Computers, Technology, and Literacies
Paul Cesarini

INTRODUCTION

Ten years ago, Myron Tuman wrote *Word Perfect: Literacy in the Computer Age*, a landmark text about the then-current state of technology literacy and the impact of computer-mediated learning on pedagogy. In it, Tuman (1992) writes that

> looking forward from a world of print, we are still able to see the importance of a critical edge in avoiding too ready and too easy an accommodation with what seems to be an increasingly market-driven world. Even the most ardent fans of computer technology must have some misgivings in the face of the onslaught of sensory images, many commercially motivated, about to invade the hitherto abstract, private space of reading and writing. (p. 138)

Ten years later, I believe we are living amidst the very onslaught of computer technologies Tuman predicted. We are collectively being blasted with banner ads on the web and saturated with spam in our electronic mail boxes. We are being systematically locked out of accessing electronic content that was previously open and freely available, and are systematically being corralled into a Babylon of proprietary file formats and technologies to access and create text, audio, and video.

The purpose of this article is to plot out key points in the history of technology literacy, analyze overlapping definitions of the term, and forecast a potential path for the near future.

DEFINITIONS, PLEASE

How do we define "literacy"? How do we define "computer literacy"? Is "computer literacy" synonymous with "technology literacy"? What about "information literacy" or "technology competency"? How has rhetoric and composition defined these terms? Have the definitions evolved? These are all questions that would likely be answered differently by those in other disciplines. I will address some of these competing definitions but focus primarily on traditional notions of computer literacy within the rhetoric and composition discipline.

In "Stop Saying 'Computer Literacy!'" Harvey (1983) aptly points out how much of the controversy over stipulative definitions of such terms is the direct result of the word "literacy" itself being so infused with meaning. He calls the term "a magic word, which conjures up a very strong metaphor." Harvey stresses that literacy "in its original sense, knowing how to read, really is universally required in our society. Any educator who suggested eliminating reading from the curriculum would be laughed at, if not tarred and feathered. Merely to say the phrase 'computer literacy' definitively answers a question which has not been explicitly asked."

As Brandt (1996) points out, there are no easy answers, no easy definitions, for literacy. She states that "how to define and measure literacy in any given period has been a thorny methodological question" (p. 393). The Ongian notion of literacy attempts to frame it around a "great divide" between print-based literacy, which he views as inherently more objective and interiorized, and orality, which he asserts follows a more situational, externalized path. Ong's views, however, clash with those of Freire, Selfe, and others in that he tends to view literacy as a "technological skill rather than as a cultural practice conditioned by ideology, power, and social practice" (Brandt, 1996, pp. 392-3).

For years, traditional notions of information literacy and technology literacy have taken distinct forms, which play important roles in higher education. Information literacy has been the central focus of many libraries. In *Information Literacy Competency Standards for Higher Education*, the Association of College & Research Libraries (2003) defines information literacy as "a set of abilities requiring individuals to recognize when information is needed and have the ability to locate, evaluate, and use effectively the information needed." It further defines computer and/or technology literacy as "rote learning of specific hardware and software applications." Additional terms, as defined by groups such as the Commission on Colleges, the American Library Association, and the Commission on Learning Resources and Instructional Technology (CLRIT), include "information competence," "fluency with technology," "media literacy," and "computer literacy." These terms are largely used synonymously with either the above-mentioned definitions of information literacy or technology literacy within these fields.

The Clinton-era Technology Literacy Challenge made a decent attempt at creating a broadly agreeable definition of "technology literacy," which of course is no small task. This initiative equates it again with computer skills and "the ability to use computers and other technology to improve learning, productivity, and performance" (U. S. Department of Education, 1996, p. 5). Placing the phrase "improve learning" side by side with more mechanical, job-oriented terms like "productivity" and "performance" is an admirable attempt at suggesting technology literacy is a multi-literacy, rather than a simple skill to get more people back to work. However, since "improve learning" can be stipulatively defined so differently, by so many different groups, with many different agendas, I am not certain the term has any real meaning beyond being a feel-good, glittering generality of sorts.

