading and writing, while humanists maintain the speculative high ground, remaining above the fray and remote from those actually involved in the process of shaping technology" (326). But to allow others to determine the design of human-computer interfaces is to risk naturalizing a set of literacy perspectives that fails to support the pedagogical practices teachers of writing and communication find most effective and informative (Hansen; Schwartz; Kemp, "Computer-Mediated"). It also endangers the status of writing and communication teachers, which is often already disempoweringly low, especially in colleges and universities organized around

technological imperatives or disciplines. Thus, rearticulating the responsibilities of teachers to include the design of literacy technologies is an essential task if the profession hopes to remain relevant pedagogically and to influence the computer interfaces shaping how students think about, and engage in, discourse-related activities online.

But the effects of technology design are not limited to redefinitions of writing and reading. Indeed, these effects, when considered in the context of race, class, and gender, can have a much deeper implication, one that indicates just how important adopting a postcritical stance can be. As the instrumental view suggests, computers can contribute not only to projects encouraging social change but also to those merely reproducing the dominant cultural values. In this way, computers are malleable in that they unevenly develop along particular axes of interest, depending on the tendential forces molding their shape and use. As Feenberg notes, computers can "evolve into very different technologies in the framework of strategies of domination or democratization" (91). Too often, however, computer technologies are aligned with competitive and oppressive formations that tend to shore up rather than address existing social inequities, despite what computer industry marketing hype would lead students and teachers to believe.

In an important case study of the Technology Literacy Challenge begun in 1996 by the Clinton administration, Cynthia Selfe analyzes how federally sponsored literacy programs—if teachers fail to pay attention to them—can actually contribute to the ongoing problems of racism, sexism, poverty, and illiteracy in the United States, notwithstanding the fact that such programs are often explicitly founded to expand the economic and educational opportunities of all citizens (*Technology*). In her analysis, Selfe reveals how a narrow definition of literacy, one that fails to encourage a situated view of technology, has been motivated, at least in part, by an interrelated set of "cultural forces that serve both political and economic ends" (xx), which are often antithetical to the social goals of providing equal access to technology or using technology to encourage democratic activities and enrich instructional experiences. Among

the conserving forces discouraging change, Selfe includes government initiatives safeguarding the success of American industrial and political efforts on both a national and international scale, private sector businesses creating an ongoing demand for their own computer products, and parents hoping to prepare their children functionally for an increasingly technological world by purchasing these products for the home.

In this list of conserving forces, however, Selfe also counts teachers of writing and communication, who tend to construct belief systems about technology that relegate its concerns to the background of professional life. Like Haas and Neuwirth, Selfe identifies a disturbing conflict in values between liberal humanism and technology. Such a conflict, she notes, allows teachers to deal with computers on their own terms, that is, when computers serve obvious or self-interested purposes. But this conflict also allows teachers to ignore computers when they become a source of discomfort or annoyance, for example, when computers seem threatening to what Catherine Belsey (*Critical*) would call our "common-sense" practices—those taken-for-granted ways of operating as teacher-researchers in educational environments (e.g., publishing in print-based forums, authoring and owning texts in a romantic sense, positioning ourselves as the sole source of expertise and authority in the classroom). Yet taking such an indecisive position is actually highly irresponsible, as Selfe so persuasively argues, for it is precisely when teachers ignore technology and its contexts that the real pedagogical and social damage is likely to be done.

In sum, if teachers fail to adopt a postcritical stance, thus leaving technology design and education to those outside of the field, it is entirely probable that students will have a much more difficult time understanding computers in critical, contextual, and historical ways; that technology designs, informed by pedagogical and cultural values not our own, will define and redefine literacy practices in ways that are less than desirable; and that computer literacy initiatives will simply serve to perpetuate rather than alleviate existing social inequities. This is not to say that humanists alone can radically alter or change the status quo or, for that matter, that all

technologists necessarily eschew social issues. Rather, the point is that a wide variety of perspectives is needed in educational settings if students are going to be prepared both usefully and responsibly for writing and communication activities in a digital age. As Selfe so aptly puts it, "Literacy alone is no longer our business. Literacy and technology are. Or so they must become" (*Technology* 3).

