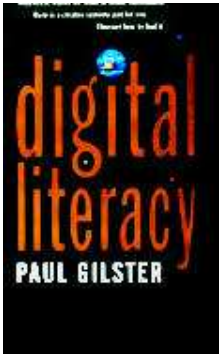
MERIDIAN

An excerpt from

Digital Literacy

by
Paul Gilster



Introduction to Excerpt

by
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Introduction

"Now, at the turn of the new century, Web technologies are replacing TV, telephones, and newspapers as the primary means by which we are informed and entertained."

This century has been one of change and growth, and media and communication have been among the most rapidly developing. At the turn of the last century, theatre, the telegraph, and the newspaper entertained and informed us. By the 1930s, movies replaced theatre as popular entertainment, and telephones had replaced telegraphs as primary lines of communication. In the 1950s TV replaced movies and, later, newspapers. Now, at the turn of the new century, Web technologies are replacing all three —TV, telephones, and newspapers—as the primary means by which we are informed and entertained.

As each of these changes has occurred in media and communication, so too the mindset of the consuming, enjoying, learning public has changed along with them. Paul Gilster, in his book *Digital Literacy* (Wiley, 1997), describes how this latest change is occurring and how we can more readily take full advantage of the opportunities and adapt to the new possibilities, and sometimes dys-abilities, we encounter as we rely more and more on the Web.

"Our ability to adapt to the Web as it adapts to us will determine its future and our own."

Our ability to adapt to the Web as it adapts to us will determine its future and our own. Gilster is concerned, as the book jacket describes, with providing "Internet novices with the basic thinking skills and core competencies they'll need to thrive in an interactive environment so fundamentally different from passive media such as television or print.

Below Meridian reprints two sections from Gilster's book. One, titled "The Spinning of the Web," covers some basic history of the medium—where it comes from. The other, "Interacting with the Media," gives some examples of the Web's potential—where we're going. To transcend passive media, to go beyond "electronic print" into truly dynamic networks, we must operate the Web as dynamic thinkers no longer content to have information and entertainment merely presented to us.

"...we must operate the Web as dynamic thinkers no longer content to have information and entertainment merely presented to us."

As we teach the next generation of Web users about the networks available to them, we are also giving them the opportunity to learn a mindset that can allow them to stretch and explore the potential of this interactive medium. If we can help our students live up to the potential Gilster describes, we can hope one day that a final media/communication merge will erase the distinction between what it means to entertain and what it means to inform…

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when learning a new operating system, for example, I never read consecutively, but hit subjects I need to understand as the occasion arises.

On the other hand, hypertext is suited only to particular kinds of reading experience. I'm reading Livy's history of Rome in my spare time. Hannibal has crossed the Alps and is pushing toward Rome; no general has yet been found who can stop him, and after the disastrous battle of Cannae, Rome's last army has been destroyed. Do I want to jump around in this text? Absolutely not; the text and its narrative flow demands my full attention. For the experience of story, hypertext isn't well suited; for the ability to perform research, it is useful as few tools have been. We have always had the ability to do either kind of reading. What the Internet has done through hypertext is to allow us to do one kind faster, and to consider pointers to ideas as live links to related information.

The Spinning of the Web

But the limits of the medium are profound. To move digital information to allow on-screen formatting, photographs, diagrams, moving video, sound, and text to appear side by side, all within the narrow constraints of bandwidth, each of these things must be turned into data packets and shipped piecemeal across the network. The packets must be reconstructed at the destination and then translated back into things we can work with on a computer screen. The Net must do all this quickly enough that we, with our modernist impatience, don't become disenchanted and find something else to do with our time.

"The key development behind the Web was Berners-Lee's creation of HyperText Transport Protocol, or HTTP."

These are no small problems, and no small magic is required to solve them. In typical Internet fashion, they were originally addressed by scientists out of the need to continue a far different enterprise. The physics center called CERN, for Conseil Européen pour la Recherche Nucleaire (the European Laboratory for Particle Physics), near Geneva, is world famous for its work on the smallest building blocks of matter. This is the domain of supercolliders, where particles are accelerated to near light speed and crashed into each other to create spectacular clouds of atomic debris.