The discipline of rhetoric and composition defines these terms much differently, and yet much in the same way. Selfe's well-timed *Technology and Literacy in the Twenty-First Century: The Importance of Paying Attention* (1999) initially focuses on establishing a broad, somewhat open-ended definition of the term. Selfe distances herself quite a bit from defining the term as a mere "computer literacy," and rightly so. Instead, she defines technology literacy as

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. . . . 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. (Selfe, 1999, p. 11)

Selfe's idea of essentially marrying context and technology literacy is extremely important. On one hand, it still acknowledges that application-specific training is necessary; on the other hand, it stresses that this training is not and cannot be the sole goal of technology literacy. Mayers and Swafford (1998) argue essentially the same perspective as Selfe in *Reading the Networks of Power* when they ask why literacy and education continue to be mistakenly represented as tools designed primarily to appease the "demands of the economy" (Selfe, 1999, p. 152). Selfe advocates technology literacy as having critical social and cultural components, if not responsibilities, to both trainer and trainee, both teacher and student. As such, Selfe's definition also implies less of a top-down approach to literacy (or, in this case, technology literacy) and more of a bottom-up method.

These concepts naturally fit in with earlier notions of literacy, as espoused by Freire and others. His pivotal text from 1970, *Pedagogy of the Oppressed*, has influenced numerous scholars and espouses a critical literacy not unlike the Selfe's ideal for technology literacy. The context of the two literacies is of course very much different, since Freire's work focused on educating peasants in Central America and Africa against ideologies often dictated by dictatorial regimes. The Kairos of the two literacies remains very similar, however, as both stress social and cultural context. Both stress empowerment and situatedness, or reading and understanding the world primarily by way of "reading the word". Both literacies equate a lack of critical consciousness and critical awareness with *de facto* illiteracy. Of course, Selfe's ideas necessarily focus on Ong's "secondary orality" literacy (that is, electronic media, hypertext, etc.), while Freire's focus more on traditional literacy.

Yet technology literacy still has its roots in traditional literacy and the essentially "hard-copy" conventions associated with traditional notions of literacy. Despite the fragmented, often nonlinear nature of electronic texts, they still largely have their basis in hard copy. For example, numerous online articles are still broken down into virtual "pages." This is done not so much out of necessity, as with non-electronic texts, but rather out of convenience. It's simply more convenient to click a link to the next page, however artificial a construct it may be, than to scroll downward vertically for the equivalent of several pages. So, although the reason for keeping this convention ultimately differs from that of traditional texts, the end result is similar.

Bolter (2001) parallels this notion in *Writing Space: Computers, Hypertext, and the Remediation of Print*. He argues that the conventions associated with hard copy--that is, with print--still ultimately dictate many of the textual qualities associated with computers, despite the steady drive away from hard copy toward electronic copy. He states that

> some groups . . . are already transferring their allegiance from the printed page to the computer screen. They think of the computer as their primary medium, and print as a secondary or specialized one. If our culture as a whole follows their lead, we may come to associate with text the qualities of the computer (flexibility, interactivity, speed of distribution) rather than those of print (stability and authority). (p. 3)

IN THE BEGINNING

The most fundamental problem of detailing the relationship between computers and literacy --and computer-mediated learning, in general-- perhaps lies in establishing a starting point. That is, where do we begin? Was there a single, watershed moment that first grafted information technology onto the writing process? Or was there a series of smaller, cumulative events that collectively formed the gestalt and shaped the electronic writing classroom as we currently experience it? Arguments can be made either way, of course.

It's somewhat easy to argue, say, that without CBS successfully using UNIVAC to predict Eisenhower's election, Kuhn writing his landmark text, *The Structure of Scientific Revolutions*, or Engelbart, Bush, and Berners-Lee developing what are generally considered to be some of the first hypertext systems (Wilferth & Cesarini, 1998), businesses and education institutions might not have opted to use the then-primitive information technologies available to execute similar tasks, and that the combined effect of not using computers in business and industry would have led to a stunted evolution of these these and other technologies. This stunted evolution, in turn, would naturally have had a negative impact on computer-mediated learning as a whole and would have potentially delayed newer accomplishments in technology such as online discussion boards, instant messaging, and so on.