Clarifying the Problems and Challenges Ahead

To this point, I have discussed in fairly broad terms some of the problems and challenges existing in technology education, including obstacles to more productive literacy practices and the consequences of failing to adopt a postcritical stance toward technology. This discussion has used words like one-dimensional, instrumental, and decontextual to characterize approaches to computer literacy that teachers of writing and communication would find impoverished. Such broad characterizations, however, can lack a real sense of clarity for most of us unless they are illustrated in a very concrete manner. Thus, in this segment, let me offer an analysis of the type of reductiveness that I am talking about, one that is too typical of the way computer literacy issues have been addressed by colleges and universities. The example comes from Florida State University, but many other universities could have provided similar illustrations. This example helps to clarify problems and challenges, and it points to the directions in which teachers of writing and communication should be headed in the area of computer literacy.

Colleges and universities are beginning to embrace requirements for computer literacy, as employers and academic accrediting agencies strongly urge upper-level administrators to do so. Although there are no comprehensive statistics on the number of institutions with computer literacy requirements, a rapidly growing number of schools have adopted computer requirements of one form or another. The Southern Association of Colleges and Schools, for example, encourages institutions of higher education in the south to require all students to become computer literate before graduation. Responding to this encouragement, at least two schools

in the association have adopted specific computer literacy requirements. Houston Baptist University requires all students to become familiar with the Windows operating system and Microsoft Office, which includes standard word-processing, spreadsheet, and database programs. And at Georgetown College in Kentucky, incoming students take an assessment test to determine their level of computer expertise. Depending on the results of this test, students are advised to review specific technology areas using online instructional materials or take an introductory course in computer science. Computer literacy requirements have also been instituted at the University of Texas at Arlington, Old Dominion University, the University of the Virgin Islands, Marshall University, Utah State University, the University of Louisville, Westminster College, and many other places.

Florida State University is typical in the way it defines computer literacy: Since 1998, Florida State has had a clearly articulated policy requiring all undergraduate students to demonstrate basic familiarity with computer hardware, operating systems, and file concepts; a working knowledge of a word processor, spreadsheet, and database program; and an ability to use the Web and e-mail (see <http://lit.cs.fsu.edu>). These requirements are matched by similar requirements at other schools. One way students at Florida State can demonstrate competency is by passing an approved course. Students typically enroll in either Computer General Studies 2060 or CGS 2100, which are offered in the computer science department and described on its Website:

> CGS 2060: Computer Literacy. An introduction to information processing and computer applications. Hands-on experience with microcomputer applications such as word processors, spreadsheets, and database managers.
>
> CGS 2100: Microcomputer Applications for Business and Economics. Course enables students in business and economics to become proficient with microcomputer hardware and software applications that are typically used in

the workplace. The following topics are covered: hardware concepts, operating systems, word processing, spreadsheets, databases, networks, Internet, World Wide Web, multimedia presentations and information systems.

Besides passing one of these courses, students can demonstrate computer competency by passing a university-sponsored test. This test is offered on a regular basis and takes approximately 2.5 hours to complete. There are four parts to the test, three of which are hands-on and one of which is multiple choice. To prepare for the test, students are encouraged to bone up on basic computer concepts and Microsoft Office. In addition, they are encouraged to make use of a university-provided study guide, which outlines very specifically what students are expected to know and do. To illustrate the nature of the test, I reproduce the first three parts of the study guide below; the part not reproduced models Part 3 on Microsoft Word but focuses on Microsoft Excel and Microsoft Access.

Part 1, Multiple choice exam (on-line): Computer Concepts [50 points]. Students should have a text-book understanding of the following concepts and terms (as discussed in the latest edition of *New Perspectives on Computer Concepts* by June Parsons and Dan Oja).

