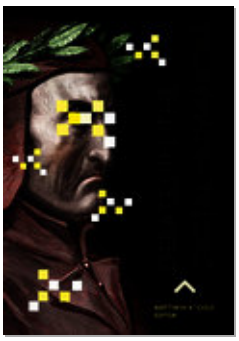
Debates in the Digital Humanities

Matthew K. Gold



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Disability, Universal Design, and the Digital Humanities

GEORGE H. WILLIAMS

Over the last several decades, scholars have developed standards for how best to create, organize, present, and preserve digital information so that future generations of teachers, students, scholars, and librarians may still use it. What has remained neglected for the most part, however, are the needs of people with disabilities. As a result, many of the otherwise most valuable digital resources are useless for people who are—for example—deaf or hard of hearing, as well as for people who are blind, have low vision, or have difficulty distinguishing particular colors. While professionals working in educational technology and commercial web design have made significant progress in meeting the needs of such users, the humanities scholars creating digital projects all too often fail to take these needs into account. This situation would be much improved if more projects embraced the concept of universal design, the idea that we should always keep the largest possible audience in mind as we make design decisions, ensuring that our final product serves the needs of those with disabilities as well as those without.

It is imperative that digital humanities work take into account the important insights of disability studies in the humanities, an interdisciplinary field that considers disability "not so much a property of bodies as a product of cultural rules about what bodies should be or do," in the words of Rosemarie Garland-Thomson, a prominent figure in the field (6). Digital knowledge tools that assume everyone approaches information with the same abilities and using the same methods risk excluding a large percentage of people. In fact, such tools actually do the work of disabling people by preventing them from using digital resources altogether. We must broaden our understanding of the ways in which people use digital resources. For example, visually impaired people take advantage of digital technologies for "accessibility," technologies that (with their oral/aural and tactile interfaces) are fascinatingly different than the standard screen-keyboard-mouse combination, forcing us to rethink our embodied relationship to data. Learning to create scholarly digital archives that take into account these human differences is a necessary task no one has yet undertaken.

In what follows I consider the somewhat arbitrary concept of disability and assistive technology, argue why the digital humanities community should adopt a universal design approach, explain what a universal design approach would look like, and then offer a few specific suggestions for collaborative projects that should be undertaken by digital humanists.

Questioning Disability

I first became interested in these issues as a graduate student working with Garland-Thomson when she was a faculty fellow at the Maryland Institute for Technology in the Humanities (MITH) in the fall of 2001. During this experience, I was forced to reevaluate my assumptions about using computers and designing web pages. Garland-Thomson worked with the staff at MITH to create an online academic resource site for disability studies, and we decided to design the website with maximum accessibility. To do so, we needed to think about the needs of people who are blind, have low vision, or have difficulty navigating because of the clutter that often accumulates on web pages. (We had no plans to include audio, so addressing the needs of people who are deaf or hard of hearing was not in our plan.) At the same time, we aimed for a visual design that would appeal to sighted users. We kept the layout simple and added certain features specifically for certain kinds of users. For example, because tech-savvy blind people often have their computer read websites out loud using what is known as screen-reading software, many find it tedious to listen to the identical detailed navigation menu on every page within a given site. To solve this problem, we inserted a tiny image—a transparent GIF exactly one pixel square, to be exact—at the beginning of each page with an alt attribute that read, "Skip to main content." This image would be invisible to sighted users, but those listening to the page with screen-reading software—which reads aloud the alt attributes of images embedded in an HTML page—could use that GIF as their cue to jump past what they did not need to hear in order to get to the information that they did want to hear. We also made sure that every image tag had an alt attribute where necessary, although in general we kept images to a minimum. For advice on accessibility issues, we worked with a blind person who used screen-reading software to listen to the web, rather than reading it off of a visual display as a sighted person would do. She demonstrated this software for me, and I was surprised by how quickly the words were spoken by the synthesized voice that came from her laptop's speakers. In fact, I could not understand anything at all that she was doing. To accommodate me, she adjusted the settings to slow down significantly the synthesized speech, at which point I could understand the words but still found myself unable to orient myself on a given page or within a given website. This scenario caused me to reevaluate my understanding of what it means to be disabled, as she clearly was using abilities that I did not—and still do not—have: I had not trained myself to be able to process auditory information as efficiently as she could.