From a purely technical stance, the single most important moment in the history of the Internet and by default computers and composition may have also been one of the dullest, and least reported. Specifically, I am referring to 1983, when the ARPANET/Internet switched from the Network Control Protocol (NCP) to the Transmission Control Protocol and Internet Protocol (TCP/IP). Since then, TCP/IP has been the standard networking protocol--that is, the standard language computers use to speak to each other--for essentially the entire Internet, allowing for previously unimagined scalability and growth. TCP/IP was a "key transition that paved the way for today's Internet" (Jaffe, 2002, para. 8). By comparison, NCP was primitive and primarily suited only for small-scale network clusters. At the time, fewer than 1000 computers were

connected to this network. Without this migration over to TCP/IP, there is little doubt that the worldwide explosion of web pages, domains, and electronic content and sources would not be available today.

Admittedly, the slightest hiccup in our collective technological history would have also had broad "ripple effects" on numerous academic and nonacademic fields. Determining the precise implications is not possible. However, rather than play a game of "What if?" in terms of picking or ranking such events to determine a starting point, I will instead pick a thematic starting point: the transition from computer-assisted instruction (CAI) to computer- mediated communication (CMC).

The 1960s and 1970s ushered in the era of CAI, with so-called "drill and skill," utilitarian learning tools like Epistle and Writer's Workbench. Numerous technical advances occurred during those decades, as well, that allowed for more flexible uses of technology than previously considered. For the first time, there were personal computers such as the Apple I and IBM PC, removable media (in the somewhat unwieldy form of 5.25" floppy disks), operating systems, and programs that individual end users could purchase and install without the need of advanced engineering degrees. Admittedly, these personal computers were more than a little impersonal, with cryptic command-line interfaces, primitive graphics, and even more primitive printing. Still, it was a beginning.   During this time, Hugh Burns wrote the TOPOI program, which acted almost as a Turing test of sorts, but with the goal of prompting invention and topic exploration for writers (Wilferth & Cesarini, 1998).

The 1980s and beyond were perhaps more fundamentally relevant to computers and composition--as well as more fundamentally interesting--as a series of rapid-fire technological advances led to breakthrough evolutions in computers. For the first time, Graphic User Interfaces (GUIs) took over from traditional command-line interfaces. Students could now use mice to point and click icons, launch programs, and select and edit text. Apple Computer's Mac OS and Microsoft's Windows dominated, though other operating systems such as GEOS were also available. Ethernet, Local Area Networks (LANs), and other connectivity and communication standards we now take for granted were all developed. The Xerox Palo Alto Research Center (PARC) served as a focal point for inventing and developing these technologies. Many of those who worked there, such as Adobe CEO John Warnock, went on to develop additional standards such as PostScript, and laser printers (Cringely & Sen, 1995).

Due in part to these advances, interest in computer-mediated learning dramatically increased. Kathleen Kiefer and Cynthia Selfe launched *Computers and Composition* while the National Council for Teachers in English published *The Computer in Composition Instruction: A Writer's Tool*. Bill Atkinson's Hypercard, the first mass-produced, consumer-oriented tool for creating and distributing self-contained hypertext documents (or "stacks," as they were then

known) was released. Enthusiasm over computers and related technologies as tools for enhanced composition instruction seemed pervasive.

During the 1980s and into the early 1990s, this enthusiasm shifted away from CAI and towards CMC. That is, computers were starting to be looked at not merely as skill-and-drill tools, not merely as the electronic successor to the typewriter, but as tools for enhanced communication and learning. This notion is enhanced by the first graphical web browsers stuch as Mosaic appearing and being made freely available to educational institutions. Suddenly, teachers, students, and end-users in general were learning HyperText Markup Language (HTML) to create, edit, and upload personal web pages, class projects, and electronic texts with images, sound, and other multimedia elements. Asynchronous communication tools such as email and USENET newsgroups became increasingly popular, as did synchronous (that is, "real time") communication tools such as instant messaging, and online virtual communities including, Multiple User Domains (MUDs) and Multiple user domains Object Oriented (MOOs). As these tools proliferated, they gave rise to numerous gender, race, and socioeconomic access issues associated with cyberspace and equally numerous virtual environments geared toward specific interests. Questions arose, prompting concerns expressed by Lanham (1993) in his preface to *The Electronic Word* when he asks, "What does this new medium do to us and for us?" (xii).