Chapter 1: Computer, Central Processing Unit (CPU), Memory, Storage, Personal Digital Assistant (PDA), Server, Peripheral Device, Data & Information, Bit & Byte, Platform, Internet, Chat Groups, Instant Messaging, P2P, Dial-Up Connection, Cable Modem, DSL, DSS, ISP, Password Do's and Don'ts, Hypertext, URL, HTML, Browser, Search Engine, Netiquette, POP, IMAP, Web-Based E-mail, The Boot Process.

Chapter 2: Digital Device, Analog Device, Binary Number System, Kilobyte, Megabyte, Gigabyte, Motherboard, Microprocessor, ALU, Control Unit, Registers, Megahertz,

Gigahertz, Cache, RAM, ROM, Magnetic Storage, Optical Storage, Capacity (Floppy Disk, Zip Disk, CD, DVD), CD-ROM, CD-RW, PC Card, LCD, Resolution.

Chapter 3: Computer Program, Computer Language, Application Software, System Software, Operating System, Document Production Software, Spreadsheet Software, What-If Analyses, Data Management Software, Presentation Software, MP3, Groupware, System Requirements, Zipped, Software License, Shrink-Wrap License, Shareware.

Chapter 4: Filename Extension, File Specification, Defragmentation Utility, Computer Virus, Macro Virus, Worm, Denial of Service Attacks, Antivirus Software, Virus Hoaxes, CD-R, Zip Disk, Floppy Disk, Removable Hard Disk, MP3 Filename Extension.

Chapter 5: Communications Network, Twisted Pair, Coaxial, Fiber Optic, Bandwidth, Packet, Protocol, Intranet, Local Area Network, Wireless Network, Peer-to-Peer Network, Client/Server Network, TCP/IP, IP Address, Top-Level Domain, Modem, Cable Modem, DSL, Personal Firewall Software.

Chapter 6: HTML Tags, HTTP, Cookie, XML, Java Applets, Digital Certificate, E-Commerce, B2B, B2C, Electronic Wallet, Encryption.

Part 2, Hands-on Exam: Operating System/File Management and The Web [50 points]. Using the Windows 2000 user interface the student shall be able to: View drive and directory (folder) contents; Create directories (folders); Start applications; Create and save files to specific drive and directory locations; Run multiple applications; Minimize and maximize windows; Close applications; Delete

and rename files; Move and copy files between hard drives and floppy drives.

Using Internet Explorer or Netscape the student shall be able to: Find a Web site from a given URL; Use WebLUIS to search the FSU databases on a given keyword; Use an Internet search engine to research a given topic; See if a given book title can be found in the FSU library; Check a class schedule on the Web; Save a webpage to disk.

Part 3, Hands-on Exam: Microsoft Word [100 points]. Our Microsoft Word 2002 Skills Exam is taken using Skills Assessment Manager (SAM). SAMxp tests a student's applications skills within the application itself. On this particular exam the students will be asked to carry out the following tasks in Word 2002: Insert text; Cut and paste text; Copy and paste text; Use Paste Special; Move text; Find and replace text; Use AutoCorrect; Insert symbols; Applying character formats; Modifying character formats; Check spelling; Use the Thesaurus; Check grammar; Apply the superscript font effect; Apply the subscript font effect; Apply an animation text effect; Highlight text; Use Format Painter; Insert a date; Modify a date field; Insert a date field; Apply a character style; Change paragraph line spacing; Apply a paragraph border; Apply shading to paragraphs; Indent paragraphs; Set Center tabs; Modify tabs; Add bullets; Add numbering; Create an outline; Apply paragraph styles; Create a document header; Modify a document header; Create a document footer; Modify a document footer; Apply columns; Modify text alignment in columns; Revise column layout; Insert page breaks; Insert page numbers; Modify page margins; Change the page orientation; Create tables; Modify tables; Apply AutoFormats to tables; Modify table borders; Shade table cells; Insert rows in a table; Delete table rows; Insert columns in a table; Delete table columns; Modify cell formats; Use print preview;

Print documents; Print envelopes; Print labels; Create folders for document storage; Create a document from a template; Save a document; Use Save As; Add images to a document.

