

Lori Arp & Beth S. Woodard
EDITORS



INFORMATION LITERACY
AND INSTRUCTION

Visual Images and Information Literacy

Loanne Snavelly, Guest Columnist

In the Fall 2004 "From the Editors" column, *Reference & User Services Quarterly* editors Danny P. Wallace and Connie Van Fleet issued a call for manuscripts addressing issues raised by incorporating digital image archives into library services. The editorial board of *RUSQ* wanted to encourage discussion of effects of digital image projects on public and user services functions in libraries. In this column, Loanne Snavelly begins to explore some of the issues surrounding instructional efforts related to digital imagery. Snavelly brings a unique perspective as an instruction coordinator with awareness of the use of images and imagery in instruction.—*Editors*

Images, Text, and Libraries

Much is new in the library world relating to the visual world. Librarians and libraries are involved with visual images in many ways, from archiving print images to creating digital ones, from creating image databases to using commercial databases of digital images; from cataloging these images and creating metadata and access for them to teaching with and about them, and helping students find and interface with them. Most of these are roles librarians did not play in the past. This column will explore a series of these relationships between the realm of the image, the library, and information literacy.

The digital age, the information age, the age of the Internet, whatever it is called, has brought images to the forefront, moving from a time when images

were very much subsidiary to text, to one in which they are gaining importance and prominence at a rapid rate. The time may come, or possibly it has already arrived, when images overtake the word as the dominant medium for communication.

Images have long been prized for their narrative value. Much of humanity's earliest art and sculpture is related to spiritual and later religious teachings. Images were used to illustrate stories at a time when most citizens did not read or write in their own language, much less in Latin, nor did they own books, and therefore had no access to religious teachings other than that conveyed by the clergy. They heard and learned the stories as an oral tradition, and the images served as visual cues to remember stories and moral tales. Royalty and the wealthy also provided secular commissions, broadening the scope of the pictorial content. Images were used in the creation of early handmade books and manuscripts, and were seamlessly integrated.

The advent of the printing press created a new set of challenges for incorporating images. The earliest printed

Correspondence concerning this column should be addressed to: **Lori Arp**, Assistant to the University Librarian, Northwestern University Library, 1970 Campus Drive, Evanston, IL 60208. E-mail: L-arp@northwestern.edu. **Beth S. Woodard** is the Central Information Services Librarian at the University of Illinois at Urbana-Champaign, 300 Library, 1408 West Gregory Drive, Urbana, IL 61801. E-mail: bswoodar@uiuc.edu. **Loanne Snavelly** is currently head of instructional programs at Pennsylvania State University, and formerly head of Arts Library at the same institution, University Park.

books were largely text, with the occasional hand-embellished capital letters. But woodblock prints and wood engravings were soon integrated into the printing process. Some books, such as emblem books, were early ways of relating ideas through visual symbolism, and demonstrated the popularity of illustrated books. As printing techniques developed for text, images followed suit, with developments leading to intaglio, lithography, and many other types of image reproductions. These processes were used for both independent art works as well as for prints incorporated into books and other printed documents such as broadsides, pamphlets, and ephemeral materials of all kinds. Sometimes they were combined, and the ability to create beautiful, large-color illustrations along with the detailed fascination with scientific and unexplored regions led to some extraordinary publishing projects.

Audubon and other naturalists took the illustrated book to new heights, often selling subscriptions in advance for works with elaborate full-color plates to finance their expeditions to remote jungles to locate the “curiosities” they wished to record. The creation of the works themselves also involved extensive planning and hard work, including sketches in the field, final drawings, the creation of the printing plates from the drawings, and the printing and hand-coloring of the editions. These elaborate and costly projects were many years in the making. The combination of scientific curiosity, art, and book- and print-making produced a wealth of illustrated works over many years. *Word & Image: A Journal of Verbal/Visual Enquiry* is devoted to exploring a wide array of issues relating to text and images, including those that go beyond the merely illustrative purposes to perceptual and conceptual images.¹

Fortunately, all of these provided fodder for the collector. Book collections, libraries, museums, and other private and institutional collections developed as a result. Libraries, for the most part, concentrated on collecting and providing access to books and

texts. Whether they included images was secondary. Special and rare book collections sometimes included art and design materials. The advent of photography brought another layer of complexity and a whole new world of imagemaking developed. Stereo cards, which gained early popularity with their three-dimensional images, have been termed the first visual mass media. Teaching about art and images created a new form of collection, the slide library, which were images of images. Film, video, and multimedia have added yet another dimension. Until recently, access to these materials in an organized and comprehensive way has been extremely limited.