The diffusion of these tools into computer-mediated learning environments prompted Haas, Johnson-Eiola, Faigley and others to reexamine classical assumptions that dictated text be a linear, hard-copy document. That is, most electronic texts are segmented into non-linear, hypertextual "chunks" capable of being read as both parts of a whole and wholes unto themselves. This rethinking of the nature of texts evolved for many different reasons: the graduation of typewriters to word processors and text editors, followed by a much larger graduation to reasonably affordable personal computers; the evolution of personal computers from those relying on cryptic, DOS-based command lines to those using graphic user interfaces (GUIs) such as the Mac OS and Windows; the gradual evolution of the old military/scientific ARPAnet to the Internet that we all know; and of course the paradigm shift from computer-assisted instruction to computer-mediated communication.

Additionally, hypertexts and computer-mediated communication in general had three distinct advantages over traditional, linear texts in the classroom: hypertexts were attractive and relatively easy to produce depending on the content creation tools available and the skill level of the author(s); hypertexts had the built-in potential for interactivity, depending on how much or how little additional effort was involved in their creation, whether multimedia elements were implemented, etc.; finally, literacy and the writing process itself were enhanced or at least reconceptualized due to the recording capability of computers during the "linguistic transaction" itself (Clark, 1996, p. 135).

For example, drafts of texts could be saved in various incarnations. Entire chat logs could be saved, archived, printed, and accessed some time after the actual chat occurred. Bulletin board discussions could be broken down and categorized in topical "threads," then viewed by date, author (that is, the person who originated each post), or subject.

Hawisher, Selfe, LeBlanc, and Moran (1996) chronicle these developments in emerging digital technologies in their book, *Computers and the Teaching of Writing in American Higher Education, 1979 - 1994: A History*. Bolter (1991) does the same in his groundbreaking text on computer-mediated communication, *Writing Space: The Computer, Hypertext, and the History of Writing*, where he opts to "argue rather cheerfully that the computer is a revolution in writing" (p. 3). Bolter, Hawisher et al., and the rest collectively point out how computer-mediated learning redefines many classical notions of rhetoric and composition because it allows for a more student-centered, non-oppressive classroom. This, in turn, allows teachers to adopt Britton's notion of "trusting our students, taking them and their concerns seriously, and making certain that electronic technology . . . is not simply a medium for the mass-delivery of a managed curriculum" (Britton, 1992, p. 4).

Around this time, LAN-based chat tools such as ASPECTS and DAEDALUS became available, allowing synchronous chat conversations without necessarily needing a connection to the Internet. Welch and others suggest these tools--along with web-based instant messaging (IM) clients like AOL Instant Messenger, Yahoo Messager, and ICQ, as well as virtual communities such Phish.Net and Bowie.Net--were perhaps modern-day equivalents of classic ideas of dialectic taking place between Socrates and a small group of his students.

The Phish.Net community was particularly interesting. Phish.Net was a virtual fan club for the musical group Phish. Watson (1997) analyzes this community in his article "Why We Argue About Community: A Case Study of the Phish.Net Community." He draws strong parallels between it and classical notions of audience and dialectic. Like any non-virtual community, the Phish.Net newsgroup "acts as an important stepping stone to the development of the consciousness that change can occur and that it can be caused by the united work of . . . participants" (Watson, 1997, p. 125).

In the case of Phish-Net and most other electronic forums, dialogues necessarily took place without the benefit of visual cues to discern tone and emotion. As a result, communities of this nature force us to think critically about audience and context, down to even the smallest details. Since the ethos of the speaker can be effectively camouflaged online, seemingly innocent comments can be mistaken for personal attacks and vice versa with only an occasional "emoticon" (ASCII-based characters arranged to create frowning or smiling faces, such as " :)") used to convey feelings.

Around the same time that Phish.Net was flourishing, online versions of traditionally hard-copy journals such as *The Chronicle of Higher Education* and *The Writing Instructor* were introduced. Many journals adopted both hard-copy and online versions. (Years later, some journals such as *The Writing Instructor* shed their hardcopy versions and evolved into online-exclusive journals, often referred to as "e-journals".) This movement toward e-journals sparked much discussion about the prestige and importance of getting published in such journals, as opposed to hard-copy journals, in terms of tenure and promotion. Blakesley (2002), editor of *The Writing Instructor*, describes this situation as being "the future of academic publishing" (para. 1) and asserts that rhetoricians and scholars of the writing process need to "watch (or act) now to see if the culture that supports academic research and publishing can change, too" (para. 2).