The scientists who study these microcosmic incidents needed to be able to keep up with the work of their colleagues around the world, which is how Tim Berners-Lee, a British-born physicist at the laboratory, came into the picture. The idea was that hypertext, sans images, sound, and other hypermedia add-ons, could be used to foster communications between researchers, allowing them to exchange documents and data as necessary. Berners-Lee proposed the project in March 1989, and the first Web software made its appearance in 1990, running on a NeXT computer at the CERN site.

The key development behind the Web was Berners-Lee's creation of HyperText Transport Protocol, or HTTP. A Web client, or browser program, selects a particular hyperlink in a document. The link is identifiable by underlining or display in a different color from the surrounding text. When the user clicks on the hyperlink, the Web client contacts the computer at the address specified by the link and asks for the particular document being requested. The server at the other end of the connection then sends this material to the client program, which displays it on the

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"Remarkably, in a relatively short period of time, we're moving from an Internet that resembles an endless rummage sale to one that in striking ways resembles a library, thanks to URLs."

user's screen. The information sent could be textual or could contain other forms of media. The World Wide Web as we know it today is the sum total of these transactions, millions upon millions of them, as they move through the universe of networked computers.

The Web uses a computer language called HyperText Markup Language (HTML)—that allows Web developers to design their pages and specify their hyperlinks, thus connecting Internet materials from files at FTP sites to Gopher menus to newsgroups, not to mention other Web pages. All this is done through the Universal Resource Locator, or URL, which can point to a particular resource no matter where it's located on the Internet. URLs compress address information into as small a space as possible. Although these "addresses" are clunky, hard to remember, and seemingly inscrutable, they tell us everything we need to know to find a particular item on the Internet. And that's no small feat, given that the Internet is composed of tens of thousands of computer networks operating off millions of separate computers and regularly traveled by tens of millions of people.

Remarkably, in a relatively short period of time, we're moving from an Internet that resembles an endless rummage sale to one that in striking ways resembles a library, thanks to URLs. At a rummage sale, you never know what you'll find, so you spend your time walking down aisles stuffed with odds and ends, occasionally running across something that catches your eye. In a library, you use the card catalog, or the electronic equivalent of it, to quickly find what you need. Like library catalog cards, URLs are pointers, so they make it possible to set up an Internet that is usefully indexed. They also let us combine Internet material, files of all kinds, into single pages

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of information. Take a file from this computer and another from that one; both can be displayed on the same World Wide Web page, for the HTML language can point to each.

The problem with hypermedia documents is that they're difficult to display. In the early days of the Web, to use a hypermedia-laden page meant downloading a file to display a graphic and calling up an external viewer to see the result. The image would appear in a separate on-screen window from the Internet session you were running to read the text. A sound file would similarly be called up through a third-party program. Each media type demanded its own player, and the result was more of a collage than a contiguous page of information. What was missing was organization, and what was needed was an appropriate software tool. Such an all-purpose viewer soon appeared in the form of a program called Mosaic.

Mosaic was developed at the National Center for Supercomputing Applications in Urbana-Champaign, Illinois, on the campus of the University of Illinois. The team that put it together, led by programmers Marc Andreessen and Eric Bina, conceived the key concept that would change the Internet into today's multimedia powerhouse. That concept was that all the resources pointed to through URLs could be displayed by a single software program, which would translate the data conveyed by HTTP into user-friendly pages. Hyperlinks would become obvious; they could be shown in blue, or underlined, or both. Text and graphics could be displayed simultaneously, while pull-down menus and mouse-driven commands could enable features like a bookmark list, where the URLs of frequently accessed pages could be stored. Annotations were possible, allowing users to write

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notes that could be kept on their own machines, supplementing what the Web sent over the Internet. Mosaic did for the World Wide Web what the Macintosh and Microsoft Windows did for desktop computers. It democratized the process.

It's probably not accurate to say that Mosaic launched the Internet boom that has continued unabated since 1993; after all, growth had been rapid even before this. Between January 1990 and June 1991, for example, the number of connected networks making up the Internet grew from 2,200 to 4,000, an indication that even in the text-based environment, people were becoming curious about what the network offered. Nevertheless, it seems safe to argue that without Mosaic, the widespread acceptance of the Internet by the public, and particularly its spread into the commercial world, simply would not have occurred. Doubtless it would have remained the kind of offbeat, if fascinating, tool that the commercial information services already provided in miniature, a place where modem users could work their way through the process of sending mail and downloading files, but one that would remain more or less intimidating to computer neophytes.