The Digital Library

Entering the information age has provided powerful new tools to access and handle these images. Through the digital image, it also has provided a means to infinitely reproduce an image exactly, with no reduction of quality as happens with the analog image. Thus libraries are now embarking on a multitude of digital projects, which include all manner of activities, from digitizing picture images and photographs from archives; digitizing images of print materials such as rare books, crumbling books, and early newspapers; or creating new text and image content in digital form, often called “born digital,” providing new means of scholarly communications.

For many of these works, issues of the electronic text arise, as the text is comprised of more than words. Illustrations, typeface, page size, spacing, margins, page numbers, and typographical errors all mean something to those who might be studying an early volume. Although an ever-increasing amount of content is available online, it still is not all there yet, despite television commercials to the contrary. Some volumes, such as art books and other “coffee table” publications with lots of full color images, still present special electronic challenges. While

some software can simulate many aspects of a book, such as page turning, book marking, and note-taking in the margins, this simply does not reproduce in digital format the experience of flipping through an extravagantly produced book with many color analog images. Thus, while the journals in many fields are largely available full-text, this is not yet the case for art, architecture, and other disciplines that rely heavily on images. Most popular full-text databases currently available are still unable to reproduce heavily illustrated articles. Even those that do provide images usually have only low-resolution black-and-white images, not high-quality color ones.

Many refer to these projects or the digital content they produce as the digital library. Where does Information Literacy and Instruction (the title of this column) fit in? Just as the physical library has reference, instruction, and access services provided, so too must the digital library. Each and every project requires a user interface, instructions on finding and accessing the content, and possibly even a tutorial to help hesitant users get started.

Early digital projects were sometimes massive imaging projects stored on optical discs or other media that was largely inaccessible, often with un-descriptive file names and little or no keyword access or metadata associated at the individual item level. Early supporters and funders of digital projects, such as the Digital Library Federation (DLF), the Institute of Museum and Library Studies (IMLS), and the Mellon Foundation, are increasingly interested in the user aspects of projects as they have found that while they were spending millions of dollars on creating digital content, much of it was later either inaccessible or unused. Finding the right content to digitize, and providing reader and instructional services for them have become much higher priorities. Thus, a full-service digital library is not comprised merely of digital collections, but also requires online reference services, online instruction and tutorials, and online access to the

collections themselves.

Image Users

This article will now take a look at some of the user aspects of these digital image collections. The Visual Image User Study (VIUS) project examined various types of picture uses, including picture users and their perceptions regarding image databases. They found that students and researchers working independently have a need for a larger variety of uses than teachers do and rate the need for image quality more highly. The study also mentions that content limitations in image databases are a drawback, and that the provision of a greater variety of content could potentially increase usage considerably: "Content is the most important factor when students and faculty consider the value of a digital image delivery system."²

However, the needs and interests of students and faculty are constantly changing. Students hoped for interdisciplinary content in a single database, making it easier than checking lots of different systems. When looking at the usage of the image databases compared to all other databases, the VIUS team found numbers of connections to the picture databases used in the study ranked well above the median, but well below average. Their data suggests that occasional users made most of these connections to image databases. However, of those who use images frequently, the study found that Arts and Architecture faculty, as individuals, use "a larger number of pictures (of all types) for teaching, and a larger number of pictures for research than their colleagues."³ On the other hand, a group including geography, meteorology, and earth sciences use a larger number of digital images than other groups; and these disciplines, along with agriculture, have a larger percentage of picture users among the faculty, suggesting a demand well beyond the disciplines now most commonly served by commercial databases. The trend