Paralleling the migration and proliferation of e-journals, Apple introduced its Power Macintosh line of computers. Microsoft, in turn, launched Windows 98 and an ongoing crusade to dominate not only the personal computer market but nearly all markets associated with business, education, and consumer-level information technologies. The computer world began to revolve around Windows, and Microsoft even went so far as to adopt that concept for its Internet Explorer icon, showing a spinning globe with the "flying Windows" flag in the center. With the exception of neo-Luddites such as Stoll, Henderson, and other like-minded researchers, there was a widespread enthusiasm for and/or euphoria about computers, the Internet, and then-emerging information technologies.

As a result of all these events taking place, as well as a host of related ones such as the introduction of broadband, higher speed analog fax/modems, and user-friendly presentation software equally relevant to the business world and academia, the very nature of texts has changed into something wholly different from what existed even twenty years ago. Now when we speak of "texts" in the classroom, we tend to have an umbrella-like definition of the term, including blogs, the now-dated MOOs and MUDs, IRC chats, interactive CD ROMs and DVDs, hypertext, QuickTime movies, etc.

Yet, in spite of all the industry and discipline-wide euphoria about emerging technologies and the Internet, computers have yet to provide a panacea for any recent literacy crisis. Race, age, gender, cost, accessibility, and in some cases steep learning curves have all played a part in assuring that every home does not have a personal computer.

However, this could change as the average cost of new machines steadily drops and set-top "Internet boxes" such as Microsoft's UltimateTV or Xbox gain market share. These devices, including digital video recorders, may prove to be the next step in the evolution of computers. They are televisions, web browsers, email and instant messaging centers, VCRs, gaming machines, and entertainment centers all rolled into one.

At the very least, though, emerging electronic technologies are forcing us again to reexamine many classical notions of rhetoric, particularly the nature of texts, authorship, audience, rhetorical situation/context, and literacy itself. That is, the ongoing transition from analog to digital content--including electronic and multimedia texts not solely limited to web pages--carries along with it implied assumptions of multilayered literacies. Selfe (1996) succinctly argues this point in *Redefining Literacy* when she describes how technologies influence and affect traditional literacy. She states that this happens in primarily two ways:

> First, computers add several new grammars to the list of things that individuals must learn before they become successfully literate in a computer-supported environment. We can posit grammars associated with computer keyboards and with computer screens, and grammars related to the use of computer networks or printers. These new kinds of literacy are layered over and have a substantial impact on the tasks of reading and writing. Second, computers change the way we "see" text and construct meaning from written texts. Like the concepts of "indexing" and "zooming-in," some of the conventions associated with computers do not exist in the natural world. (p. 3)

Selfe's point here is well taken: the conventions associated with these multilayered, technological grammars require us to reexamine the ways in which we think about communication problems. That is, in order to construct meaning from these texts, we must critically examine the methods by which these texts are created.

RETHINKING TEXTS (AGAIN) ELECTRONICALLY

Given this range of stipulative definitions for computer literacy, information literacy, and/or technology literacy (from inside and outside our discipline), the necessarily multilayered conventions associated with them, and the constantly evolving nature of information technology itself, I believe there is a need to rethink texts, yet again, electronically. It is necessary to critically examine the technologies we use in the classroom--to examine them as technology systems, arrived at through myriad legislative policies, political deals, and existing technologies of control. I believe we must peer deep into their origins to better understand them, in order to better understand how these technologies affect literacy.