It was Mosaic that put the idea of the compound document firmly into the public consciousness. The Mosaic display of a well-designed Web site reminded home users of television, the medium with which they were most familiar. While a Web page didn't move, it did offer attractive graphics and the capability of at least downloading sound. Text appeared, enough to make it seem like the enterprise was content-laden, but it was pictures that made the Web so attractive to the average newcomer, because pictures aren't intimidating. The idea that you could click on a hyperlink

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rather than submit a command also had resonance; it promised a computer network "for the rest of us," as the commercials say, one without the hassles of deep study or classroom training.

The trend in Internet software development is to make it ever more television-like, combining its already powerful features with the live-picture model of the broadcast networks. If this seems ironic, consider that change is most likely to take deep root when it grows organically out of concepts people already understand. Thus the subsequent development of Java, a programming language created at Sun Microsystems, whose whole reason for being is to provide Web pages that are not static. Java works by downloading small applications, called *applets*, to your computer, which then run and create action on your browser's display. Static text suddenly acquires a moving logo. A ticker showing sports scores can now update itself. For the user, the effect is one of linking to something live, rather than to old information acquired through a new means.

Thus the Internet moves toward immediacy; and immediacy defines media types, a play on words that suggests an always available media presence. A newspaper is low on the immediacy scale; we read it in the morning knowing that we are seeing a summary of news as it came in several hours before. If an ongoing story catches our eye and we want an update on it, we get the update by flicking on the television, where CNN or one of the major networks points a live camera at the action.

What would stop the growth of the Internet in its tracks would be to forsake that sense of immediacy that the public now demands. Java is one way around the problem; Microsoft's ActiveX technology is another.

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"If the Web is to compete with television (and, we hope, drive up the intellectual stakes), it must make maximum use of the things that distinguish it from traditional forms of content."

Companies like Progressive Networks, with RealAudio, and Xing Technology, with StreamWorks, are pursuing audio and video solutions. This means that if I'm following a major story, I can work at my desk while listening to the news on my computer over the Internet. It was only as the network began to develop these capabilities that the notion of the Net as a challenge to television began to arise. It is emerging as an alternative for viewer time, one that advertisers will have to reckon with as they plan their budgets. Time spent on the Internet is, more and more often, time spent away from the television.

Interacting with Media

If the Web is to compete with television (and, we hope, drive up the intellectual stakes), it must make maximum use of the things that distinguish it from traditional forms of content. On that score, the Web today bears disturbing parallels to CD-ROM technology. Why disturbing? CD-ROMs entered the computer world with immense promise; after all, they could hold more data than a large hard disk, making it possible to digitize entire encyclopedias on a single platter, and to include multimedia features like moving video and sound. But despite prominent exceptions like Microsoft's Encarta (an encyclopedia) and Cinemania (a moviegoer's guide to reviews), CD-ROMs have fallen victim to the "shovelware" phenomenon—it's too easy to put content on them, so developers are careless about the quality of what they sell. Few CD-ROMs on today's market live up to the potential of the medium, as witness the raft of text-based CDs that do

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nothing other than provide unedited ASCII versions of widely available out-of-copyright texts.

Numerous Web sites have fallen victim to the same carelessness. Out of an imperfect understanding of the medium, their developers have chosen to make the Web little more than a digital form of the printed page. Yes, hyperlinks are included to move you between the various documents at the site, but the potential of multimedia is often lacking, while the notion that people can read vast amounts of text on a computer screen goes unchallenged. To be effective, a Web site must transcend these limitations. The Web is about interactivity, the ability of the user to choose information pathways and explore them with new-found ease. We should be looking for sites that provide something significantly different than the usual reading and researching experience.

How do you translate the experience of television into the World Wide Web format? If you operate The Discovery Channel, the answer is that you provide links to your television shows (including a useful e-mail notification service so your users won't miss shows of particular interest), along with background information supporting your programming. But you also provide original content, using the Web's ability to link to resources that television cannot reach. You make the site an entirely different reason to tune in to the network, and if you're successful, the network benefits from the exposure.