Students scoring at least 210 points (or 70%) on this 300-point test are "declared Computer Competent." But what does such a declaration really mean? After fulfilling the requirement, what will students know about computers and, just as importantly, what will remain a mystery to them, especially when it comes to using computers for writing and communication purposes?

On a practical level, the answer is that students will undoubtedly know a great deal. They will know, for example, how to manage files and certain aspects of computer interfaces (e.g., how to organize and backup work in a variety of ways; toggle between multiple application spaces; make the most efficient use of screen real-estate); they will know how to participate in online course activities (e.g., how to exchange asynchronous messages; circulate drafts over wide-area networks; search scholarly databases); they will know how to control document structures (e.g., how to create and manipulate layout elements; integrate verbal and visual texts; generate graphics from data sets). For what it is worth, they will also understand the ways in which certain generic components of a computer work, knowledge that could aid them in troubleshooting technical problems. In many instances, students will actually know more than their teachers about operating computers, a conclusion supported by a University of California, Los Angeles survey. According to this survey, which was conducted by the Higher Education Research Institute at UCLA's Graduate School of Education and Information Studies, staying up-to-date with technology affects more professors than traditional stresses such as publishing demands and teaching loads. Of the 33,785 faculty members surveyed at 378 colleges and universities, 67 percent fear the task of keeping current with technology, even though 87 percent agree that computers enhance student learning (*The American College Teacher*). In a similar study done by the Campus Computing Project, nearly 40 percent of

academic-computing officials at 557 colleges and universities cited helping faculty bring technology to the classroom as their number one challenge, despite vexing Y2K and e-commerce issues (*The 1999 National Survey of Information Technology in Higher Education*). According to Kenneth Green, founder and director of the Campus Computing Project, "It's fair to say that many faculty members have ceded to their students the whole issue of technology skills" (qtd. in Olsen).

But if, on the one hand, the computer competency requirement at Florida State promotes skills for working productively in practical terms, on the other hand, it fails to offer the perspectives needed for making rhetorical judgments. And although teachers may tend to lag behind students in the whole area of computer skills, when it comes to rhetoric the expertise of teachers is undeniably crucial. The requirement neglects important topics such as developing file-naming schemes that can be searched meaningfully; writing effective e-mail messages; participating appropriately in asynchronous discussions; analyzing the currency, authority, and reliability of Website content; and generating visual images that represent data relationships accurately and convincingly—among other things. The requirement not only bypasses such writing and communication concerns, however; it also fails to situate technology in social, political, and economic contexts, thus ignoring the implications of technology as well as the tendential forces helping to shape it. In this way, the requirement perpetuates the false assumption that the relationship between a technology and its construction and implementation is natural and not conventional.

In its practical orientation, the computer competency requirement at Florida State is not unusual. Indeed, at Old Dominion University, for example, the Student Technical Skill Requirement emphasizes using e-mail, the Web, and a word-processing program, but not critically analyzing these uses and their contexts. At my own institution, instrumental perspectives inflect the curriculum in a new School of Information Science and Technology. This school, which began matriculating students during the 1999–2000 academic year, has a laudable goal: to teach the use and application of

information technologies and the social, cultural, and ethical implications that surround them. But on some level, the course requirements belie this goal, as students can largely avoid taking classes that contextualize computer technologies. In my estimation, this school should invert its approach in a way that brings social and technical learning together. That is, as opposed to consolidating the classes focusing on society and social policy in an optional track, these classes should constitute the required core, as opposed to courses in the organization of data, networking, telecommunications, logic and discrete mathematics, and programming. After building a social foundation, students could pursue technical interests or focus further on the implications of information technologies. Paradoxically, such a socially based curriculum would not only foreground humanistic concerns, but also provide the perspectives needed for successful technical practice: Case studies have shown repeatedly that useful computer products accommodate the contexts in which they are used (see Barrett; Wiklund; Winograd, *Bringing*).