Walter Ong famously wrote, "Technologies are artificial, but . . . artificiality is natural to humans" (81). Ong's concern is with writing as a fundamentally artificial process that has been so "internalized" by humans that it appears to be as natural to us as talking. Ong's observation is part of a larger cultural critique that highlights the socially constructed nature of the ways we perceive technology and its role in our lives. To those of us who are more or less comfortable with the existing dominant model of using computers, anything different, like a fast screen reader, seems alien, and the potential shortcomings of our familiar model of some combination of keyboard, mouse, and visual display remain invisible to us. We classify some software and hardware tools as "assistive technology"—sometimes the term "adaptive technology" is used instead—because they have been designed specifically to assist those people with "special needs." We might consider, however, that there is no "natural" way to interact with the 1's and 0's that make up the data we are interested in creating, transmitting, receiving, and using; there is only the model we have chosen to think of as natural. All technology is assistive, in the end.

Finally, we would do well to be aware of the range of "assistive"-technology software applications and hardware devices that do not work in the same ways as the devices used by nondisabled people. In addition to being compatible with desktop computers, laptops, smart phones, and tablet devices, the materials we create should also work well with such tools as refreshable braille displays, digital talking book devices, screen reader applications, and screen magnification software.

Universal Design Defined

The term "universal design" was invented by architect Ronald Mace, founder of North Carolina State University's (NCSU) Center for Universal Design. According to the NCSU College of Design, the term "describe[s] the concept of designing all products and the built environment to be aesthetic and usable to the greatest extent possible by everyone, regardless of their age, ability, or status in life" ("Ronald L. Mace"). Wendy Chisolm and Matt May write that to embrace universal design principles is to "approach every problem . . . with the ultimate goal of providing the greatest benefit to the greatest number of people possible" (2). Mace argues for the importance of distinguishing between universal design principles and accessibility principles. To embrace accessibility is to focus design efforts on people who are disabled, ensuring that all barriers have been removed. To embrace universal design, by contrast, is to focus "not specifically on people with disabilities, but all people" (Mace). Something created to assist a person with a disability—to make their environment more accessible in some way—might not be affordable or aesthetically pleasing even if it is usable and helpful. Something created using universal design principles, on the other hand, is designed "for a very broad definition of user that encourages attractive, marketable products that are more usable by everyone" (Mace). Devoting efforts to accessibility might improve the built environment for

disabled people, but devoting efforts to universal design improves the built environment for all people. Mace cites the example of the automatic garage door opener as a consumer product created with universal design principles: it is affordable; it appeals to and is useful to people both with and without disabilities. Another frequently cited example of universal design is the sidewalk curb cut; initially created to allow people in wheelchairs to cross the street more easily, curb cuts became recognized as useful also to other people such as someone making a delivery with a dolly, a traveler pulling luggage on wheels, a parent pushing a child in a stroller, or a person walking beside their bicycle. Whether in a physical or a digital environment, designers are always making choices about accessibility. However, not all designers are aware of how their choices affect accessibility. Universal design is design that involves conscious decisions about accessibility for all, and it is a philosophy that should be adopted more widely by digital humanities scholars.

Why Universal Design?

Before I recommend how to adopt universal design principles, I need to explain the several reasons why we should do so. First, ensuring that digital resources created with federal funding are accessible is the law in many countries. In the United States, for example, the Federal Rehabilitation Act of 1973 was amended in 1998 with what is now referred to as Section 508 to require that all federal agencies "developing, procuring, maintaining, or using electronic and information technology" ensure that disabled people "have access to and use of information and data that is comparable to the access to and use of the information and data" by people who are not disabled (U.S. General Services Administration, "Section 508 of the Rehabilitation Act, as Amended by the Workforce Investment Act of 1998."). American government agencies that fund digital humanities projects do not currently require proof of accessibility, but there is no reason to assume that this will always be the case. In addition to the United States, the list of nations with laws or policies requiring web accessibility includes Australia, Canada, Germany, Israel, India, Italy, Ireland, Japan, Korea, Portugal, and Spain (Chisolm and May, 14–15). At some point in the future, project directors seeking government funding could be turned down if they are unable to demonstrate in their grant proposals that the results of their work will be accessible. Rather than wait until such time at which the laws begin to be enforced, we should start now to follow the existing guidelines for accessibility and to develop our own guidelines and tools for authoring and evaluating accessible resources. Not all digital humanities projects are created with government funding, of course, but enough of them are that this is a significant issue. Furthermore, instructors who wish to use digital humanities resources in their courses will need to ensure that those resources are accessible if they teach at an institution that receives any sort of government funding. Otherwise, they make themselves and their institution vulnerable to legal action.