is toward a greater desire and use of digital images. While traditionally the major picture user groups have been thought to have very different needs in terms of database capabilities, the study found that the needs of teachers, students, and picture managers are increasingly overlapping and less distinct. Students prepare presentations as teachers do, faculty maintain collections as collection managers do, and so on. They conclude that students and independent learners want lots of good quality pictures from a variety of disciplines, mostly digital, consolidated in one database for "one-stop shopping." They also want lots of access points, metadata, and extensive descriptions so they can find the images in a variety of ways.⁴ The VIUS team recommends "user-centered approaches and to seek image delivery systems that benefit and grow from the participation of users—systems that are literally and continuously shaped by users."⁵

In another article, Pisciotta suggests a variety of reasons to examine the Web as a successful image delivery model, such as its popularity, its heavy use of images and pictures, and its potential for producing excellent search results. He states: "To compete for our attention, screens must be visually rich. Pictures have become key ingredients in web page design."⁶ He finds similarities between users' picture-searching behaviors with current Web searching behaviors in that both tend to use simple queries and a good deal of browsing. He notes that browsing thumbnail images is "an especially powerful method of searching and selecting pictures" and that "a thumbnail picture generates more information and more interpretations than a bibliographic citation or even a summary abstract."⁷

Web search engines have become very effective at delivering an astounding array of pictures. Anecdotal conversations with art students support this, such as a recent one with a student who had just completed a rather extensive class assignment requiring that a series of self-selected images of works of art be brought to class for discussion. The student had successfully

used Google to locate and print a number of high quality images. When trying to repeat the same assignment in ARTstor, she was discouraged by fewer images that met her criteria, of lower quality (smaller image size and lower resolution), and with less descriptive information than those she had discovered in her Internet search.

This ability of the Internet and search engines to meet many student image needs quickly and successfully may explain the difficulty many image databases are having in reaching a critical mass of users. However, image databases provide other added values, and the popularity of digital image use is increasing exponentially and in many fields of study, so increasing demand appears to be on the horizon. Meeting that demand is the challenge. "Strategies for successful image delivery include aggressive study of preferences among mainstream users, recognition of similarities in information-seeking techniques on the Web and general characteristics of picture searching."⁸

In addition to still pictures and images, an increasing variety and depth of content for many disciplines including animation and moving images are becoming available on the Internet. Sites show visually what users cannot see for themselves, such as the movement of mountains or paleographic views of earth's history.⁹

Visualization

Visualization is another important form of daily image use. Visualization has been a popular form of inner image creation from ancient times and was well established in the twelfth century when a Buddhist monk wrote on the "principles of meditative visualization."¹⁰ It has been used throughout the centuries in the meditation practices of many Eastern traditions, and continues today in alternative healing, kinesiology, and many other areas. Visualization has been a long-standing technique for improving

learning, performance, and health. While visualization involves images, they differ from those discussed previously in that they do not exist in a physical form and normally cannot be shared with others except through verbal descriptions. Visualization is a process of creating a mental picture of something that one does not currently see. It can include visualizing the face of a friend or a previously known place, or anything that is not currently available to reference visually. Some people are much better at this than others; some have clear and vivid mental pictures with extensive details, while others get a more vague image-blurred or indistinct. Vivid imagers tend to “be more creative (but only if your IQ is above average); be a better proofreader; be better at solving geometric puzzles; have better immediate visual memory for details of a scene; and be more easily hypnotized.”¹¹

In a chapter section titled “Pictures Painted by Words,” Robertson states, “Some words can trigger images in all our senses more easily than others. You can, for instance, visualize the word *rose* more easily than the word *strategy*.”¹² These triggers can sometimes foster problem solving and discovery in ways that other forms of reasoning might not. Use of visualization techniques sometimes include things that are not visual, such as recalling sounds (known as “auditory imagery”), smells, tastes, touches and feelings. Olympic athletes incorporate “kinesthetic imagery” into their training programs to visualize the perfect dive, golfing putt or sprint. Piano teachers have their students visualize crescendo and decrescendo through the choice of an animal whose head, body, and tail represent the small (quiet) beginning, the bigger (louder) crescendo and the tapering (softer) ending of a musical movement. Positive visualizations can promote healing of past traumatic events and generally improve well-being. Visualization can assist with memory as well. “When you use visual imagery, auditory imagery, or ‘visualize’ in

any of the other senses, you switch on more of your brain than when you confine yourself to word-based remembering.”¹³ The more areas of the brain working on a memory, the more likely it will get triggered later. Thus visualization is another aspect of imagery that can have an effect on learning, recall, and performance.