That computer requirements and initiatives are often primarily skills-based should not be surprising, for behind them are employers and academic accrediting agencies influenced by corporate interests. For example, the new School of Information Science and Technology at Penn State was explicitly founded to address a shortage of high-tech professionals in the Pennsylvania private sector: Input and support in the development of the school have come from over twenty-five corporate sponsors, including AT&T, IBM, Lockheed Martin, Lucent, and Microsoft. In the same way, the computer competency requirement at Florida State has been rationalized along corporate lines. In an interview on National Public Radio, Ken Baldauf, the computer literacy czar at Florida State, declared that the goal of this requirement is to develop in students "the application skills that businesses are looking for." Although students could, in theory, take an approved course in the English department that complicates and expands on such a goal, the department does not offer one. In fact, when I contacted Wendy Bishop, a professor of rhetoric and composition at Florida State, about her university's

computer literacy requirement, she was unaware of it. For this lack of awareness, the English department and Bishop should not be condemned. Rather, this situation merely illustrates the fact that faculty in English departments are rarely (if ever) consulted in institutional matters of computer literacy.

The examples analyzed in this section were not arbitrary or convenient choices. Both implicitly and explicitly they collectively lay bare many of the problems and challenges existing in technology education and in doing so make it evident that teachers of writing and communication need to cultivate approaches to computer literacy that are more useful and professionally responsible. It is clear from the examples, for instance, that computer literacy programs can take a rather monolithic and one-dimensional approach, ignoring the fact that computer technologies are embedded in a wide range of constitutive contexts, as well as entangled in value systems. And while computer literacy programs cannot and should not avoid practical issues, they can take a rather shortsighted approach that narrowly ties instruction to specific software features that will undoubtedly change with time. This state of affairs is even more disturbing when one considers the revolutionary rhetoric accompanying it, for the examples also call attention to the fact that technology is so often used uncreatively and conservatively. Although there is nothing inherently wrong with institutionally driven programs, computer literacy is an area that will remain impoverished as long as its parameters are defined and understood primarily in technical terms or in terms that are dictated by the private sector.

A Portrait of the Ideal Multiliterate Student

Despite numerous attempts to standardize computer literacy in educational settings, there is no one perfect approach. As with any form of literacy, computer practices do not travel seamlessly or unproblematically across contexts, cultures, and communities. In light of this reality, the key is for teachers to develop a disciplinary approach that is not too prescriptive, one that is generative and directive while acknowledging the fact that every specific instructional

situation may very well call for a unique solution, or at least one that accounts for local social forces and material conditions. For teachers of writing and communication who work in departments of English, the primary audience for this book, such a challenge can be a source of considerable confusion and apprehension. But it does not have to be so.

This book provides the framework for such an approach. That framework should not be construed as definitive or exhaustive, but rather as part of a larger, ongoing conversation about the special responsibilities of humanities teachers in a digital age. The specific contribution I make here, however, is not always in strict agreement with the current consensus within this conversation, and in fact has been motivated by at least two tendencies that have inhibited the progress of positive change. The first is a tendency to rely too heavily on one-way literacy models as a foundation for computer initiatives. That is, many teachers of writing and communication simply transfer wholesale to the screen their existing assumptions, goals, and practices. Although it is sensible and helpful to begin with current ways of knowing and working, such a model is ultimately limiting because it is non-dialogic: Not only does the model assume that technology is neutral, but it fails to recognize that technology can encourage teachers to reconsider taken-for-granted assumptions, goals, and practices.

The second thing that worries me is theory reductiveness, which has to do with how the profession tends to treat successive theories of computer literacy. It is not inaccurate to say that newer approaches have commonly driven out older ones. This is neither always nor automatically a problem, and in a sense one hallmark of a vibrant discipline is discernible shifts in the intellectual paradigms that animate its knowledge. More than occasionally, however, the theories that get expelled are useful, if imperfect. For example, many teachers have eschewed functional literacy for more critical approaches, a move that serves as a much-needed corrective to programs that focus on isolated features of software programs. But such a move does not change the fact that students must still learn effective ways to interact with computers and with those who are

online. A better approach, then, would be more additive than substitutive: Students need both functional and critical literacies (although to be sure functional literacy as it has been traditionally mapped out is impoverished and dangerous and, for that reason, must be reimagined).