Second, universal design is efficient. In order to adhere to the "alternative means of access" subsection of Section 508, American web designers used to create alternative, accessible versions of their content to parallel the original content. However, coding everything twice—first for nondisabled people and then again for disabled people—is time consuming and expensive. Fortunately, web standards have developed enough that this duplication of effort is no longer necessary. Instead, it is now possible to create just one version of a resource and to make design choices that ensure the resource suits the needs of all users, disabled and nondisabled alike. The ability to separate structure from presentation is particularly useful in this regard.

Third, applying universal design principles to digital resources will make those resources more likely to be compatible with multiple devices. To create an online resource that only works with a desktop or laptop computer is to exclude people who would prefer to access the resource with a smart phone, a tablet, or some other mobile device. The Web Accessibility Initiative of the World Wide Web Consortium points out that there is "significant overlap between making a website accessible for a mobile device and for people with disabilities" (Henry, "Web Content Accessibility"). Compatibility with mobile devices is important because an increasing number of people are using such devices to access the web. In the United States, for example, young adults between the ages of eighteen and thirty-three make up the largest segment of the population of web users at 35 percent (Zickuhr, 4), and 65 percent of those between the ages of eighteen and twenty-nine use a mobile device to go online (Smith, 5). Furthermore, those more likely to use a mobile device for online access include African Americans, Hispanics, and individuals from lower-income households (Smith, 10). If the digital humanities is to create resources accessible by a diverse array of people, then compatibility with mobile devices is a necessity.

Fourth and finally, it is the right thing to do. We recognize the importance of open access for scholarly materials, but "open access means more than simply making stuff available," as Jeremy Boggs, humanities design architect at the University of Virginia's Scholars' Lab, has said. We would never use a proprietary format for preserving and sharing our work, in part because to do so would be to exclude those people who cannot afford or do not have access to the necessary software to use that format. However, few of us think twice about whether or not the format we have chosen and the design choices we have made exclude disabled people. It might be tempting to assume that few, if any, disabled people are interested in or need to make use of our work, but by creating barriers to access we are ensuring that such people will never have the opportunity to participate in the digital humanities. According to a report from the Pew Research Center's Internet and American Life Project, 81 percent of all adults report using the Internet, but only 54 percent of disabled adults do (Fox, "Americans," 3). Of course, disabled adults are also more likely to be older, to have lower incomes, and to have less education than nondisabled adults, and all of these demographic factors are correlated with lower levels of Internet use (Fox, "What People"). However, inaccessible design choices remain a significant barrier

to information for disabled people, and removing those barriers to information can only contribute to higher levels of education and perhaps higher levels of income as well. If our goals include the ability to share our work with as wide and diverse an audience as possible, then we should embrace universal design principles.

Designing for Accessibility

It is beyond the scope of this chapter to reiterate the specific guidelines for designing accessible web resources, especially when so many useful guidelines already exist. Digital humanists interested in learning more about these guidelines would do well to start with the Web Accessibility Initiative website hosted by the World Wide Web Consortium, where they will find a wide variety of specific recommendations as well as references to additional resources. Many helpful tutorials may be found on other sites, of course, but the Web Accessibility Initiative guidelines specifically and the World Wide Web Consortium guidelines more generally are widely considered to be web standards followed by those who create and maintain web-based resources. There are, however, specific projects that the digital humanities community should undertake in order to improve greatly the accessibility of the resources we create as well as the ease with which we make those resources accessible.