An example of such original content is "Get Down! An Australian Adventure." It appeared on The Discovery Channel's main menu in April 1996, telling the story of one Jim Malusa. In the words of the site: "A man, his bike, and his laptop challenge the merciless outback." Along with the blurb is a photograph of

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Malusa that, when clicked, gives way to the underlying page dedicated to his adventures Down Under.

Along one side of that page is a graphical cast of characters, the people who figure in Malusa's story, everyone from his mother to the support team who aided him on his journey. There is a link for someone called Bikeman, which takes you to John Schubert, technical editor of *Adventure Cyclist* magazine and the author of two books on biking. A photograph of the congenial Schubert likewise appears, along with two interesting features: At the bottom of the page is a clickable link that, when chosen, allows you to send electronic mail to Schubert. An audio link features Schubert's voice discussing Malusa's proposed journey; he's concerned that the trip will carry the cyclist into an area so remote that basic supplies will be all but impossible to obtain.

When you read about a person like John Schubert in a print magazine, or watch a television show that covers the Malusa story and see Schubert interviewed, a rhetorical distance remains between you and the person discussed. That distance is one reason why it's so exhilarating for ordinary people when they appear in the newspaper or on television. The experience is vivid, almost an out-of-body journey, for what they've done is to move between one existence, defined by their daily routine, to another, defined by its presence on the papers and screens we all use as input devices for our traditional information.

Electronic mail to the source circumvents that rhetorical space. Having read what Schubert thinks about Malusa's proposed trip through Australia, and having looked at his photograph, we can conflate the two worlds—the inner and outer experience—by punching a message straight through to Schubert

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himself. The messaging process, enabled by a Web browser, is simple. A click takes us into the editing screen, on which we can compose a message; a second click sends it on its way. With other forms of media, we can, of course, contact the people we see and read about, but the process is more cumbersome, and involves looking up postal addresses, writing letters, or making telephone calls, with no assurance of receiving any response.

Thus hypertext's great potential is interactive. Its linkages can lessen the separation between what we consider news on the one hand and our own experience on the other. Indeed, if we choose, we can bring the newsmaker into our own life by engaging in an electronic mail exchange that allows us to frame questions of our own. How many times have you watched a television show and wondered why a particular question was never asked? Interactive media gives you the chance to ask that question.

The audio link is similarly intriguing. Schubert is an expert on the subject of biking through difficult terrain, so his thoughts on Malusa's trek bear thinking about. When we click on the hyperlink, we begin the download process, pulling in a 400K file which our browser can play by invoking a plug-in audio program. We listen to Schubert's voice as he expresses his thoughts on the various dangers faced by Malusa. The content exists on two levels. We hear the thoughts he's expressing, but we also pick up the nuances of that expression through the spoken word, giving us a feel for his character and personality that we measure against the page's accompanying photograph. The result isn't television—it lacks the immediacy of full-motion video—nor is it straight text. It's a hybrid form of media that works by fleshing out our knowl-

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"The picture we build is formed by accretion; we learn in snatches, putting the story together link by link."

edge step by step, through a series of links that we can explore in whichever direction we choose.

The matter of direction is itself interesting. The top page of the "Get Down!" story contains an image with inset hyperlinks. We can choose between the aforementioned set of people who take part in the story; an introduction to the trip; a map of the journey's progress; updates on Malusa's stopovers, including his letters; and a bulletin board in which people can discuss what's going on as they read through the story and check in to see how Malusa is doing. There is, it's clear, no one way to work through this maze. The picture we build is formed by accretion; we learn in snatches, putting the story together link by link. If a particular aspect of the trip interests us, we can go directly to it, or we can choose to start with the introduction and attempt a chronological perusal of the story.

I chose to begin with an idle click on a person I knew nothing about—John Schubert. I worked into the site knowing that the story must involve a hazardous journey (on a bicycle, of all things) through one of the most inhospitable landscapes on the planet. I listened to Schubert's concerns on an audio clip and then moved on to a current letter from Malusa. Reading it, I discovered he had camped at a place called Nourlangie Rock, near the eastern boundary of Kakadu National Park. I read his thoughts on aboriginal myths and enjoyed his photography.