Research on visualization is increasing at a terrific rate in a wide array of disciplines, including medicine, psychotherapy, psychology, kinesiology, biology, geography, engineering, computer science, archaeology, geometry, chemistry, and animation. Another area that has developed over the past twenty years, “information visualization,” refers to the visual representation of nonphysical data. It is distinguished from scientific visualization, which is the visual representation of physical scientific data. A recent issue of *Library Technology Reports* is devoted to a discussion of information visualization, a definition of its aspects, including two- and three-dimensional information visualization and virtual reality. Information visualization is “a highly efficient way for the mind to directly perceive data and discover knowledge and insight from it.”¹⁴

From Visual Literacy to Visual Culture and on to Visual Ecology

Visuals are pervasive. A concern for the uncritical acceptance of images and their impact on individuals has led to many studies of the influence of advertising images, and the underlying subliminal messages that may be sent. In the art world, visual literacy often refers to the ability and vocabulary to discuss and critique art and images, and to look critically at visual materials. Visual culture incorporates this and much more, referring to the visually rich nature of the world. The overwhelming number of images that confront people daily on the streets through graffiti, posters, flyers, and billboards and advertis-

ing in buses, sports arenas, and every imaginable surface that can be rented out; in homes through television, movies, magazines, newspapers, and books; and everywhere on computers, iPods, PDAs, and cell phones, to name just a few. Images surround, bombard, and at times overwhelm. Marcum uses the term “visual ecology” to encompass not only the visual culture but also the “visual-interactive” culture. He describes this visual ecology as “a comprehensive and continuous participatory event, a universe of action, and a world of knowledge and learning rather than of information transfer.”¹⁵ He posits that “the library profession remains grounded in textual, print media, creating vulnerability amidst a culture increasingly characterized as visual,” and advises that “Librarians must engage the tools and practices of visualization in order to capture, preserve, and disseminate today’s culture for posterity.”¹⁶ This is a tall order for libraries to take on, but one that surely takes a broader view of the role of the library in a dizzily evolving environment.

The Web and the GUI

The Internet, the Web, and the Graphical User Interface (GUI) in the form of Web browsers has opened a dramatic world of imagemaking, using and sharing, creating an explosion of content. Anyone can be an image-maker, a Web designer, or a publisher, creating and incorporating graphics and visuals whether they have any training. In fact most Web developers are trained in technology and not in art, design, or other visual disciplines, all of which means that there is a wide range of quality on the Web, visually as well as regarding content. Attention to good graphic design and good instructional design is critical. Librarians have devoted considerable attention to issues of excellence and authority regarding content, and have paid some attention to screen design for online catalogs and library home

pages, turning to usability studies for help in determining what works for users and what does not.¹⁷

Ease of including images has, not surprisingly, increased their use dramatically on Web pages and documents provided through a computer screen. Research on screen design has provided a number of insights. At the dawn of the Web, this column reviewed instructional issues related to screen design for OPACs and LANs in an era dominated by menus and a character-based environment. While the issues of the day have changed, the overall themes of developing effective user interfaces through attention to screen design, and using those screens for teaching have remained constant. The authors wisely predict, "Web pages will probably prove to be the most efficient and effective way for instruction librarians to teach the Internet via screens."¹⁸ Kanuka and Szabo provide an overview on how learning takes place in a visual space. They review research findings that claim good screen design leads to improved performance, that visually based mental models combined with text enhances learning, that visualization can increase comprehension, that visuals used in the learning process can increase learning for both children and adults, but that the mere presence of visuals does not necessarily result in better instruction and retention.