Specific Project Ideas

ACCESSIBILITY TOOLS FOR CONTENT MANAGEMENT SYSTEMS

Accessibility would be much easier for most content creators to achieve if a suite of free and open-source accessibility tools were developed for popular content management systems (CMS).[1] A list of the most commonly used CMSes for digital humanities projects would include—but not be limited to—WordPress, Drupal, Omeka, MediaWiki, and Joomla. Each of these has a number of appealing features: they are relatively easy to install, often available as one-click-installation options through commercial web-hosting services; they are free and open-source projects; and their appearance and functions may be customized through the use of such add-ons as themes, plug-ins, modules, and extensions. A valuable project would be for the digital humanities community to develop a collection of add-ons that would integrate easily with these CMSes and improve the accessibility of the websites they deliver. Making available a ready-made set of accessibility tools for developers to add to their sites would allow individual projects to avoid the work of developing and evaluating their own accessibility features independently of one another. These tools could not only provide end users with a more accessible interface but also provide content creators with built-in accessibility evaluation functions, facilitating good design choices from the ground up rather than after a site has already been completed.

FORMAT TRANSLATION TOOLS

In July of 2010, the Center for History and New Media at George Mason University hosted a workshop involving twelve digital humanists who were tasked with creating a useful digital humanities tool in one week. The result was Anthologize, "a free, open-source plugin that transforms WordPress 3.0 into a platform for publishing electronic texts" ("About," Anthologize). Anthologize imports texts from RSS feeds and then translates them into one of a handful of alternate formats: ePub, PDF, TEI (plus HTML), or RTF. Blind people who use the web are in need of a digital humanities project that either extends Anthologize or creates a similar tool so that RSS feeds may be converted easily and automatically into XML formats that work with digital talking book devices or with braille output devices.

A digital talking book is an XML document created to be compatible with any of a number of devices that will read the document aloud. The format includes metadata that facilitates navigation between different sections of the document, and it may include recordings of a person reading the document aloud, or it may be designed to be read aloud as synthesized speech by a device ("ANSI/NISO Z39.86"). Since 1996, the DAISY Consortium has been working to establish and promote an open standard for digital talking books ("About Us"). One of their most powerful products is the DAISY Pipeline, "a cross-platform, open source framework for DTB-related document transformations" ("DAISY Pipeline"). A well-structured document in a format like TEI or HTML is ideally suited to be automatically translated into the DAISY format through a software process that makes use of the DAISY Pipeline. A CMS add-on like Anthologize that accomplishes this task efficiently, automatically, and easily would be an extremely powerful tool in the hands of content creators, allowing them to easily make their texts available as digital talking books, providing access to information for the many people who make use of digital talking books as their primary method of reading.

People literate in braille often prefer to read by that method rather than by listening to texts. Reading content through braille provides a deeper understanding of that content for many, yet producing well-formatted braille files is accomplished through one of two expensive methods.[2] First, professionals who are certified braille translators may be hired to create well-formatted braille. Second, a number of commercial braille translation software applications may be used; the most reliable applications cost several hundred dollars and are cost prohibitive to low-income users and nonspecialized content creators. A CMS add-on like Anthologize could be such a translator if it incorporated Liblouis, a widely used open-source braille translation engine. Such an add-on would allow braille readers to access online texts through such devices as refreshable braille displays or braille embossers. Clearly, creating a free and easy-to-use online braille translator would make a tremendous

difference in the lives of individuals who need braille translations of online content and in the ability of content creators to reach braille-literate audiences.

TOOLS FOR CROWDSOURCED CAPTIONS, SUBTITLES, AND TRANSCRIPTS

Online information presented in audio or video format is not accessible to deaf and hard-of-hearing end users without captions. These individuals benefit from online captioning as well as from written transcriptions presented as separate and independent documents. Creating captions and transcriptions makes such information subject to search and computer analysis in ways not currently possible with audio and video alone. Additionally, individuals without disabilities often find transcriptions easier to follow. The time and expense of captioning or transcribing is a significant obstacle to making accessible an online project featuring several hours of video or audio. Currently, a number of desktop software applications provide an interface designed to facilitate captioning videos or transcribing audio. However, none of them that I have found are free, and because they are not online tools none of them allow projects to take advantage of one of the web's most powerful and relatively new practices: crowdsourcing.