Maps on the World Wide Web are clickable; at least, they can be. A clickable map is one in which the image overlays deeper content. It's like an atlas that compresses the colorful maps of the first half of the book and the lengthy tables and charts of the second

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half into a single, dynamic image. Click here to learn more. Click here to return to the larger map. Because I'm obsessed with maps, I want to know where Nourlangie Rock fits into a larger map of Australia, and I find a link to one at the bottom of the page. A click takes me to a map of the entire continent. Here I find that Kakadu National Park is not far outside Darwin, in a part of Australia that is still largely tropical. A click on this map over the dot marking Kakadu takes me to a short backgrounder on this 8,000-square-mile ecosystem, which houses one-third of Australia's bird species and some of its rarest plants and animals.

At each stop along the way, the Web page's designers have made it easy to remember the route. It behooves good Web page designers to always keep a map of the site in front of us, because the Web challenges us with its many different ways to explore its riches. Thus, while our browser can take us back to previous pages with ease, we can also choose to skip directly back to the Introduction screen, or to the Updates page, or to the Bulletin Board on which we can discuss this journey. We can also move between stories at this point, choosing to leave the Malusa adventure and see what other multimedia tales may be stored at the site. A search function provides the ability to enter keywords to return to the page of our choice.

But let's not leave Malusa yet. The Updates page houses the collected letters of the intrepid cyclist as he crosses Australia. This is an ongoing story; it is being updated by its author from the field via laptop computer and Internet connections. I'm looking now at a report of Malusa's encounter with Cyclone Oliver. Having left Kakadu National Park, he noticed increasing clouds; peddling past eucalyptus woodlands, he barely had time to set up his tent and get inside before

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"If I were watching a television account of his exploits, I would need to tune in at the scheduled time. On the Web, I can check at a time of my own choosing."

the storm hit, lashing the canvas with rain and sending stark bolts of lightning across the sky. An accompanying photograph shot by the dispirited Malusa shows the sodden campsite. Storms followed him throughout the rest of his journey through the Northern Territory.

A good Web site, then, is one that continually updates its content. In the case of The Discovery Channel's story on Malusa, I realize that I can check here every day to find out where Jim is on the map and to see the latest photographs of his journey. The material posted seems to be running approximately a day and a half behind actual events, which is presumably the amount of time it takes the developers to translate Jim's letters and photographs into the necessary HTML coding to make up a Web page. It is important here to note how the Web allows me to follow Malusa asynchronously. If I were watching a television account of his exploits, I would need to tune in at the scheduled time. On the Web, I can check at a time of my own choosing.

I also think to click on Jim's own icon, available from the same introductory page to his story. Here I learn that he makes his home in Tucson, Arizona, that he has practiced something called freelance demolition (fireworks?), and that he's a biologist and part-time research associate at the University of Arizona, as well as being a writer, ". . . which seems the correct vocation for someone fond of camping, beans, and travel." The trip through Australia is part of his plan to visit the seven lowest points on each continent. Lake Eyre, his Australian destination, is 50 feet below sea level, a salt lake accessible only through a dirt track leading several hundred miles off the main highway. The accompanying photograph of Jim is of a rugged,

"..he's linking to the telephone system through an acoustic coupler that fits onto a conventional telephone handset. That's the only way onto the Internet, long-distance over the rare outback pay phones."

self-reliant man who looks tough enough to handle the outback—at least if it's not raining.

At the bottom of the page on Jim's life is a link that looks promising: Click to see all Jim's gear, it says. I do, and am rewarded with a photograph of the lot, spread out on a tarp, each item numbered. Below the photograph is a scrollable field with a key to the numbers. Scrolling through the items, I discover that he is carrying a Kodak digital camera, which is presumably how he's able to get his photographs uploaded and displayed on the Web. His computer is a Toshiba 610 CT, which he's linking to the telephone system through an acoustic coupler that fits onto a conventional telephone handset. That's the only way onto the Internet, long-distance over the rare outback pay phones.