They also found that much research on screen design is context sensitive, and what might be effective design for one purpose may not be so for another.¹⁹ Their own research found that "poor use of design principles increases instructional time and reduced completion rate or persistence."²⁰ Another study by de Jong and van der Hulst found that "a visual display conveys knowledge in its own right and that knowledge gained does not depend on the exploration route followed."²¹

Newell questions what he considers the unanalyzed visual messages that are sent by all of these images used on library Web pages. He states that the profession has devoted time

to post-image construction, to issues such as placement of the image within the Web page, but not to the message the image is delivering. He draws attention to the "key visual signifiers that affect communication between the librarian and the user," but points out that as a profession, librarians have failed to apply to Web pages what they've learned about their image from live interactions. He encourages the "active construction of the intended visual message."²²

Another factor that influences the use of images on the Web are guidelines for ADA compliance for the Web, which encourage design that can be "translated" to a machine read audio output.²³ Images and graphics can prove difficult for the software to "read." Rather than finding ways to incorporate images for visual learners while making the pages accessible for those with visual disabilities, some institutions have been reluctant to use very many images at all for fear of not meeting ADA standards. At the present, a variety of solutions have been implemented, from little to no use of images, to parallel text-only sites, to text tagging the images, to ignoring the issue altogether. The ideal solution would be to ensure access for all by exploring technologies that would provide graphical interfaces for most users, but that would simultaneously allow those with visual impairments to access the content in an understandable way.

Teaching with Technology and the GUI Interface

As predicted here more than ten years ago, the Web interface can, indeed, be an ideal learning tool because it allows graphics to be included easily and plentifully, without financial implications found in the use of color images in a print publication. The ability to seamlessly incorporate text and graphics can enhance conceptual understanding and allows various learning

styles to get the most out of the lesson. This can create an enhanced learning environment, which can help student literacy, one of the challenges libraries and higher education continue to face. Technology has provided challenges and has created opportunities for teaching students in the classroom. And with access to information in the library almost exclusively through a computer, the images of these interfaces on the computer screen, displayed through a data projector, have become primary visual materials in the classroom. These might take the form of PowerPoint presentations, tutorials designed for the Web, general library Web pages, or of direct connections through the Internet to online catalogs, databases, Web sites, subject guides, or other materials. Each of these is displayed in a visual format through a GUI. Some of these materials such as online library tutorials may have been designed specifically with learning in mind, paying careful attention to instructional design, screen design, and learning theory. Many of these materials are designed by someone other than the class instructor, yet they often serve as teaching materials and "visual aids" for the lesson.

An additional challenge is that these interfaces are most often designed for the individual user at the computer, not as a tool for group learning. Therefore, they usually run counter to all of the previously established rules regarding what constitutes a good visual aid to classroom instruction, or what constitutes a good screen design for the user. Screens are often crowded with text and filled with lots of information and options. They may be cluttered with irrelevant graphics. Students in a class gazing at an unfamiliar interface may have little idea what the instructor is talking about, or exactly where on the screen to direct their attention. Multiple solutions, all of a visual nature, can help to resolve these issues. The instructor can point to the area of the screen with hand or finger, can use the mouse arrow to indicate where to look, or can use a laser pointer. Technology provides

additional options. A Smartboard or Schoolboard can be used, allowing the hand to become the mouse and the pointer, or allowing for the use of virtual or actual markers or highlighters on the board itself. Classroom control software also allows what is on the instructor's screen to appear on the students' screen, providing a closer, more intimate view of the screen and a clear view of the cursor. Again, virtual highlighters and markers can assist in drawing attention to the desired area or aspect of the screen under discussion. While the use of these graphical interfaces may be confusing as teaching visuals in the class, they do provide a good view of what the student will face when searching for information on their own. In addition, the judicious use of animation can provide even more opportunities to illustrate concepts that students may find difficult. When combined with careful attention to screen design and instructional design, effective library learning tools can be created.²⁴