This all leads me to the framing concept for this book: multiliteracies. My view is that teachers should emphasize different kinds of computer literacies and help students become skilled at moving among them in strategic ways. The three literacy categories that organize my discussion—functional, critical, and rhetorical—are meant to be suggestive rather than restrictive, and more complimentary than in competition with each other. In other words, I do not provide a taxonomy that prioritizes theory over practice or vice-versa, or that must be rigidly adhered to in some abstract fashion. Instead, the macro-level framework of functional literacy, critical literacy, and rhetorical literacy, along with the many micro-level frameworks that can be found in individual chapters, function as heuristics that can help students assess the perspectives and practices that might be needed in any particular situation. If my approach is necessarily contextual in character, however, there is one sweeping statement I am prepared to make: Students who are not adequately exposed to all three literacy categories will find it difficult to participate fully and meaningfully in technological activities.

Table 1.1 conceptualizes the literacy landscape that students should be able to navigate. Each category has a metaphor, subject position, and objective, all of which help to characterize the nature and scope of a computer literacy program that focuses on multiple literacies. For example, the functional category is organized by a tool metaphor that stresses effective computer use, the critical category is organized by an artifactual metaphor that stresses informed critique, and the rhetorical category is organized by a hypertextual metaphor that stresses reflective praxis. No one metaphor could be complete and sufficient by itself, but collectively they offer a diversity of perspectives that have become associated with computer technologies. The goal is to help students both understand the ways in which all three metaphors filter experience and become adept at

Table 1.1
The Conceptual Landscape of a Computer Multiliteracies Program

Category	Metaphor	Subject Position	Objective
Functional Literacy	computers as tools	students as users of technology	effective employment
Critical Literacy	computers as cultural artifacts	students as questioners of technology	informed critique
Rhetorical Literacy	computers as hypertextual media	students as producers of technology	reflective praxis

using them at various times and in various combinations. Likewise, there are three subject positions connected to the literacy landscape: students as users of technology, students as questioners of technology, and students as producers of technology. Again, the goal is not to endorse one over another, but to help students learn to exploit the different subjectivities that have become associated with computer technologies. Although the rhetorical category mediates the binary division between functional and critical literacies to some extent—rhetorical activities like Web design demand both effective computer use and informed critique—I do not necessarily place a higher value on it: There will be times when an attention to functional or critical concerns should be paramount. A curricular implication of this relationship, however, is that rhetorical literacy might prove to be a particularly challenging place to start. In fact, one of the larger questions for teachers will be how to scaffold instructional activities that illuminate the relationships and interdependencies between these multiple literacies.

The objective of this book is not to focus primarily on what is

wrong with computer literacy programs today. My feeling is that the profession has already done an excellent and careful job of pointing out problems: Most programs overemphasize technology in one way or another, fail to acknowledge its design biases, which are unavoidable, and fail to acknowledge the tendential forces shaping both technology development and use. To put it another way, the approaches to most computer literacy programs are far too decontextualized. Although technology critique should be an important and ongoing contribution of scholars and teachers practicing in the humanities, the profession also has an obligation to formulate better alternatives, to offer approaches and practices that are more responsible, broad-based, and productive.

Toward that end, this book offers more than a single assignment or syllabus. The framework I provide is illustrated with numerous examples and activities, but it signifies a larger-scale attempt to conceptualize computer literacy. Moreover, the framework represents a totality without being totalizing. This is a crucial point to keep in mind, because the main problem with so many formalized programs is that they put forward a universal approach to computer literacy that disregards the continuous and contingent interplay between context and technology. The other point that should be made is that the framework is not neutral: The very notion that it is workable relies on the idea that inclusiveness is good and that theory and practice should inform each other. It is likely that some in the profession would reject these premises.