"Crowdsourcing" is a term coined by Jeff Howe in 2006 to describe online projects that make use of free or extremely inexpensive labor provided by "enthusiasts" around the world who are interested in donating their time to a project that interests them. Several digital humanities projects have experimented with taking this approach to transcribing digital images of documents, with mixed results: nonexpert transcribers sometimes make a significant number of mistakes when transcribing material written in an unfamiliar hand (Cohen). However, a digital file in which the audio has been clearly recorded stands to result in a more accurate transcription, even by nonexpert transcribers. The Center for History and New Media is currently developing a promising online tool named Scripto, which "will allow users to contribute transcriptions to online documentary projects" ("About," Scripto). Transcriptions of images of documents greatly enhance accessibility for people who are blind because screen readers will be able to read aloud the transcriptions while image-only documents are inaccessible. People who are deaf or hard of hearing, however, are in need of a digital humanities project that presents a user-friendly interface like Scripto for hearing people to caption videos or transcribe audio. Universal Subtitles, created by the Participatory Culture Foundation, is an admirable example of such an interface ("Frequently Asked Questions"). However, captions created with this interface are stored on the Universal Subtitles server, rather than in a project's content management system. An extremely valuable digital humanities accessibility project would be one that facilitates crowdsourced transcriptions and captions but that works with

a variety of different content management systems, saving the resulting text in the relevant database field of the CMS or in a shared, open repository.

Conclusion: Reciprocal Benefits

People with disabilities will benefit significantly if the digital humanities community pursues projects such as these and begins to take seriously the need to adopt universal design principles. However, by working to meet the needs of disabled people—and by working with disabled people through usability testing—the digital humanities community will also benefit significantly as it rethinks its assumptions about how digital devices could and should work with and for people. Graham Pullin, a senior lecturer in the University of Dundee School of Computing, has observed that the prevailing assumption in product design is that new developments in the mainstream slowly "trickle-down" to "specialist products for people with disabilities" (xiii). However, as Pullin points out, sometimes the effect works the other way, "when the issues around disability catalyze new design thinking and influence a broader design culture in return" (xiii). What I am arguing is that infusing the digital humanities with universal design principles will result in just this kind of reciprocal relationship.

Matthew Kirschenbaum has described "the current state of new media studies" as one "in which the graphical user interface is often uncritically accepted as the ground zero of the user's experience" (34). In arguing that computer storage deserves more critical attention from scholars than it has traditionally received, Kirschenbaum adopts Nick Montfort's term "screen essentialism" to describe the fallacy of assuming that all computer interaction occurs through the interface of the screen. Montfort points out that screen essentialism obscures the diversity of computing interfaces that have existed prior to the appearance of the modern electronic screen; in particular, as he describes, early computing programs relied on paper interfaces. Montfort's point is historical, but screen essentialism also obscures the diversity of contemporary interfaces used by people with disabilities and, increasingly, by all people.

Blind computer users, for example, have no use for a screen, and they most often use an interface that is either tactile, in the form of refreshable braille devices, or audible, in the form of screen-reading software or digital books. We might also reconsider our "essentialist" thinking about the keyboard and the mouse and not just because of the technologies that we perceive to be specific to disabled people. Speech recognition technologies, while far from perfect, are already accurate enough to allow writers—if that is still the correct term—to compose documents without the need for typing. And the growth of touch screens, primarily but not exclusively available on mobile devices, bring the possibility of a mouse-less future ever closer. Both of these technologies are extremely useful for people who are disabled, but

they are used for the most part by people who are not. To continue to create projects designed primarily for the screen-keyboard-mouse environment would be foolish: if a resource doesn't work on a device that lacks one of those components, then that resource is already worthless to a significant number of computer users, disabled and nondisabled alike. As we observe contemporary computing devices proliferate and diversify, we need to plan for a future in which our current digital resources continue to be not only useful but usable.

NOTES

1. I am grateful to Jennifer Guiliano for this suggestion.

2. My understanding of braille and braille technologies would not have been possible without advice and input from Tina Herzberg.

BIBLIOGRAPHY

"About." Anthologize. Center for History and New Media, 2010. http://anthologize.org/.

"About." Scripto. Center for History and New Media, 2010. http://scripto.org/.

"About Us." DAISY Consortium. 2011. http://www.daisy.org/.

Abou-Zahra, Shadi, ed. "Evaluating Web Sites for Accessibility: Overview." Web Accessibility Initiative. World Wide Web Consortium, 2011. http://www.w3.org/WAI/.

———, ed. "How People with Disabilities Use the Web: Overview." Web Accessibility Initiative. World Wide Web Consortium, 2011. http://www.w3.org/WAI/.