Yet, a decade ago Tuman (1992) emphatically argued against this notion. He stressed that, "we need to look less at the technology itself, and more at the existing practices of reading and writing" (p. 6). I feel this approach was more relevant in the 1980s and early 1990s when information and communication technologies such as email, the Internet, and asynchronous communication tools were just starting to come of age. These technologies were more inherently neutral back then. The vast majority of Internet content was freely accessible, as opposed to being walled-off into subscription-based offerings (such as content offered by Salon.com,

NYTimes.com, the Wall Street Journal Online, and others). Most government documents were freely available via the Freedom of Information Act, which has now been all but repealed by the Justice Department (Grimaldi, 2002). The majority of our information and communication technologies did not attempt to mask overt functionality with covert tracking to better exploit us and our students for marketing information. Electronic texts were not buried under layer upon layer of proprietary file formats that in turn required proprietary hardware and/or software to access.   In 1990, no one cared about intentionally constructing artificial incompatibilities into the tools our students use to read, write, and communicate.

Given the current state of many of these technologies, I suggest we must now out of necessity do exactly the opposite of what Tuman argues.   We must consider combining several notions within existing literacies to create a meta-literacy that addresses the monumental changes occurring within the technologies we and our students use.   We must put the technology first and make a concerted attempt to examine the policies and technologies of control, and how they impact computer-mediated learning and technology literacy. If we don't, we risk seeing the very tools we use to make our students more literate, more critically aware, become little more than the online equivalent of Channel One: predetermined content being pushed toward our students rather than pulled from them, in easily digestible chunks, commercially driven, with few alternatives.

As such, I suggest an "Information Technology (IT) literacy."   Such a literacy mandates that we teach our students to think critically about technology, by using and managing various hardware devices, software applications, and online resources, so as to locate and evaluate information dealing with the information technology industry itself. To put it more simply: I propose we advocate a somewhat circular IT literacy that involves using technology to learn about the technology industry, to better understand the technology we all use.

The information technology industry itself represents a living, continually evolving Rosetta Stone for IT literacy, both for us as teachers and our students. In the classroom, every bit of information technology we use is the end result of numerous decisions, struggles, backroom deals, and legal and economic battles.   As end users, that is, consumers of information technology, we see and use only the "last leg" of these decisions and battles. In a very real way, we experience only the trickle-down effect of these decisions, often with little or no knowledge of the factors that led to the products and services being consumed.

Too often, there is a perception that ignorance of the IT industry is of little consequence. The daily goings-on of obscure IT companies halfway across the country seem like little more than technical minutiae, for the most part. However, nothing could be further from the truth. Whether it's Double-Click surreptitiously tracking and cataloging our every mouse-click online, Microsoft preventing competing products from ever reaching our desktops, or AOL/Time-

Warner and Disney blaming each other over ABC being unavailable on our cable lineups, content providers waging war on their consumers (regardless of the impact on educational institutions), decisions made in the IT industry affect all of our lives *directly*, every single day.

Arming ourselves with knowledge about this industry represents the only sustainable method of preventing our rights as end users from completely eroding under a sea of banners ads, unsolicited commercial email, stolen identities, and limited choices, and of promoting our students' collective writing abilities--to invent, create, and explore. Basically, we need to understand the causes, evolutions, and effects of information technology in our society and in others. Volti (2001) perhaps explains it best:

> Technology has only recently become a topic of concentrated scholarly attention. While law, religious beliefs, and political doctrines have long been the subject of teaching and research, technology has been generally pursued only as a practical subject in schools of engineering. But just as war is too important to be left to the generals technology is too important to be the exclusive province of its practitioners. (p. xiii)

If we can agree with Volti that technology is too important to be left to its practitioners and that it needs to be examined and explored for its impact within a wide variety of disciplines inside and outside academia, inside and outside the writing classroom, then technology should be examined from more of a postmodern, technorealist perspective. Technorealism, a collaboration of twelve technology writers in the late 1990's, is a way of thinking about information technology which

> demands that we think critically about the role that tools and interfaces play in human evolution and everyday life. . . . As technorealists, we seek to expand the fertile middle ground between techno-utopianism and neo-Luddism. We are technology "critics" in the same way, and for the same reasons, that others are food critics, art critics, or literary critics. We can be passionately optimistic about some technologies, skeptical and disdainful of others. (Technorealism, 2002, paras. 4-5)