The heart of the book lays out and develops a conceptual apparatus that can help teachers imagine the contours of a computer multiliteracies program. There are some patterns that can be found throughout chapters 2, 3, and 4. For example, each chapter discusses the elements listed in table 1.1 as well as includes heuristics to suggest ways of putting into practice the concepts and approaches that have been suggested. If there are discernible patterns throughout the core chapters, however, they are not exactly parallel. For example, I review the literature when it comes to functional and critical literacies because these areas have well-established disciplinary narratives that cannot be ignored. But, in the context of

technology education, the narrative for rhetorical literacy is more nascent than the others. While I have no doubt that many teachers take a rhetorical approach, there is still much to be done to conceptualize the praxis required to help students become reflective producers of technology. For this reason, the discussion of rhetorical literacy looks ahead more than it looks back. Another variation can be found in the level of concreteness across arguments. I have done my best to provide examples that clearly illustrate key points, but sometimes being too specific can be counterproductive, especially if an example limits the imagination or the development of a concept. So I do not flesh out every single heuristic into a fully realized, complex assignment. Nevertheless, I have tried to use heuristics and examples that provide more than enough explanatory power to be useful.

Each chapter in the heart of the book has a distinct purpose. Chapter 2 tries to recover the concept of functional literacy in a way that speaks to scholars and teachers in the humanities. I am quite sensitive to the fact that the vast majority of functional approaches are not only overly simplistic but also downright harmful. Critics are right to condemn perspectives that understand literacy as a set of value-free skills that can be defined, learned, and measured in absolute terms and whose main purpose is to serve economic development. Such perspectives ignore the inextricable ties among literacy, power, culture, and context and as a result promote approaches to computer literacy based on mastery of technique. But there is no reason why functional literacy, which offers certain kinds of important access to a culture, cannot be reconceived in a more positive way as well as articulated with other types of literacies. Which is to say that functional literacy need not be disempowering and that functional and critical literacies need not be mutually exclusive.

The purposes of the next two chapters are less polemical and more conventional. The purpose of chapter 3 is to provide a specific and coherent framework for a critical literacy of computers. One valid concern raised in the literature on critical literacy is that its theory is often vague or difficult to apply. What does it really mean

for a student to become critically literate in a digital age? There is no one right answer to this question, nor should there be, but the profession must provide responses that are concrete, comprehensive, and capable of being implemented. Chapter 3 offers such a response, one that gives students a metadiscourse they can use in order to identify and respond to the politics of technologies. The purpose of chapter 4 is similar in that it provides a specific and coherent framework for a rhetorical literacy of computers, which focuses on interface design and its intersections with certain broad areas of interest to the profession. Interface design is often considered to be a technical rather than rhetorical endeavor, but I contend in this chapter that interface design problems are more like writing than programming problems and that although all projects have technical aspects, mathematical and scientific formalisms are inadequate in design situations that involve social concerns and interactions. My hope is that chapter 4 will give teachers the background and confidence they need to begin exploring the design of twenty-first-century texts that defy the established purview of English departments.

Chapter 5 attempts to help teachers develop a full-scale program that integrates functional literacy, critical literacy, and rhetorical literacy in ways that are useful and professionally responsible. Change does not magically take care of itself, nor is the path to meaningful change ever straightforward or unfettered, especially in educational settings. Indeed, the whole area of technology will require attention, but this is not the only area. From there, the requirements spiral outward to encompass pedagogical, curricular, departmental, and institutional contexts. This assemblage of nested contexts implicates an increasingly broad set of forces and encourages a systemic perspective on change, because no single context can be understood in isolation from the others. An important conceptual point in chapter 5 is that the tripartite framework of functional literacy, critical literacy, and rhetorical literacy is fractal-like in that it can be applied in ever smaller scales to the curricular components of academic programs. This extensibility should help teachers envision and establish tightly integrated initiatives.

There will never be a final word on computer literacy: Technology and its constitutive contexts are dynamic, contingent, and negotiable by nature. But that does not mean teachers must work in an ad hoc fashion with little to no direction or structure. My goal is to provide at least some direction and structure for teachers of writing and communication who work in departments of English.