"ANSI/NISO Z39.86–Specifications for the Digital Talking Book." NISO. National Information Standards Organization, April 12, 2005. http://www.niso.org/.

Boggs, Jeremy. Instant message to author. February 21, 2011.

Chisholm, Wendy, and Matthew May. *Universal Design for Web Applications*. Sebastopol, Calif.: O'Reilly Media, 2009.

Cohen, Patricia. "Scholars Recruit Public for Project." *New York Times,* December 27, 2010. http://www.nytimes.com/.

"DAISY Pipeline: DTB-related Document Transformations." *DAISY Pipeline*. DAISY Consortium, 2011. http://www.daisy.org/.

Fox, Susannah. "Americans Living with Disability and Their Technology Profile." Pew Research Center's Internet & American Life Project. January 21, 2011. http://www.pewinternet.org/.

———. "What People Living with Disability Can Teach Us." Pew Research Center's Internet & American Life Project. January 26, 2011. http://www.pewinternet.org/.

"Frequently Asked Questions." *Universal Subtitles*. Participatory Culture Foundation, 2010. http://www.universalsubtitles.org/.

Garland-Thomson, Rosemarie. *Extraordinary Bodies: Figuring Physical Disability in American Culture and Literature*. New York: Columbia University Press, 1997.

Henry, Shawn Lawton, ed. "Web Content Accessibility Guidelines (WCAG) Overview." *Web Accessibility Initiative*. World Wide Web Consortium, 2011. http://www.w3.org/WAI/.

Henry, Shawn Lawton, and Liam McGee, eds. "Accessibility." *Web Design and Applications*. World Wide Web Consortium, 2010. http://www.w3.org/standards/Webdesign/.

Howe, Jeff. "The Rise of Crowdsourcing." *Wired.com,* Condé Nast Digital, June 2006. http://www.wired.com/.

Kirschenbaum, Matthew G. *Mechanisms: New Media and the Forensic Imagination*. Cambridge, Mass.: MIT Press, 2008.

"Liblouis–A Braille Translation and Back-Translation Library." Google Code. Google, 2010. http://code.google.com/.

Mace, Ron. "A Perspective on Universal Design," edited by Jan Reagan. Center for Universal Design. North Carolina State University, 2008. http://www.design.ncsu.edu/cud/.

Montfort, Nick. "Continuous Paper: MLA." *Nick Montfort*. January 1, 2005. http://nickm.com/.

Ong, Walter J. *Orality and Literacy: The Technologizing of the Word*. London: Routledge, 1982.

Pullin, Graham. *Design Meets Disability*. Cambridge, Mass.: MIT Press, 2009.

NSCU College of Design. "Ronald L. Mace." North Carolina State University, 2011. http://design.ncsu.edu/alumni-friends/alumni-profiles/ronald-mace.

Smith, Aaron. "Mobile Access 2010." *Pew Research Center's Internet & American Life Project*. July 7, 2010. http://www.pewinternet.org/.

Thorp, Justin, and Shawn Lawton Henry, eds. "Web Content Accessibility and Mobile Web: Making a Web Site Accessible Both for People with Disabilities and for Mobile Devices." *Web Accessibility Initiative*. World Wide Web Consortium, 2008. http://www.w3.org/WAI/mobile/.

U.S. Department of Commerce. *Exploring the Digital Nation: Home Broadband Internet Adoption in the United States*. Economics & Statistics Administration, and National Telecommunications and Information Administration, November 2010. http://www.ntia.doc.gov/.

U.S. Department of Justice. "Americans with Disabilities Act of 1990, as Amended with ADA Amendments Act of 2008." ADA Home Page. July 15, 2009. http://www.ada.gov/.

U.S. General Services Administration. "How do I Evaluate My Software Applications or Website for Accessibility?" Section508.gov. http://www.section508.gov/.

———. "Section 508 of the Rehabilitation Act, as Amended by the Workforce Investment Act of 1998." *Section508.gov*. January 2010. http://www.section508.gov/.

———. "Technology Tools." *Section508.gov*. http://www.section508.gov/.

Web Accessibility Initiative. World Wide Web Consortium, 2011. http://www.w3.org/WAI/.

Zickuhr, Kathryn. "Generations 2010." *Pew Research Center's Internet & American Life Project*. December 16, 2010. http://www.pewinternet.org/.