So much for the camera and its digitizing capabilities. But I'm curious about something else. What kind of bicycle does a man take when he's going to journey into one of the most forbidding landscapes on the planet? I decide to take the opportunity to send Malusa a letter of my own, posing this question to him. It's a matter of roughly 24 hours before I receive an answer: "About my bike. After touring with road bikes and mountain bikes, I decided that a hybrid bike is for me. Fast on the road, but I can take it on the dirt, even if it's only a short ways, to get me away from the highway. Mine's a Bruce Gordon Rock 'n Road; very nice, but very expensive if bought new (I found mine used). I've got a set of road wheels and a set of touring wheels, so I simply switch when I get home. Also, I prefer drop handlebars—at least after six or eight hours on the road. But that's a matter of personal preference." By now Malusa is south of Alice Springs, in what, on my map, looks to be totally uninhabited country. And I've been talking to him through my computer.

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"One hyperlink is as close as another on the World Wide Web."

My wandering through the Malusa story is emblematic of what can happen at a well-planned Web site. I've entered into the story as it was ongoing, prowled around long enough to understand the scenario, returned to read the introductory passages, listened to audio accounts of the planning for the trip, read updates on Malusa's progress, and received additional information on demand. Now I go back to read the letters sequentially, starting out with Jim's departure from the tropical city of Darwin, where "... the sun is one mean skillet in the sky," and 4-foot lizards called *goannas* are common sights. An index to the letters makes it easy to skip around between them, but I'm now reading sequentially, following from link to link, in chronological order. I'm filling in my background information and catching up on what I've missed.

One hyperlink is as close as another on the World Wide Web. Thus far, I've stayed within The Discovery Channel's Web site, but one link takes me to a page that displays links to other Web sources. I find Australia Online, with Australian maps, news, and tourist information. The Aboriginal Page, from Australian National University, contains extensive information about aboriginal culture. Diction-Aussie is an interactive Australian dictionary, which can explain cryptic sentences like this one uttered to Jim in Darwin by a man with felt hat and tattoos: "I was once working a mob of brumbies on a station when a jackeroo asked the boss cockie what to do if he runs across a western taipan." It translates: "I was once rounding up a herd of wild horses when a cowboy asked the foreman how to avoid a venomous snake."

There is no up or down at a Web site. While the introductory page to the Malusa story could legiti-

"Learning how to turn this hybrid medium to your advantage means mastering a set of tools designed expressly for the purpose of cataloging and retrieving Web resources."

mately be considered a gateway into it, most readers will come into the tale by clicking here and there, sampling from among the many sights and sounds of the associated documents, to form their own experience of the story. The experience can be extended by sending electronic mail to people involved in the journey or by joining the bulletin board likewise made available to readers. A Web site without such interactivity is one that fails to deliver on the promise of the medium.

Interactivity is one of the three key concepts that help the Web deliver on that promise. All three start with the letter *I*: interactivity, immediacy, and integration. *Interactivity*, because a well-designed site lets you talk to the players and conceivably influence the way a particular situation is handled; interactivity also means being able to choose your own path through the site. *Immediacy*, because a frequently updated Web site can put you on the scene of a continuing story, just as I check in every day to track the progress of a cyclist through the Australian outback. And finally, *integration*, because a good Web site exploits varied forms of media to support its message. Learning how to turn this hybrid medium to your advantage means mastering a set of tools designed expressly for the purpose of cataloging and retrieving Web resources.

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Digital Literacy

Paul Gilster

Paul Gilster is a freelance writer specializing in computers and technology. He is the author of six books about the Internet, all from John Wiley & Sons: Digital Literacy (1998), The Web Navigator (1997), The New Internet Navigator (1995), Finding It on the Internet (1994), The Mosaic Navigator (1995) and The SLIP/PPP Connection (1995). Gilster has also contributed frequently to numerous technology and business magazines, and has published essays, feature stories, reviews and fiction in a wide range of publications both in and out of the computing field. For the past twelve years, he has written the weekly "Computer Focus" column, which now appears in The News & Observer (Raleigh, NC). Before turning to writing full-time in 1985, he was, at various times, a specialist in medieval literature, a commercial pilot, and the owner of a wine shop. Even his wife got confused.

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Digital Literacy

Trish Watson

Trish Watson is in her final semester of the MS Technical Communication program at NC State. Her studies, research, and work experience focus on research communication channels among researchers, students, and the general public. She has taught ENG333, Communication for Science and Research, and has been a research assistant for the Center for Communication in Science, Technology, and Management, in the College of Humanities and Social Science. Her thesis examines the factors influencing participation in an electronic journal for student research at NCSU.

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