The principle authors of the Technorealism movement and/or ideology espouse several principles, including the notions that technologies are not neutral, that the web is "revolutionary, not Utopian" (Technorealism, 2002, Principles of Technorealism, para. 2), that simply wiring schools won't save them or solve any serious literacy problems, and that understanding technology and the underlying code used to create it is an "essential component of global citizenship" (Principles of Technorealism, para. 8). The most critical principle is likely the last one. It argues that a deeper scrutiny of the forces used to create many of the information technologies we use every day in the classroom is necessary if we are to understand the implications of using these technologies as consumers, teachers, and as students. To an extent, Tuman echoes this idea when he states that it is "usually a mistake to assume that a new

technology will be used to extend, rather than transform, an existing practice" (Tuman, 1992, p. 5). The forces that shape these technologies evolve within the IT industry, yet this industry is all too often left unexamined, save for some disciplines directly related to the technology (manufacturing, visual communications, engineering, etc.) Unfolding events within this industry are often all but ignored by traditional news media outlets, beyond the occasional "technology column" in the local paper, typically limited to 400 words or less, or technology-related sound bites on Headline News. To be fair, many magazines such as *Time* and *Newsweek* have recently begun to offer more coverage of the IT industry.   However, even those are still few and far between, and seem to occur mainly when a technology-related issue directly impacts day-to-day life (such as the recent "slammer" worm that crippled ATM machines and credit card transactions). Issues that have more of an indirect impact, or a direct impact that is not quite as high profile (such as the troublesome "product activation" issues associated with Microsoft's Plus Digital Media Edition), are typically left to IT-specific publications.

Unless students happen to pick up an issue of *Wired News* or happen to glance at *CNET News.com*, many of these issues slip under the radar, despite having broad implications for students and faculty alike. This is a huge problem, echoed by Volti (2001) when he argues that the "inability to understand technology and perceive its effects on our society and on ourselves is one of the greatest, if most subtle, problems of an age that has been so influenced by technological change" (p. 3).

Our students deserve to develop critical literacies of the industry many of them will intentionally or unintentionally graduate into. That is, given the pervasiveness of information and communication technologies both in IT-related fields and in seemingly unrelated ones, they deserve to be made aware of the rhetoric of control gripping this industry, and how this control positively and negatively impacts their education and lives. They deserve to use technologies not merely as uninformed end users, not merely as skilled professionals, technically competent in rote, application-specific tasks; rather, our students deserve to understand how the various information technologies they intentionally use and unintentionally encounter every day work. They deserve to know not merely how to use certain programs deemed relevant to their respective majors but how these programs were arrived at in the first place and how they continue to evolve.

Our students also deserve to know when these technologies are used to protect or invade their privacy as well as when they are used to enable or limit creativity. They deserve to realize when the CEO of a large IT company is bending the truth, and why. They deserve to examine the lasting and profound effect mega-mergers will have in this industry, whether it's AOL/Time-Warner or HP/Compaq. In short, our students deserve to know how seemingly abstract issues in the IT industry will ultimately play a part in their academic and professional careers. By

providing them with a forum for examining issues within this industry, we are providing them with an opportunity to examine how various information technologies--and the issues that pertain to them--directly and indirectly affect their lives.

WHAT COMES NEXT?

It is natural to wonder at what point, and in what form, such a forum would take place. Would an examination of such issues be best served only within technology-specific disciplines such as computer science or telecommunications departments or only within a College of Technology? Or would our students be best served if such discussions took place at the foundational reading and writing level within higher education, since such entry-level courses dealing with the writing process are typically required of all students and inevitably result in the use of at least some information and communication technologies? Should such discussions instead take place long before students even go into higher education?

These are all important issues that call into question the very nature and scope of computer-mediated learning and involve examining new and emerging technologies that--good or bad--likely represent the future. No one can deny that current and emerging technologies are reshaping our views on how we teach and learn. We can, however, question what effect they will ultimately have on our students, ourselves, and our disciplines.

References

Association of College & Research Libraries. (2000, January). Information literacy competency

    standards for higher education. *Association of College & Research Libraries*. American

    Library Association.

    http://www.ala.org/Content/NavigationMenu/ACRL/Standards_and_Guidelines/Informat

    ion_Literacy_Competency_Standards_for_Higher_Education.htm

Blakesley, D. (2002, Spring). Introduction: Facing the perilous future of electronic publishing.