In addition to images and screens being used as visual materials in teaching, librarians often use images in the classroom in an entirely different way. As commercial image databases and local digital image collections become more pervasive, and as various disciplines continue to rely more and more heavily on visual materials, librarians are and will be teaching more about information literacy issues in the visual realm, about effective searching strategies, appropriate sources, and evaluative techniques for assessing images. The class may use images as sources for papers or proj-

ects or presentations. Copyright and intellectual property issues, citation styles and giving appropriate credit for images will all be classroom topics for discussion. Art librarians, visual resources librarians, and a few others are pioneers in the examination of these critical issues, but as this visual ecology evolves, librarians will all take on these new roles and issues, teaching with and through the graphical interface, about images and image resources.²⁵ ■

References and Notes

1. *Word and Image: A Journal of Verbal/ Visual Imaging* (London: Taylor and Francis, 1985—)
2. Henry Pisciotta et al., "Penn State's Visual Image User Study," *portal: Libraries and the Academy* 5 (Jan. 2005): 37.
3. *Ibid.*, 38.
4. *Ibid.*, 40; *Ibid.*, 43.
5. *Ibid.*, 53.
6. Henry Pisciotta, "Image Delivery and the Critical Masses," *Journal of Library Administration* 39, nos. 2/3 (2003): 128.
7. *Ibid.*, 130.
8. *Ibid.*, 123.
9. See for example: Regional Paleographic Views of Earth History. Accessed Apr. 24, 2005, <http://jan.ucc.nau.edu/~rcb7/globaltext.html>; Dynamic Earth. Accessed Apr. 24, 2005, <http://earth.leeds.ac.uk/dynamicearth/index.htm>; and Paleomap Project. Accessed Apr. 24, 2005, www.scotese.com.
10. Mahapandita Abhayakasagupta and Benoytosh Bhattacharyya, *Nispanayogauali: Of Mahapandita Abhayakasagupta* (Baroda: Oriental Institute, 1949).
11. Ian Robertson, *Opening the Mind's Eye* (New York: St. Martin's Pr., 2003), 57.
12. *Ibid.*, 61.
13. *Ibid.*, 126.
14. "Information Visualization," *Library Technology Reports* 41 (Jan./Feb. 2005): 7.
15. James W. Marcum, "Beyond Visual Culture: The Challenge of Visual Ecology," *portal: Libraries and the Academy* 2 (April 2002): 189.
16. *Ibid.*, 189.
17. Elaina Norlin, *Usability Testing for Library Websites: A Hands-on Guide* (Chicago: American Library Association, 2002); Eric Novotny, "I Don't Think, I Click: A Protocol Analysis Study of Use of a Library Online Catalog in the Internet Age," *College & Research Libraries* 65 (Nov. 2004): 525-37.
18. Lori Arp, John Culshaw, and William Garrison, "Teaching Behind the Screens: Practical Advice for a Practical World," *RQ* 35 (Winter 1995): 184.
19. Heather Kanuka and Michael Szabo, "Conducting Research on Visual Design and Learning: Pitfalls and Promises," *Canadian Journal of Educational Communication* 27 (Winter 1999): 106-7.
20. *Ibid.*, 113.
21. T. de Jong and A. van der Hulst, "The Effects of Graphical Overviews on Knowledge Acquisition in Hypertext," *Journal of Computer Assisted Learning* 18 (June 2002): 219.
22. Terrance Newell, "Representing Library Users and Professionals on Websites: A Visual Grammar Approach for Library Image-Makers and Library Educators," *Journal of Education for Library and Information Science* 45 (Fall 2004): 309; *Ibid.*, 315.
23. Web Content Accessibility Guidelines 1.0. Accessed Apr. 27, 2005, www.w3.org/TR/WCAG10/.
24. The Information Cycle. Accessed Apr. 24, 2005, www.libraries.psu.edu/instruction/infocycle/infocycle.html; Penn State University Libraries, "Welcome to the

Copyright of Reference & User Services Quarterly is the property of American Library Association. The copyright in an individual article may be maintained by the author in certain cases. Content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.