    Enculturation, 4.1. http://enculturation.gmu.edu/4_1/intro

Bolter, D. (1991). *Writing space: The computer, hypertext, and the history of writing.*

    Hillsdale, NJ: L. Erlbaum Associates.

---. (2001). *Writing space: Computers, hypertext, and the remediation of print.* Hillsdale, NJ: L.

    Erlbaum Associates. (2001).

Brandt, D. (1996). Literacy. In T. Enos (Ed.), *Encyclopedia of rhetoric and composition:*

    Communication from ancient times to the information age (pp. 392-393). New York:

    Garland.

Britton, J. (1992). Theories of the disciplines and a learning theory. In A. Herrington &

    C. Moran (Eds.), *Writing, teaching, and learning in the disciplines* (pp. 47-60). New

    York: MLA.

Clark, J. M. (1992). Computer application in rhetoric. In T. Enos (Ed.), *Encyclopedia of*

    rhetoric and composition: Communication from ancient times to the information age (pp.

    134-136). New York: Garland.

Cringely, R. X. (Writer, Host), & Sen, P. (Director). (1996). *Triumph of the nerds: The rise of*

accidental empires. [Videotape]. New York and Washington, DC: Public Broadcasting Service.

Dibble, M. (Ed.) (2002). Directory of online resources for information literacy: Definitions of information literacy and related terms. *Directory of online resources for information literacy*. University of South Florida. http://www.lib.usf.edu/ref/doril/definitions.html

Faigley, L. (1998). Literacy after the revolution: 1996 CCCC chair's address. In T. W. Taylor & I. Ward (Eds.), *Literacy theory in the age of the Internet* (pp. 3-15). New York: Columbia University Press.

Grimaldi, J. V. (2002, December 2). At Justice, freedom not to release information. *Washington post.* http://www.washingtonpost.com/ac2/wp-dyn/A58419-2002Nov30?language=printer

Harvey, B. (n.d.). Stop saying "computer literacy"! http://http.cs.berkeley.edu/~bh/stop.html.

Hawisher, G., Selfe, C., LeBlanc, P., Moran, C. (1996). *Computers and the teaching of writing in American higher education, 1979-1994 : A history*. Norwood, N.J. : Ablex Pub.

Jaffe, J. (2002, December 31). Happy birthday, dear Internet. *Wired News.* http://www.wired.com/news/infostructure/0,1377,57013,00.html

Lanham, R. (1993). *The electronic word: Democracy, technology and the arts*. Chicago: University of Chicago Press.

Mayers, T., & Swafford, K. (1998). Reading the networks of power: Rethinking "critical thinking" in computerized classrooms. In T. W. Taylor & I. Ward (Eds.), *Literacy theory in the age of the Internet* (pp. 146-157). New York: Columbia University Press.

Selfe, C. (1999). *Technology and literacy in the twenty-first century: The importance of paying attention*. Carbondale, IL: Southern Illinois University Press.

---. (1996). Redefining literacy: The multilayered grammars of computers. In G. E.

      Hawisher & C. Self (Eds.) (1989), *Critical Perspectives on Computers and Composition*

      Instruction (pp. 3-15). New York: Teachers College Press. Available at

      http://www.hu.mtu.edu/~cyselfe/texts/redefine.html

Technorealism. (2002). Overview. *Technorealism.org*. http://www.technorealism.org

Tuman, M. (1992). *Word perfect: Literacy in the computer age*. Pittsburgh: University of

      Pittsburgh Press.

Volti, R. (2001). *Society and technological change* (4th ed.). New York: Worth Publishers.

Watson, N. (1997). Why we argue about virtual community: A case study of the Phish.net fan

      community. In S. G. Jones (Ed.), *Virtual culture: Identity and communication in*

      cybersociety (pp. 102-132)*.* London: Sage Publications.

Wilferth, J., & Cesarini, P. (1998). A timeline for computers and the teaching of writing in

      higher education, 1979-1994: A history. *Computers & composition*. Available at

      http://www.cwrl.utexas.edu/~ccjrnl/Archives/online/1998/Wilferth-Cesarini/CC.html

U.S. Department of Education. (1996). *Getting America's students ready for the twenty-*

      first century: Meeting the technology literacy challenge. A report to the nation on

      technology and education. Washington, D.C.: U.S. Government Printing Office.